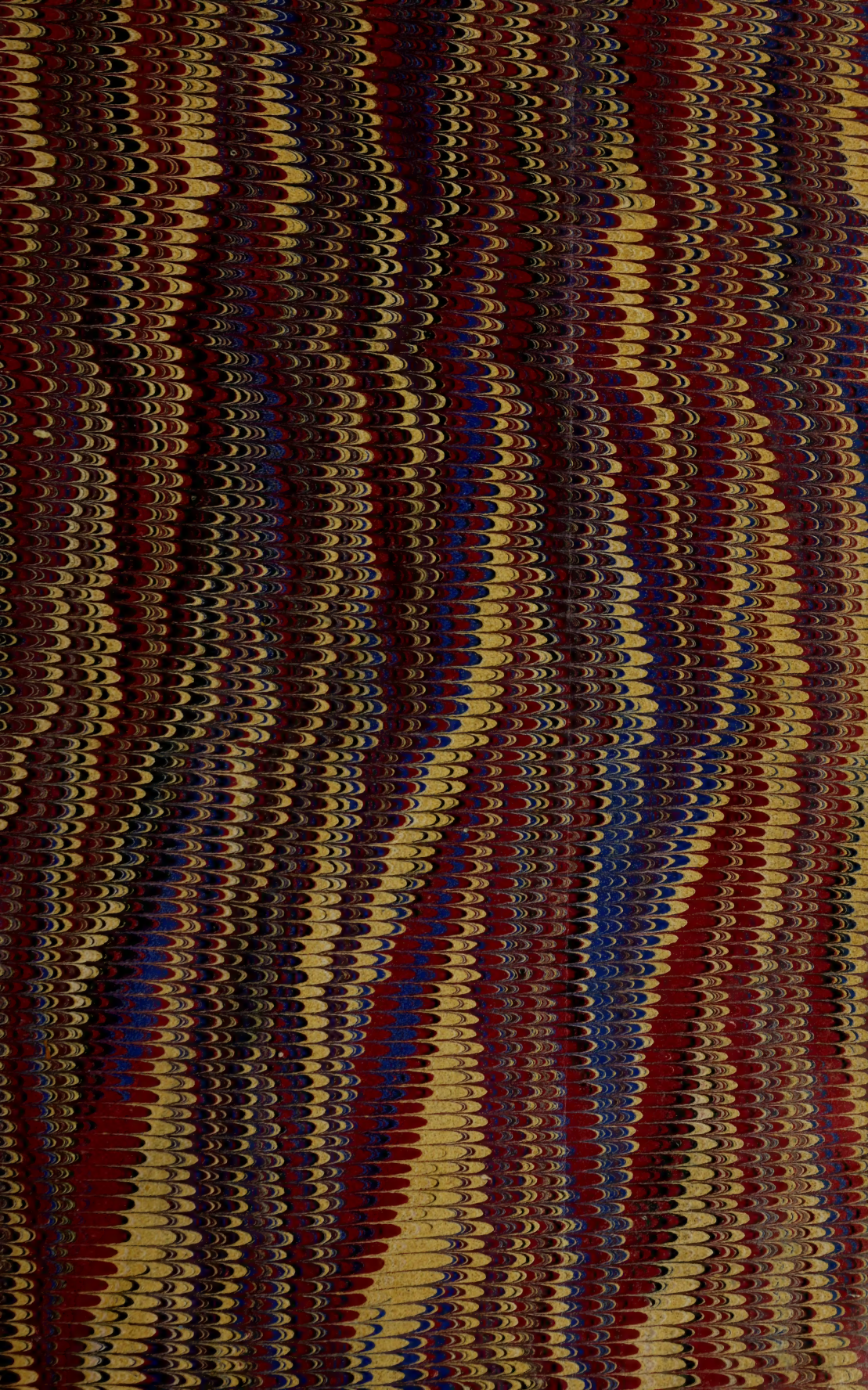


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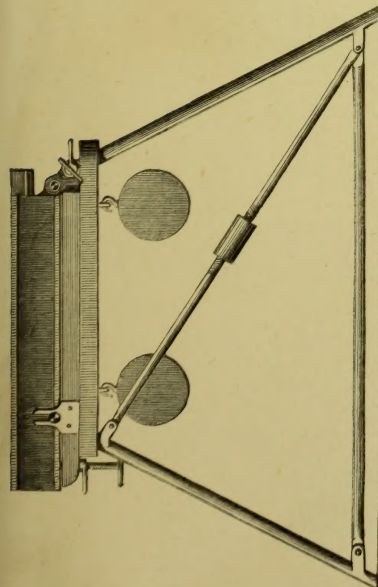


FIG. 1.—WHITWORTH'S REST—SIDE ELEVATION.



FIG. 2.—WHITWORTH'S REST—PLAN.

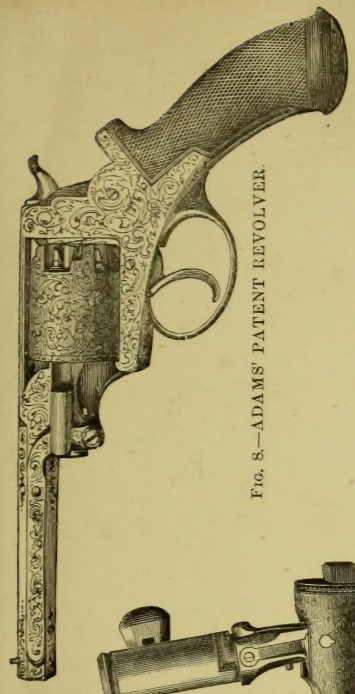


FIG. 8.—ADAMS' PATENT REVOLVER.

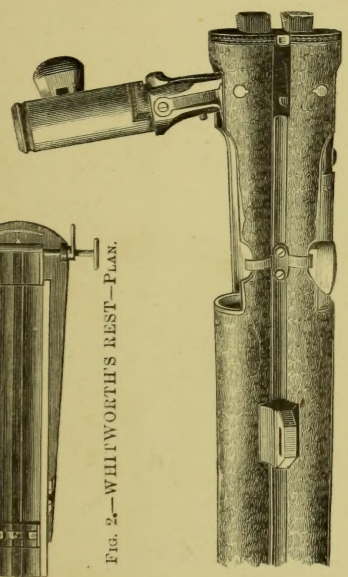


FIG. 5.—NEEDHAM'S PATENT.

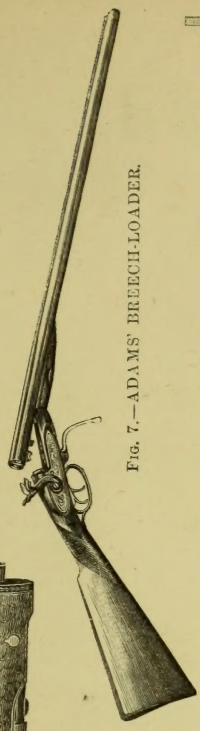


FIG. 7.—ADAMS' BREECH-LOADER.

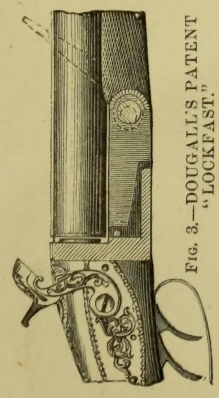


FIG. 3.—DOUGALL'S PATENT
"LOCKFAST."

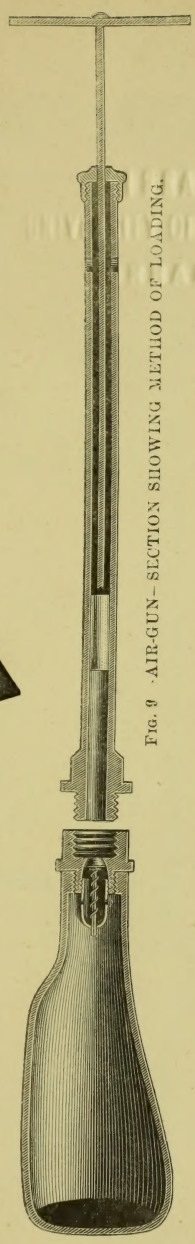


FIG. 9.—AIR-GUN—SECTION SHOWING METHOD OF LOADING.

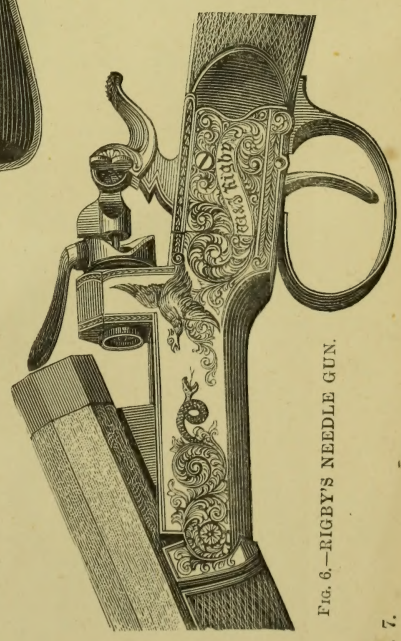


FIG. 6.—RIGBY'S NEEDLE GUN.

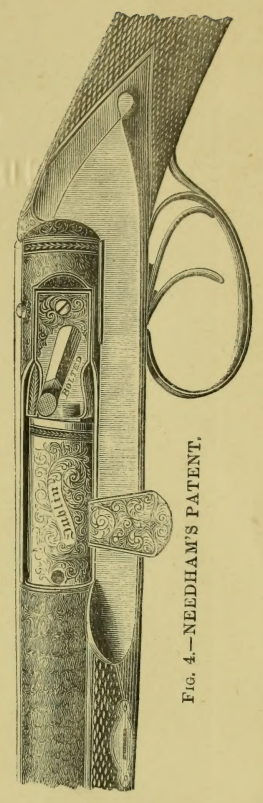
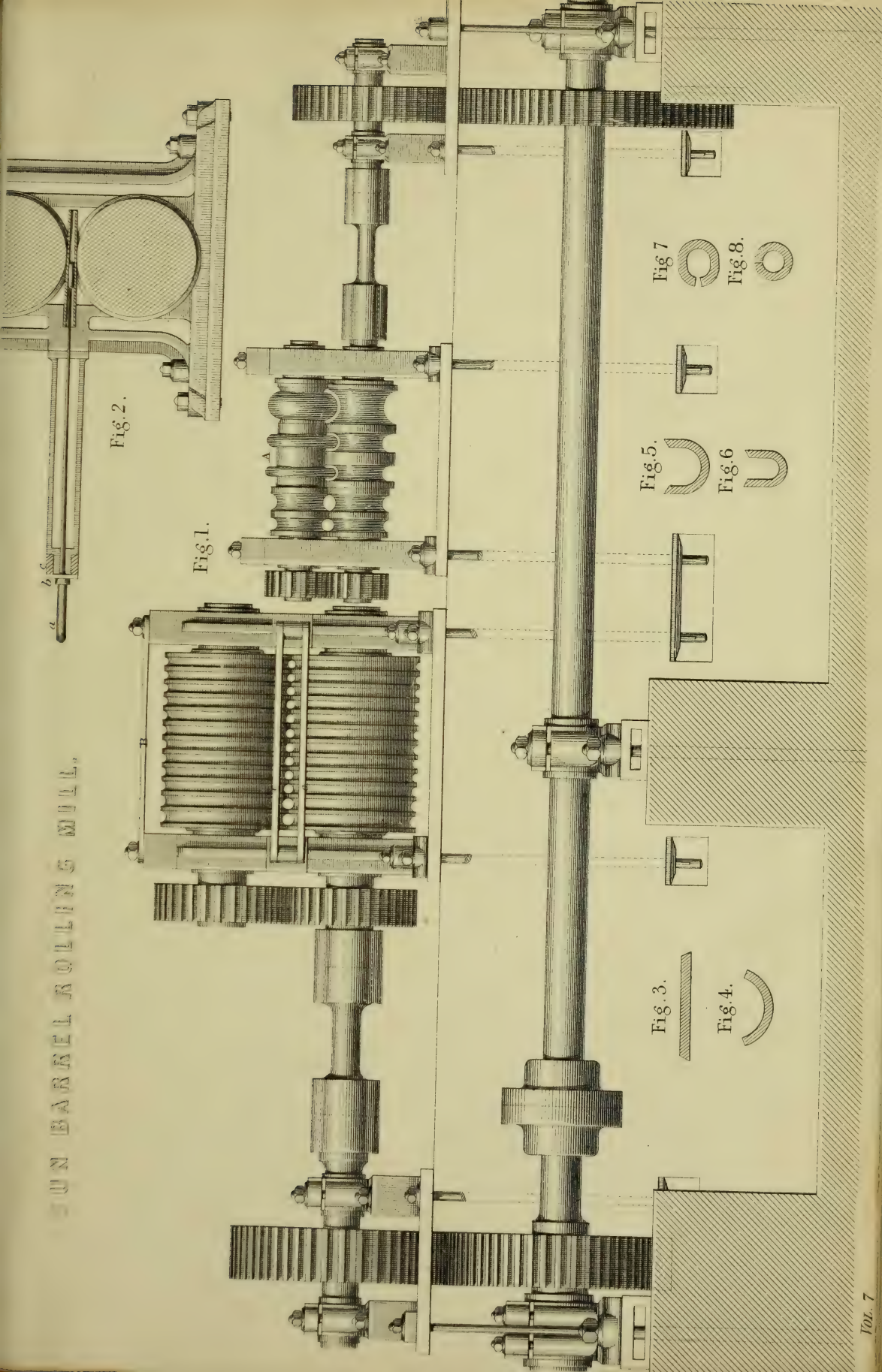


FIG. 4.—NEEDHAM'S PATENT.

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SUN BARREL ROLLING MILL.



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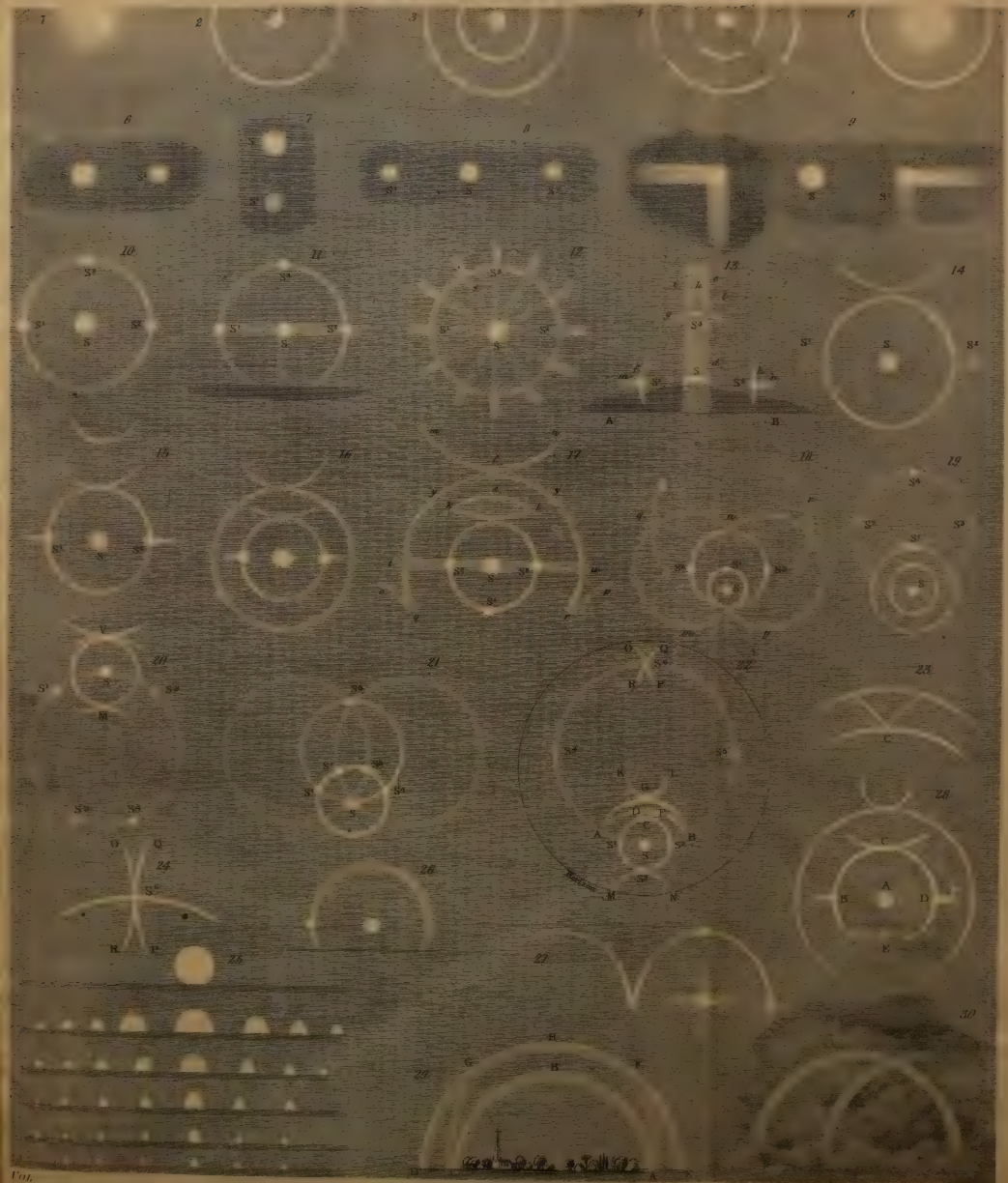


Fig. 1.



Fig. 2.



Fig. 3.

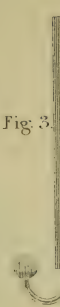


Fig. 4.

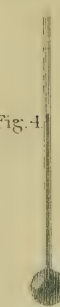


Fig. 5.

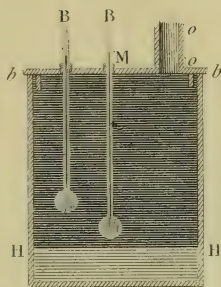


Fig. 6.

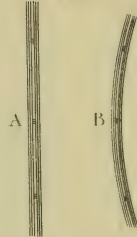


Fig. 7.



Fig. 8.

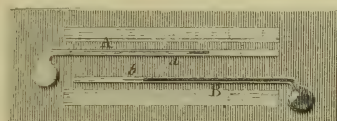


Fig. 15.

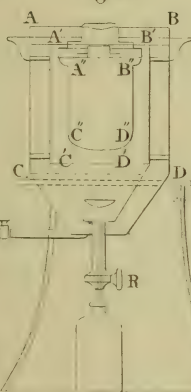


Fig. 9.

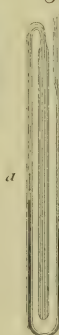


Fig. 10.

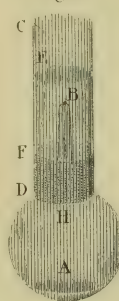


Fig. 11.

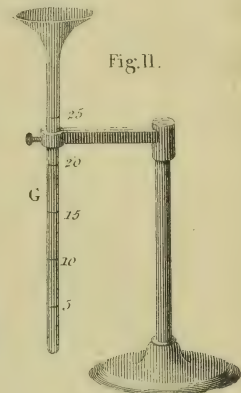


Fig. 12.



Fig. 13.



Fig. 14.



Fig. 16.

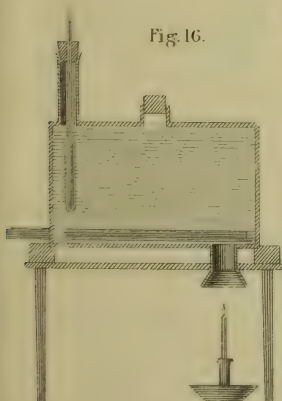


Fig. 17.

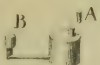


Fig. 21.

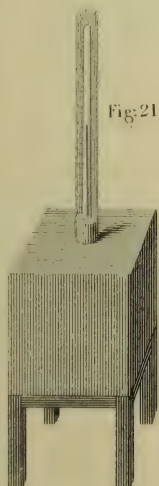


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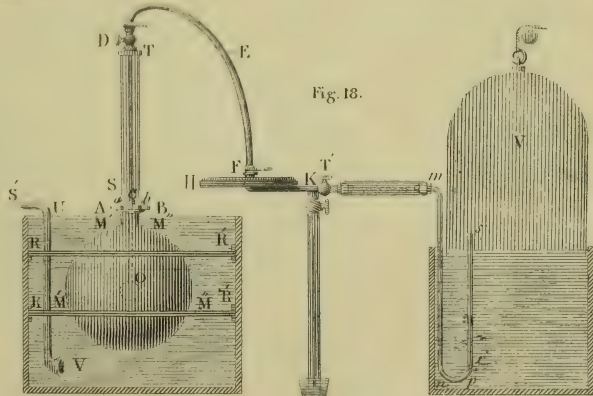


Fig. 20.



Fig. 19.



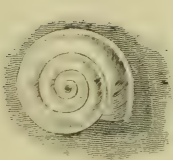
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Acarus Hamastoma.



Zonites Algira



Sheba albella



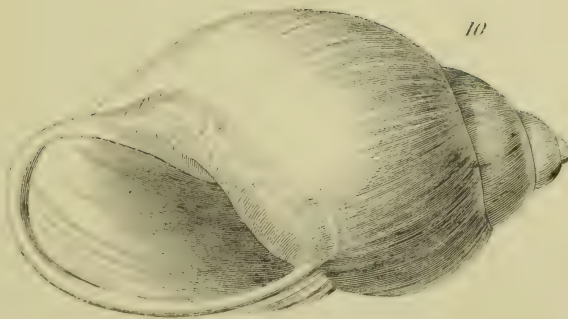
Nux denticulata



Liguus Achatina virginea



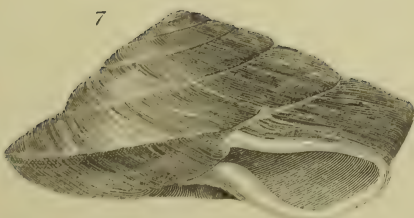
Physa rivolis



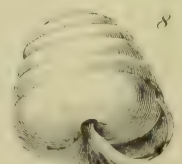
Bulinus Ovatus



Pupa Munia

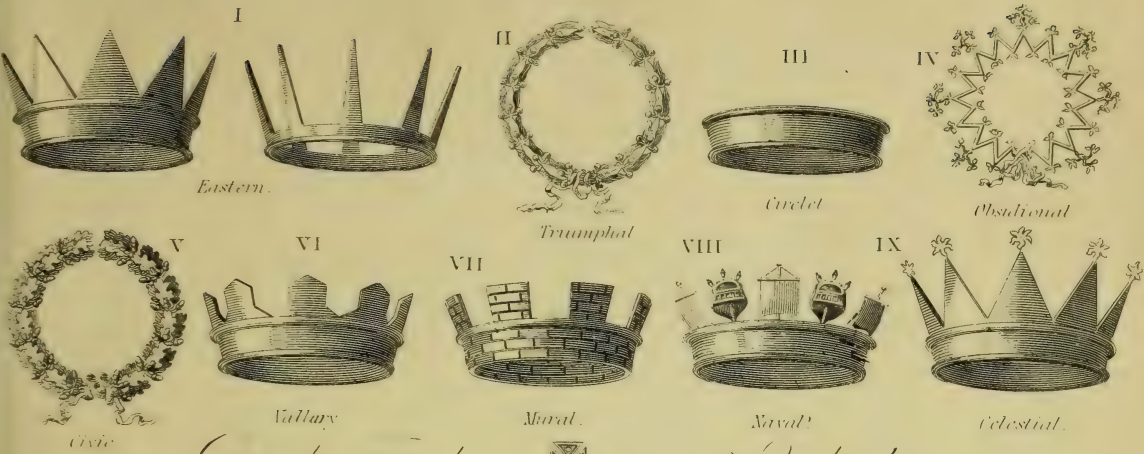


Iberus Corocolla.



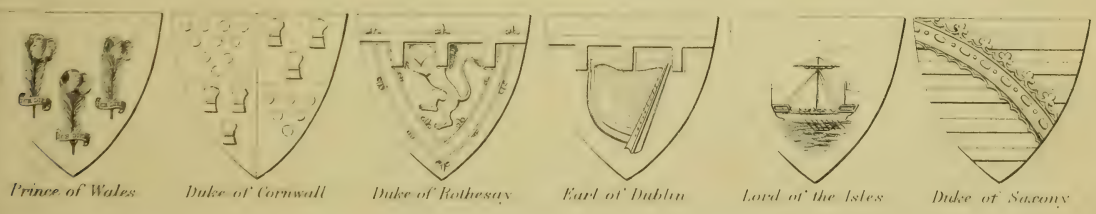
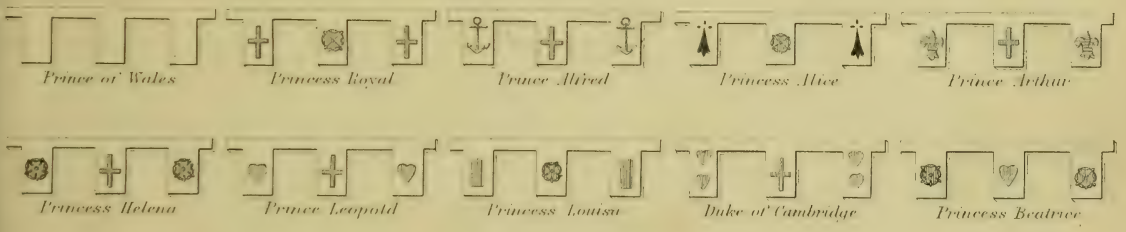
Sagala Epistylum

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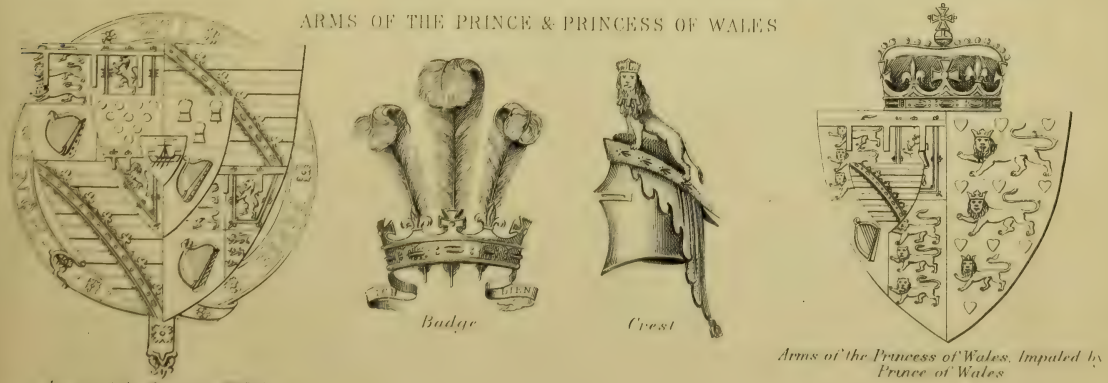


Royal Family

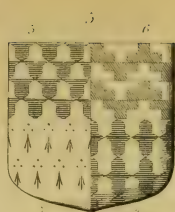
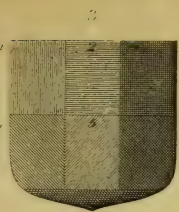
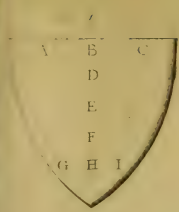
of England



ARMS OF THE PRINCE & PRINCESS OF WALES



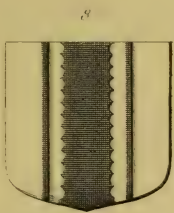
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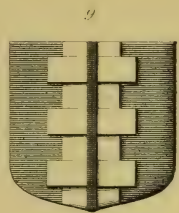
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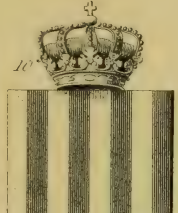
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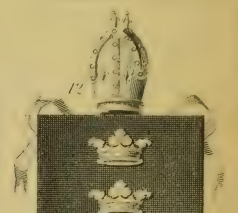
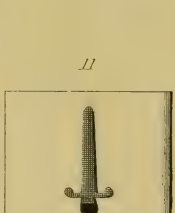
Bellasius
quartered with Bellasius.



Sublet de Noyers.



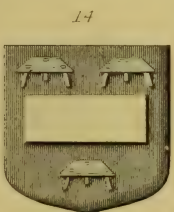
Aragon. Championship of England.



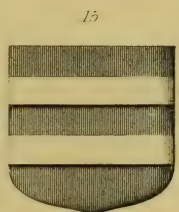
Bristol.



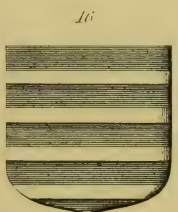
Hense, or Austera.



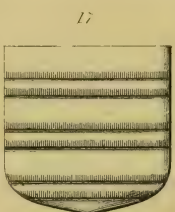
Stratford.



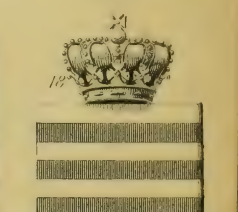
Harcourt.



City of Salisbury.



Barry.



Hungary.



Canton of Freiburg



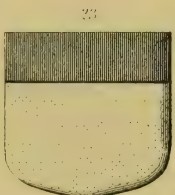
Oxford University.



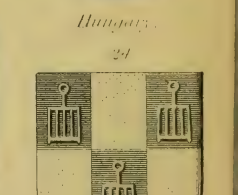
Priors of St. Augustine



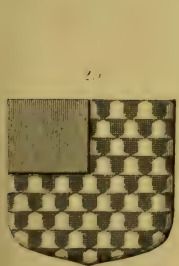
Cape.



Gamysc.



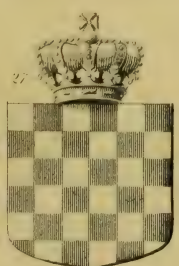
Girdlers of London.



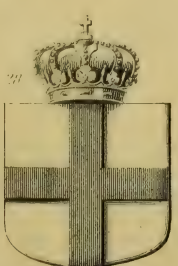
Stanton



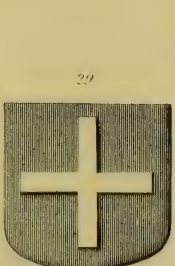
Slieve



Croatia.



Genoa.



Knights Templars
and Savoy.



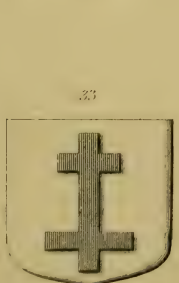
Dukentfield Bar!



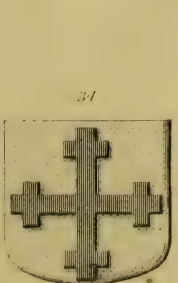
Dunkeld



Lithuania



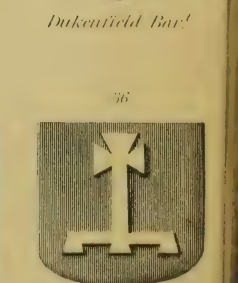
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Dominion of Thiert.



Stephen King of England.



Holter.



Crest of Asgill.



City of Nuremberg.



Sir Isaac Hord.



Harting.



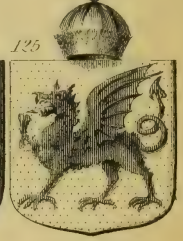
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Antilupe.



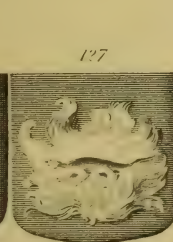
Arnold.



China.



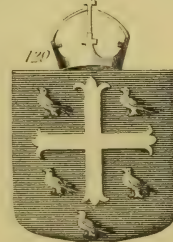
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Gennino.



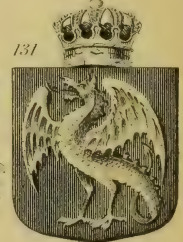
Crest of Barber-Surgens' Temple London.



Edward the Confessor.



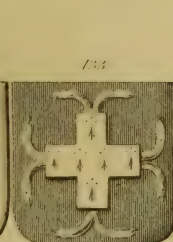
Crest of Seymour.



Vandals.



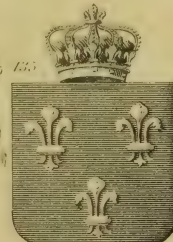
Langley.



Karr.



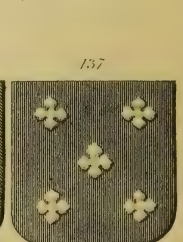
Cardinal Wolsey, also Christ Church Oxon.



France.



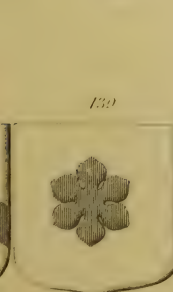
Doctors Commons.



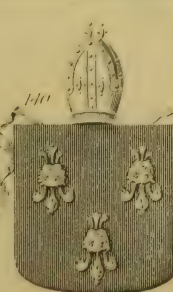
Palmer.



All Souls Coll Oxon.



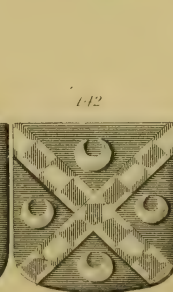
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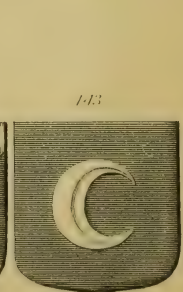
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Turkey.

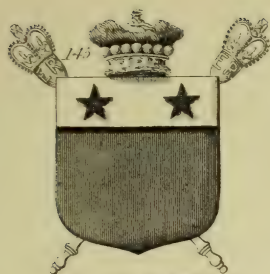


Tisbury Monastery.



Delalana.

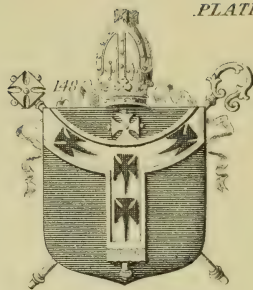
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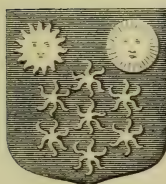
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German Empire
Modern Austria.
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Canterbury.
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De Fontibus.



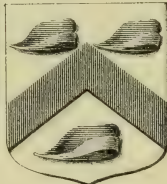
Sythia



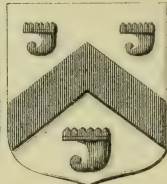
Plantagenet.



Richardson.



Brudenell.

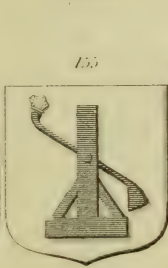


Arthur of Clepton.



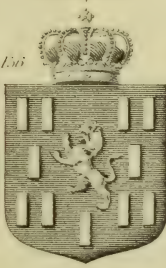
Sir Philip Sidney.

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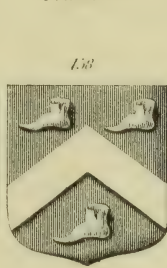
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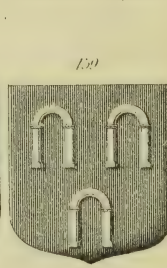
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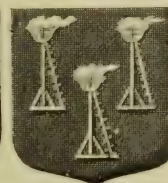
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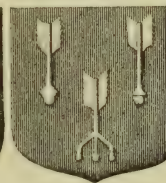
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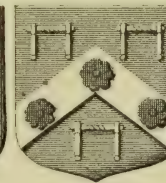
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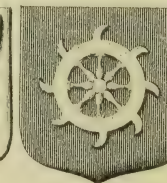
Lorimers of London.

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Duchy of Angria.

164



Katherine Hall
Cambridge

165



Walsingham.

166



Badde of Delaware.

167



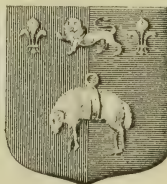
Lockhart.

168



Surgeons of London

169



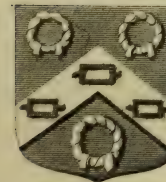
Tavistock.

170



Gorges.

171



Hatband Makers.

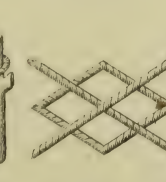


Bowen.

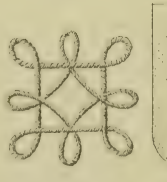


Badde of Ducre.

172



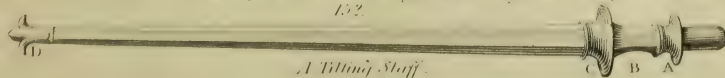
Badde of Tharrington.



Badde of Loce.



Hastings



A Tilting Staff.

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178

179

180

181

182

183



Town of Stafford



Selavonia.



Crest of Wake



Warre.



Earldom of the Isle of Arran.



James of Surrey.

184

185

186

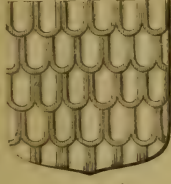
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188

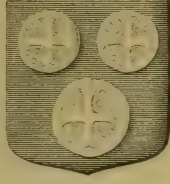
189



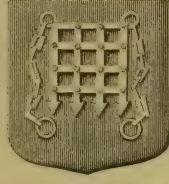
New Nantwich Priory.



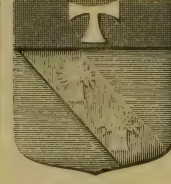
Grumball



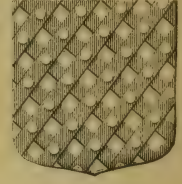
Spence



Baro' of Harwich



Thavies Inn London



Bardouche

190

191

192

193

194



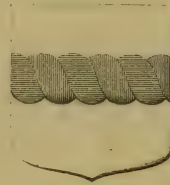
Johnson.



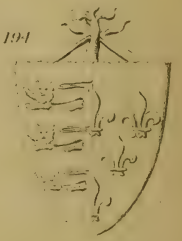
Bourcheir.



Jocelyn.



Carmichael.



Seal of Margaret consort of Edward 1st

Statements.

195

196

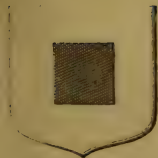
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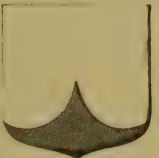
Delf.



Escutcheon reversed.



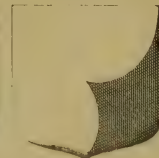
Point dexter parted.



Point in Point.



Point Champain.

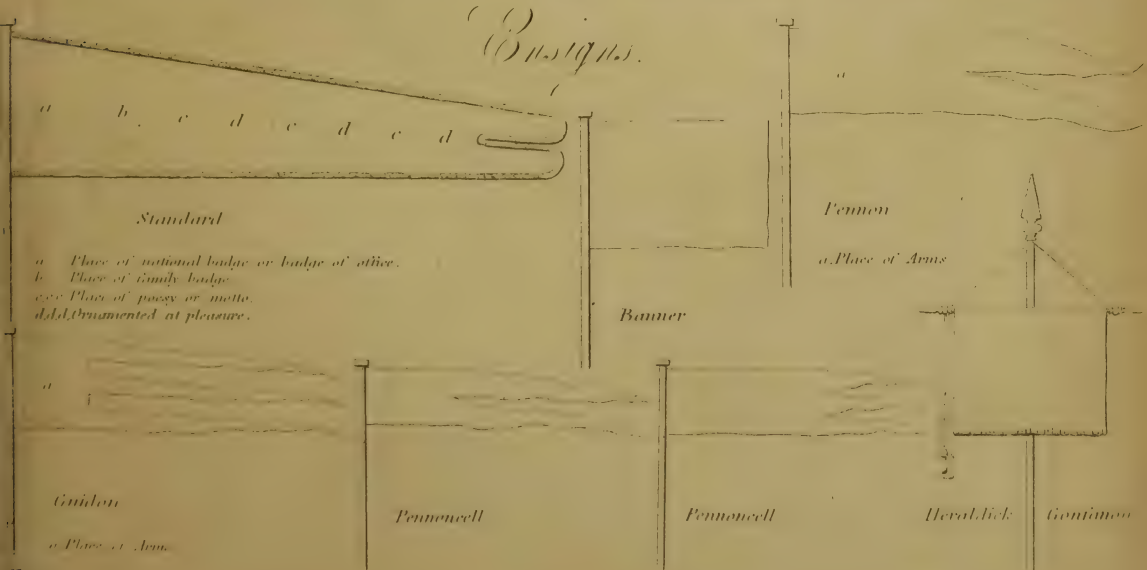


Gore sinister.



Gussets.

Busigns.



Standard

Pennon

Banner

Guidon

Pennoncel

Pennoncel

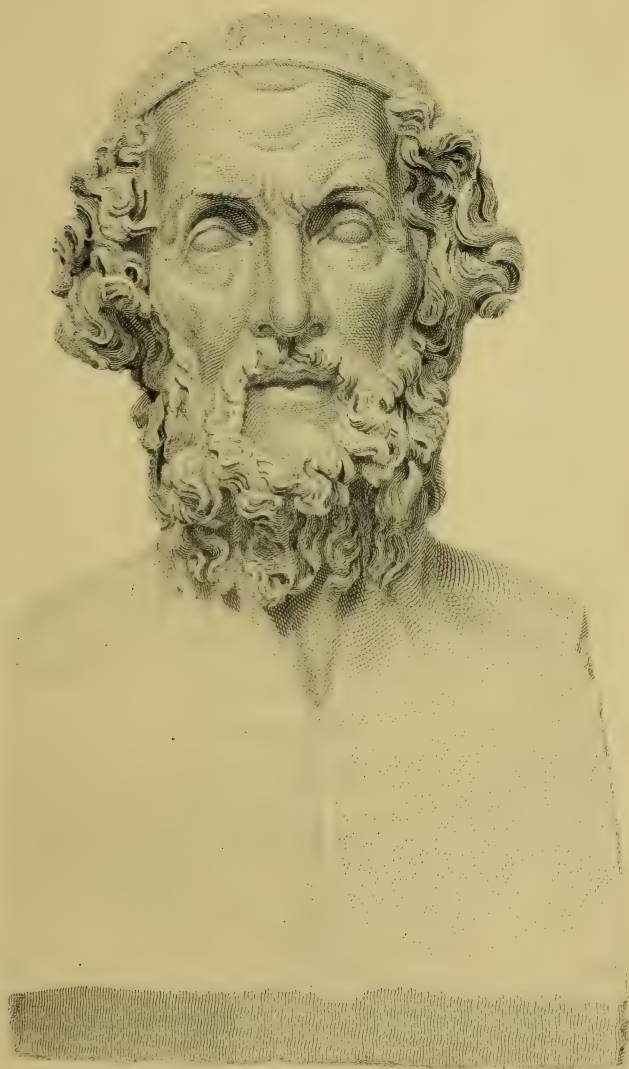
Heraldick

Gentleman

a. Place of Arms

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SCULPTURE.



H O M E R .

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Ancient Clock by De Wick.

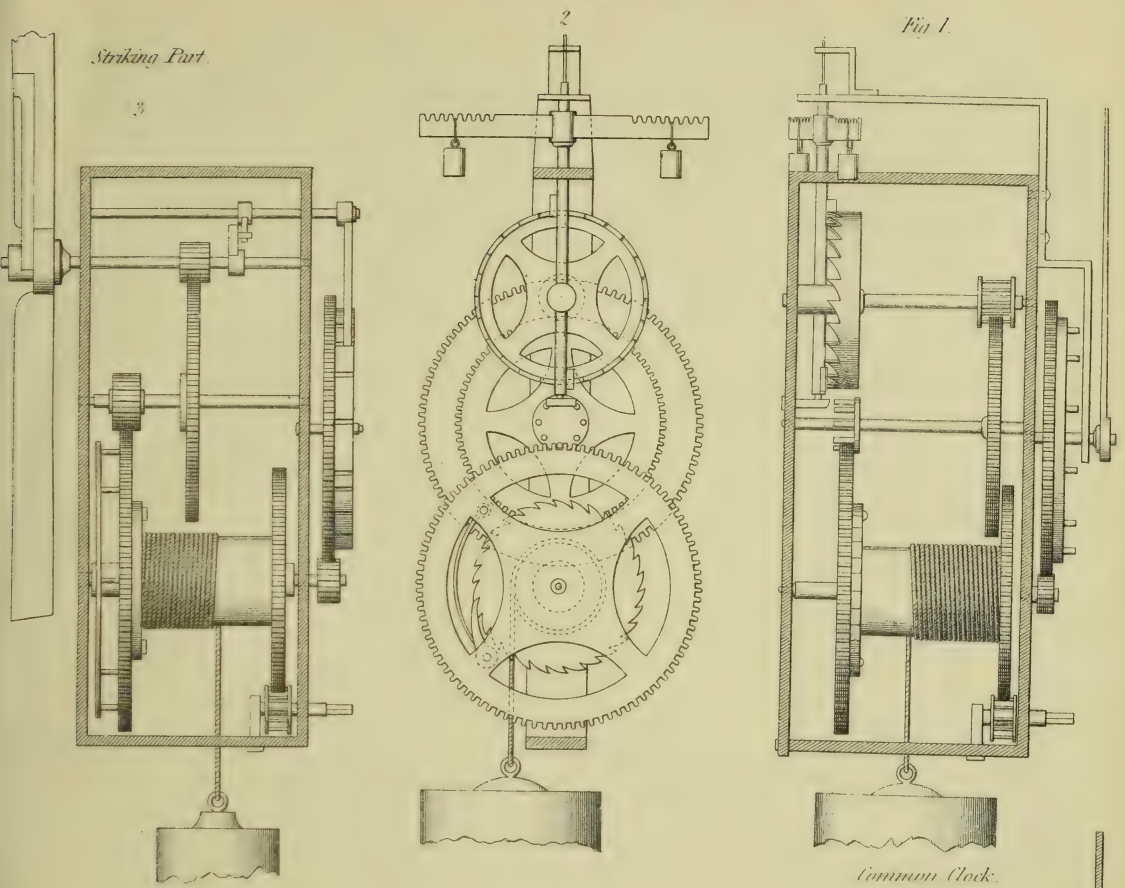
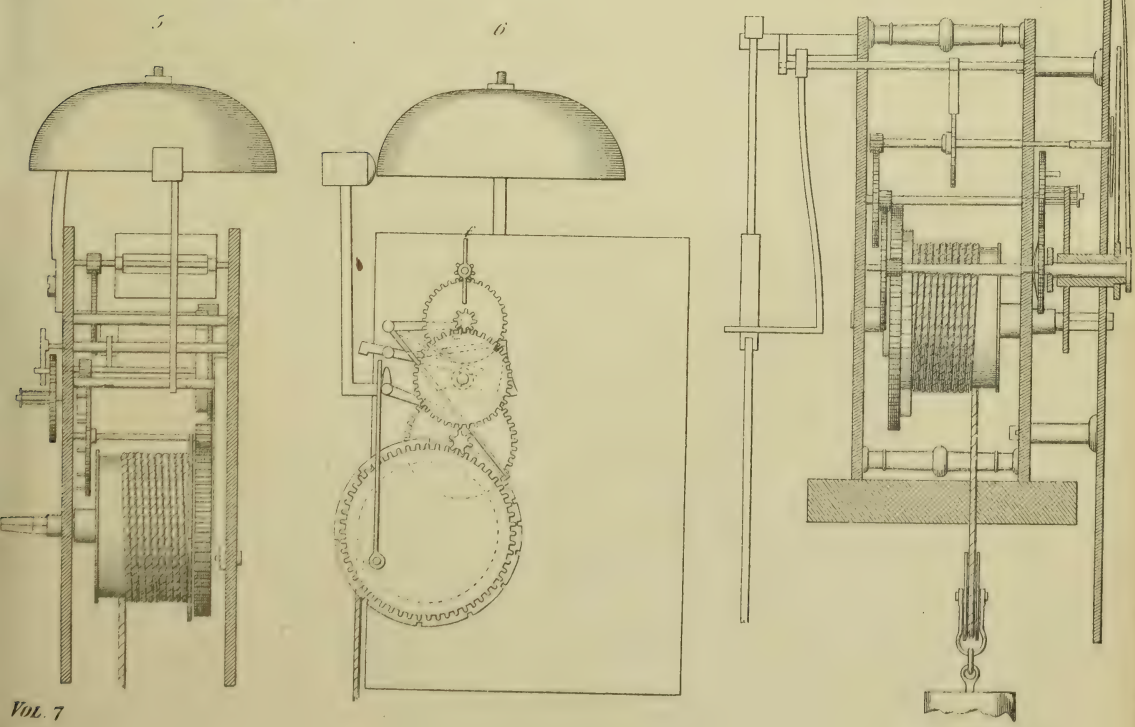


Fig 1.

Common Clock.

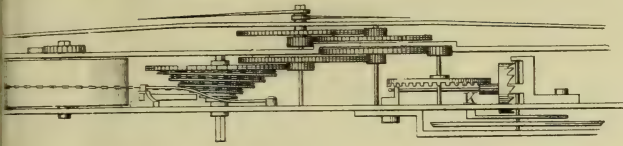
Striking Part



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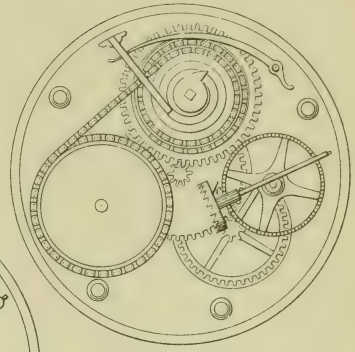
Fig. 1.

Common Watch, elevation.

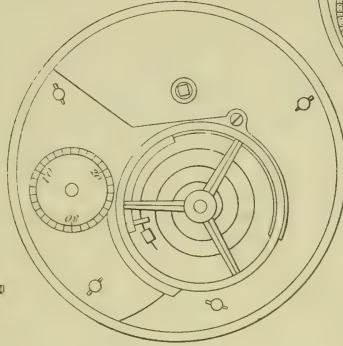


2

Common Watch, plan.

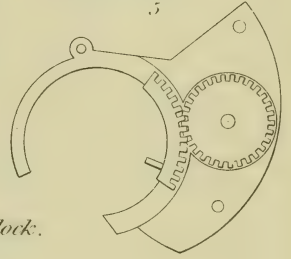


3

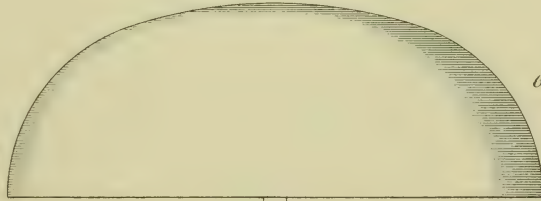


Striking part of a Clock.

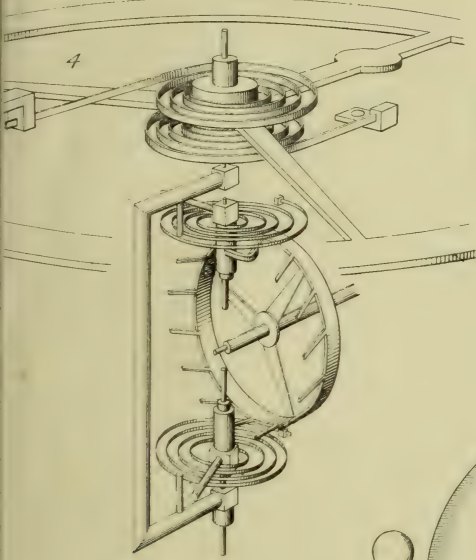
5



6



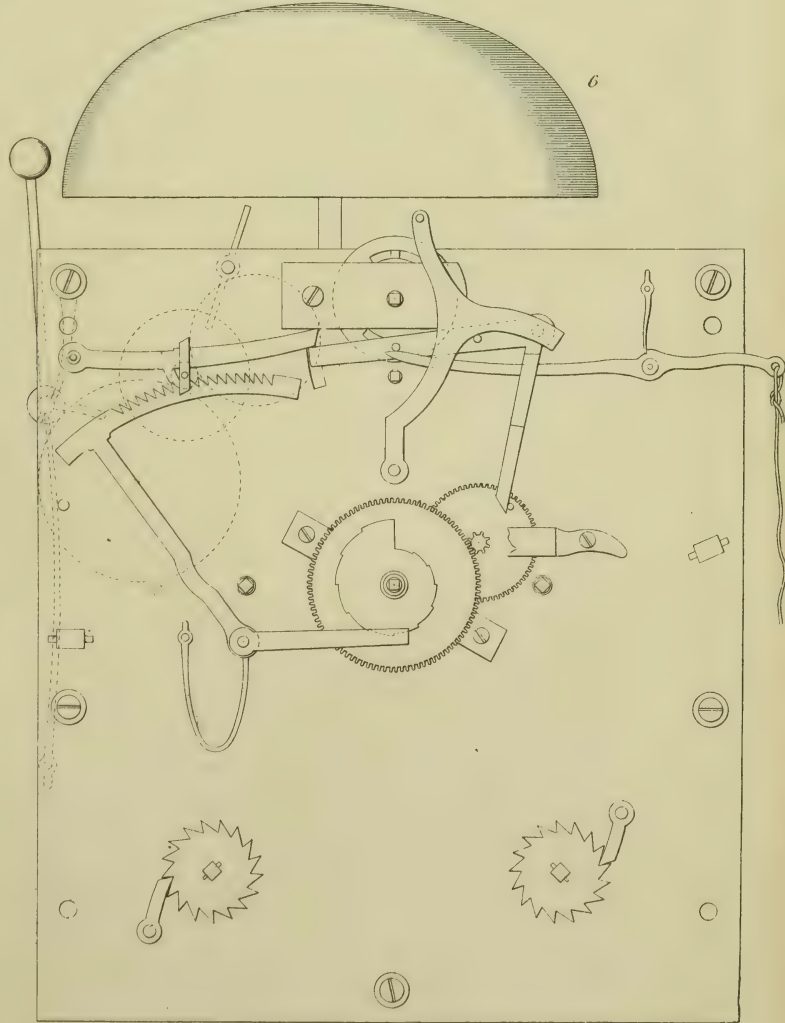
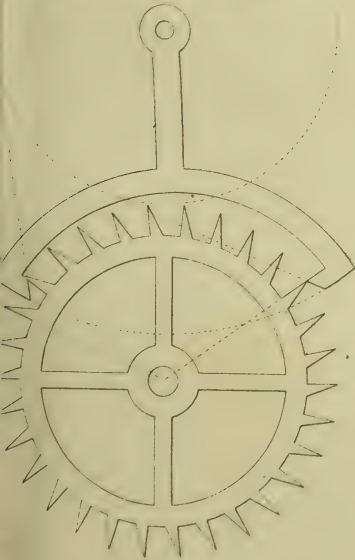
4



Mudge's Escapement.

7

Graham's Dead beat.



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HOROLOGY.

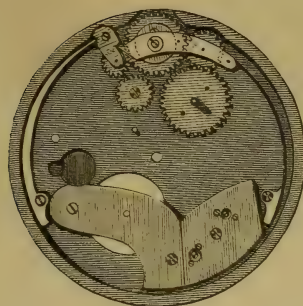


FIG. 2.—JOHNSON'S KEYLESS MOTION.

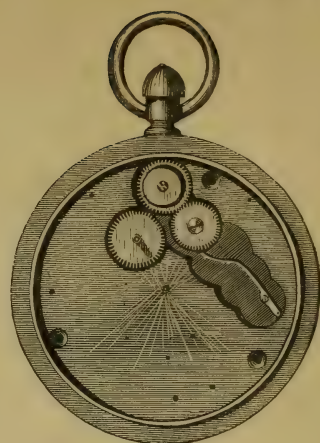
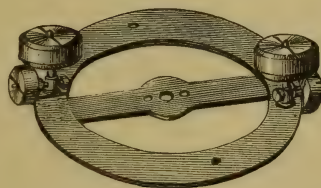


FIG. 3.—KULLBERG'S KEYLESS MOTION.



FIG. 4.—DENT'S BALANCE.



FIGS. 5, 6.—KULLBERG'S BALANCES.

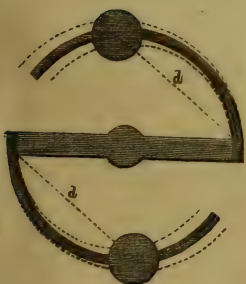
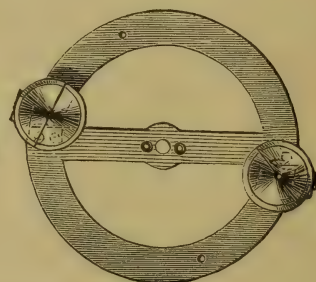


FIG. 7.—ORDINARY COMPENSATING BALANCE.

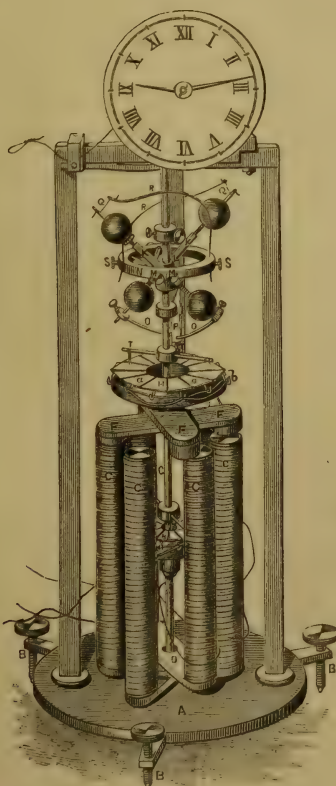


FIG. 9.

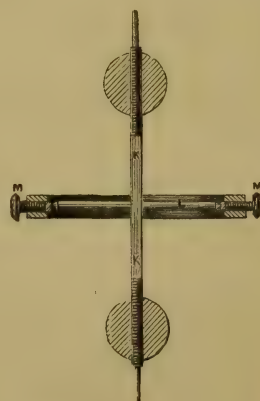


FIG. 10.



FIG. 8.—COLE'S PENDULUM SUSPENDER.

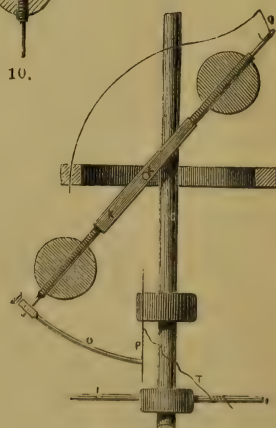
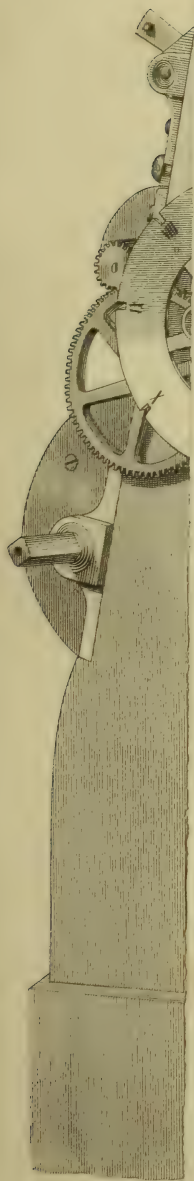
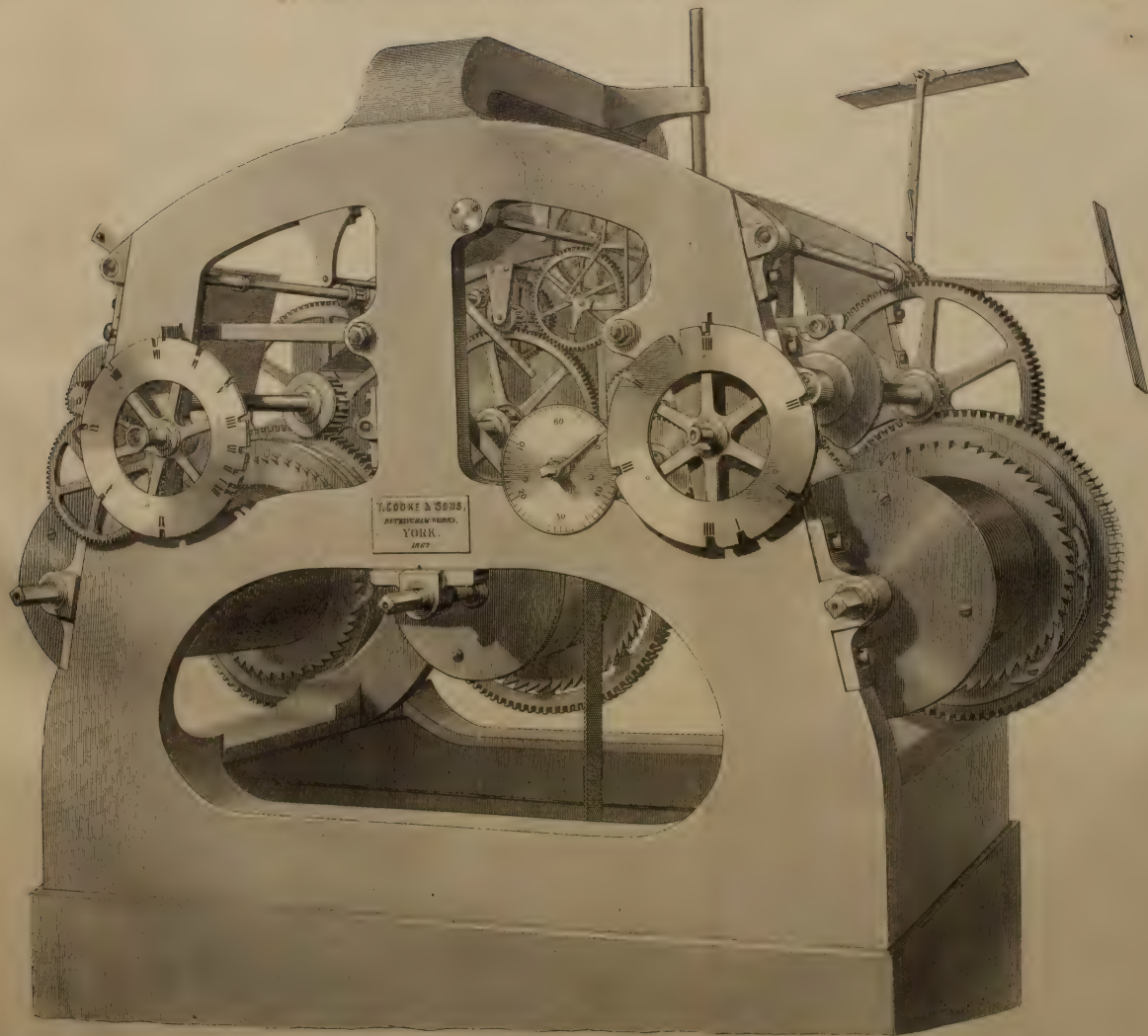


FIG. 11.

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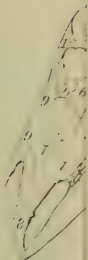


THE GREAT WESTERN RAILWAY CO. LTD.



Front V
F

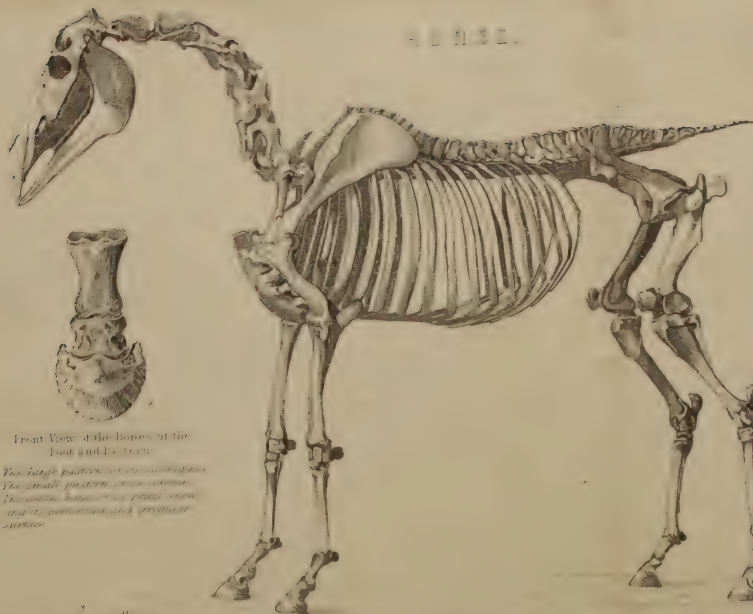
c. The large
d. The small
e. The coffin
f. The surface



1 Os Fra
2 — Pa
3 — Or
4 — Te
5 — La
6 — Ma
7 — Ma
8 — Pa
9 — Na
10 — Ma

11 11 Fa
12 12 —
13 13 —
14 14 —
15 15 —
16 16 (e
17 17 O

FO
18 Sa
19 La
20 Fa
21 I
22 O
23 O
24



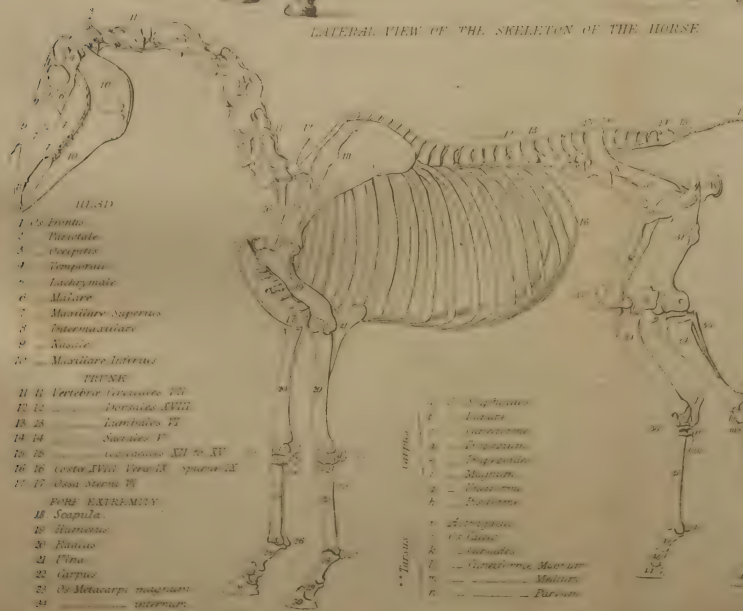
Front View of the Bones of the Foot and Hoof.

- a* The large pastern bone.
b The small pastern bone.
c The sesamoid bone.
d The navicular bone.

Front View of the Bones of the Foot and Hoof.

- a* The large pastern bone.
b The small pastern bone.
c The sesamoid bone.
d The navicular bone.
e The navicular bone.

LATERAL VIEW OF THE SKELETON OF THE HORSE



HEAD

- 1 Cranium.
2 Mandible.
3 Maxilla.
4 Temporal bone.
5 Zygomatic bone.
6 Malar bone.
7 Maxillary process.
8 Mandibular process.
9 Nasal bone.
10 Maxillary process.

TRUNK

- 11 Cervical vertebrae C1.
12 Thoracic vertebrae T1.
13 Lumbar vertebrae L1.
14 Sacrum S1.
15 Coccyx.
16 Costal cartilage.
17 Sternum.

FORE EXTREMITY

- 18 Scapula.
19 Humerus.
20 Radius.
21 Ulna.
22 Carpus.
23 Metacarpus.
24 Phalanx.
25 Sesamoid bone.

HOOF

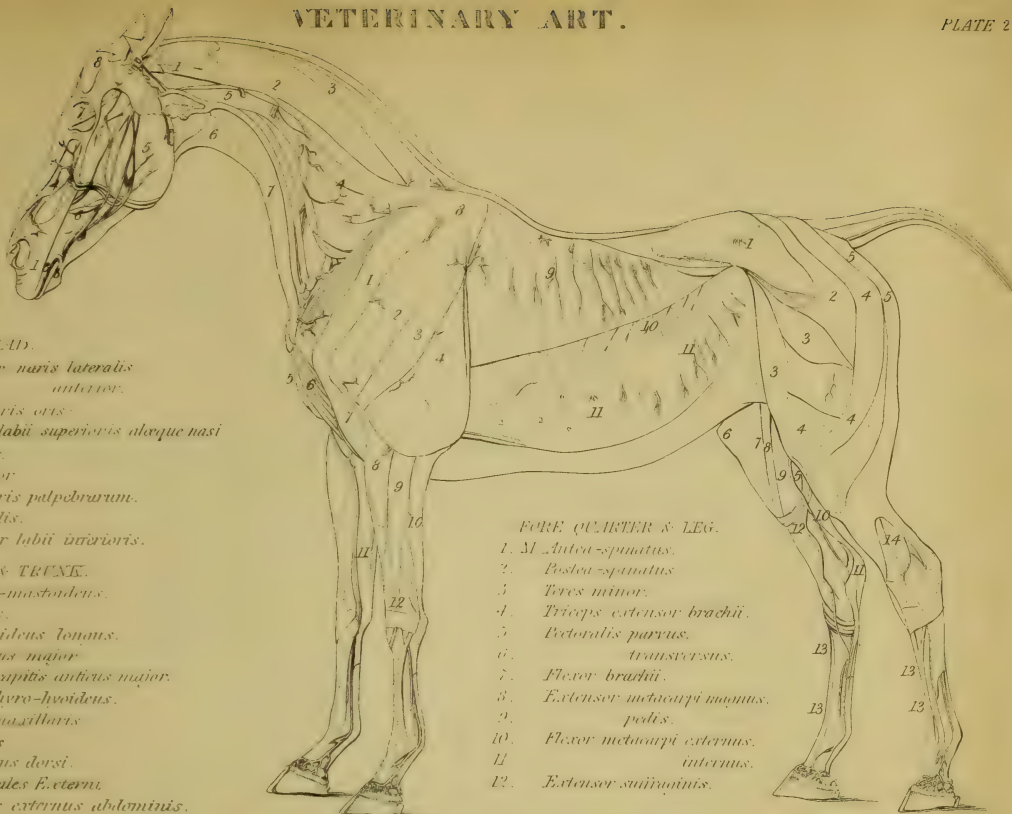
- 26 Sesamoid bone.
27 Pastern bone.
28 Navicular bone.
29 Sesamoid bone.
30 Phalanx.
31 Sesamoid bone.
32 Phalanx.
33 Sesamoid bone.
34 Phalanx.
35 Sesamoid bone.
36 Phalanx.

FORE EXTREMITY

- 37 Scapula.
38 Humerus.
39 Radius.
40 Ulna.
41 Carpus.
42 Metacarpus.
43 Phalanx.
44 Sesamoid bone.

HIND EXTREMITY

- 45 Pelvis.
46 Femur.
47 Patella.
48 Tibia.
49 Fibula.
50 Sesamoid bone.
51 Phalanx.
52 Sesamoid bone.
53 Phalanx.
54 Sesamoid bone.
55 Phalanx.

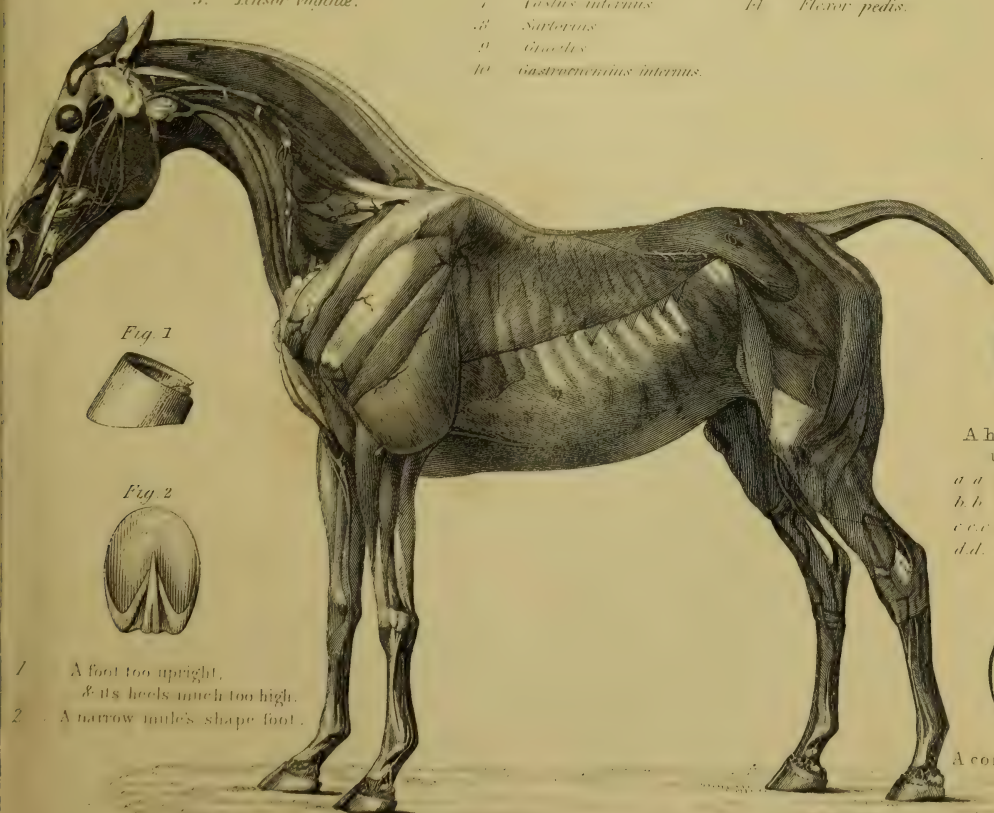


HIND QUARTER & LEG.

1. *M. Gluteus maximus.*
2. *externus.*
3. *Tensor vaginæ.*

4. *Biceps Abductor.*
5. *Semimembranosus.*
6. *Rectus.*
7. *Vastus internus.*
8. *Sartorius.*
9. *Gastrocnemius.*
10. *Gastrocnemius internus.*

11. *Plantaris.*
12. *Flexor metatarsi.*
13. *Extensor pedis.*
14. *Flexor pedis.*



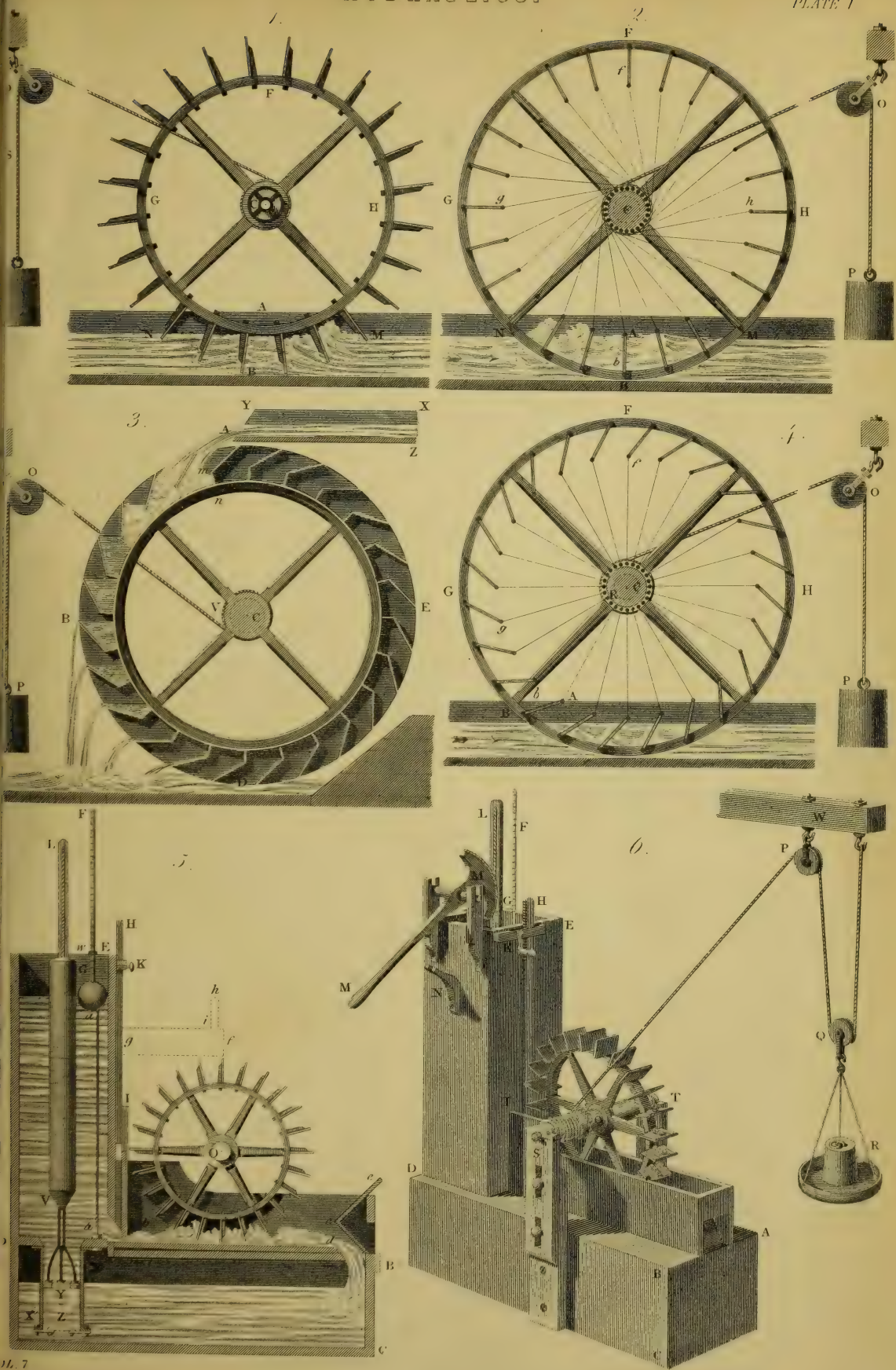
A healthy Foot in an upraised state

- a a The frog
b b — bars
c c c — sole
d d — seat of corns

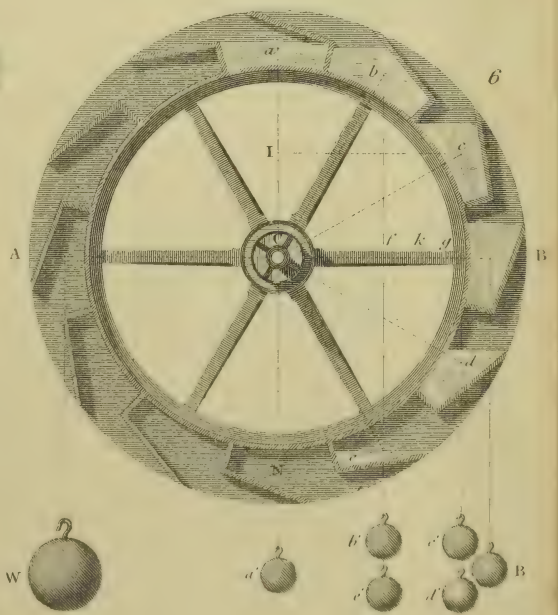
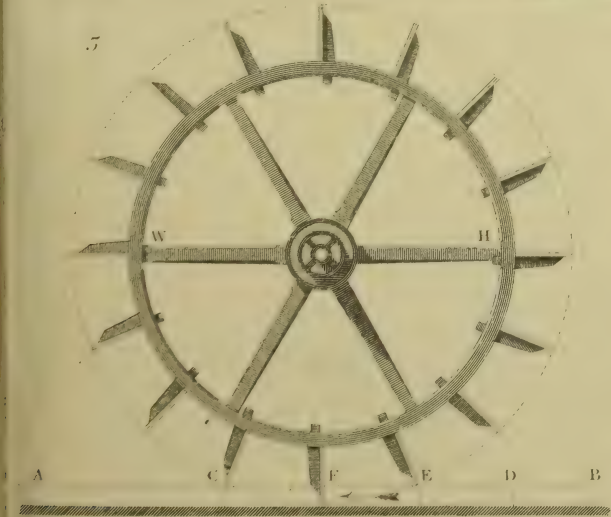
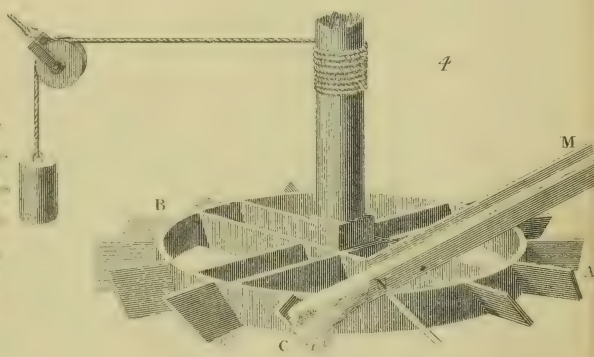
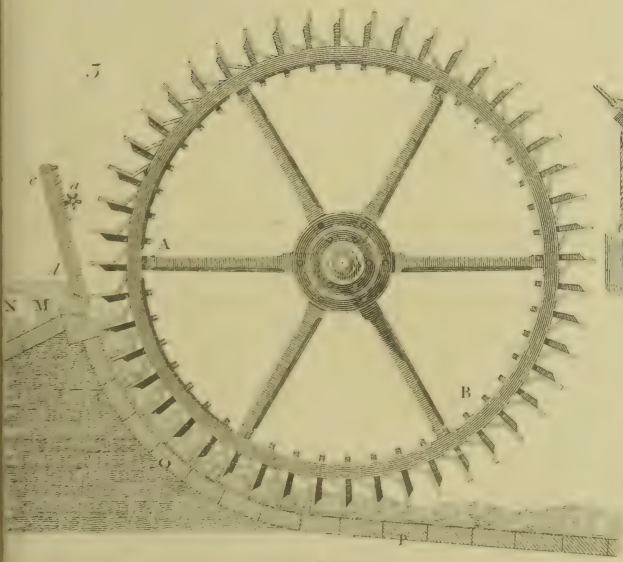
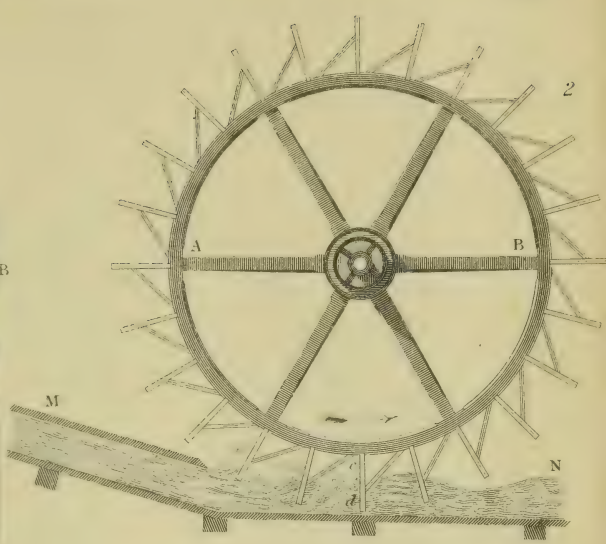
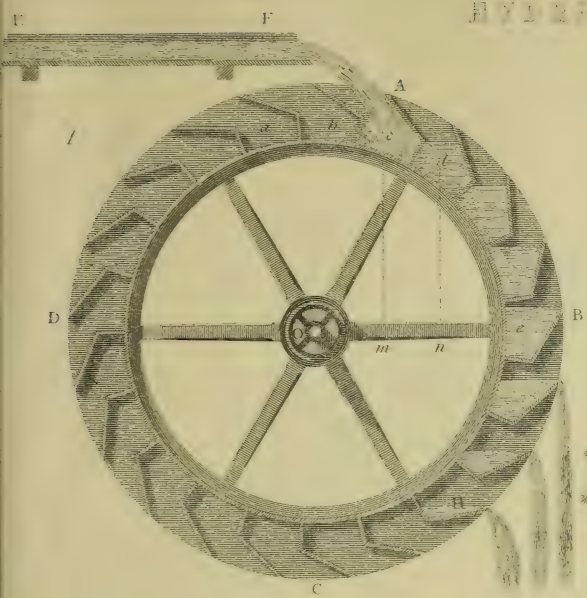


A contracted Foot.

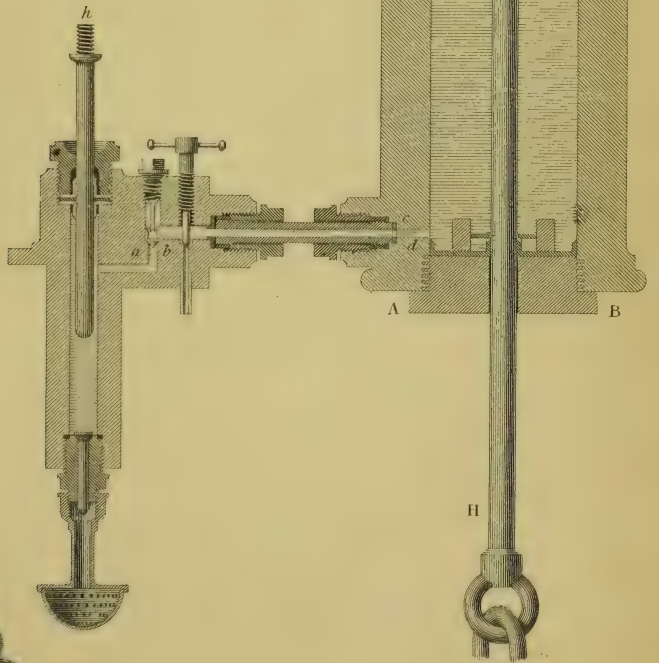
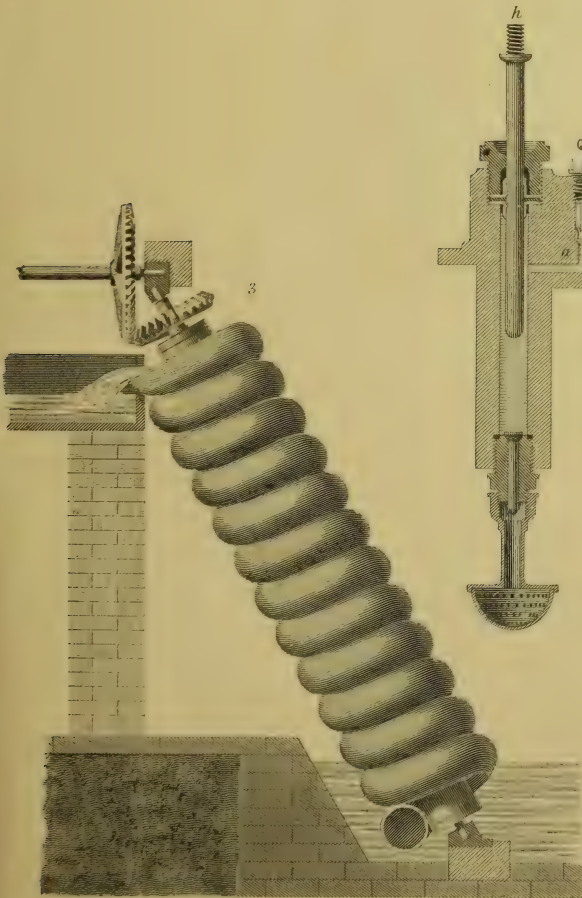
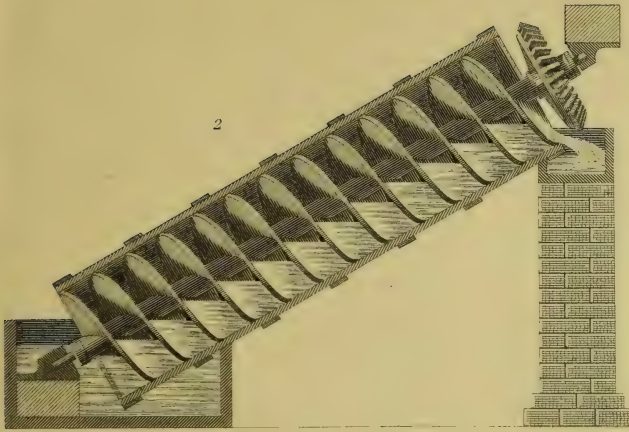
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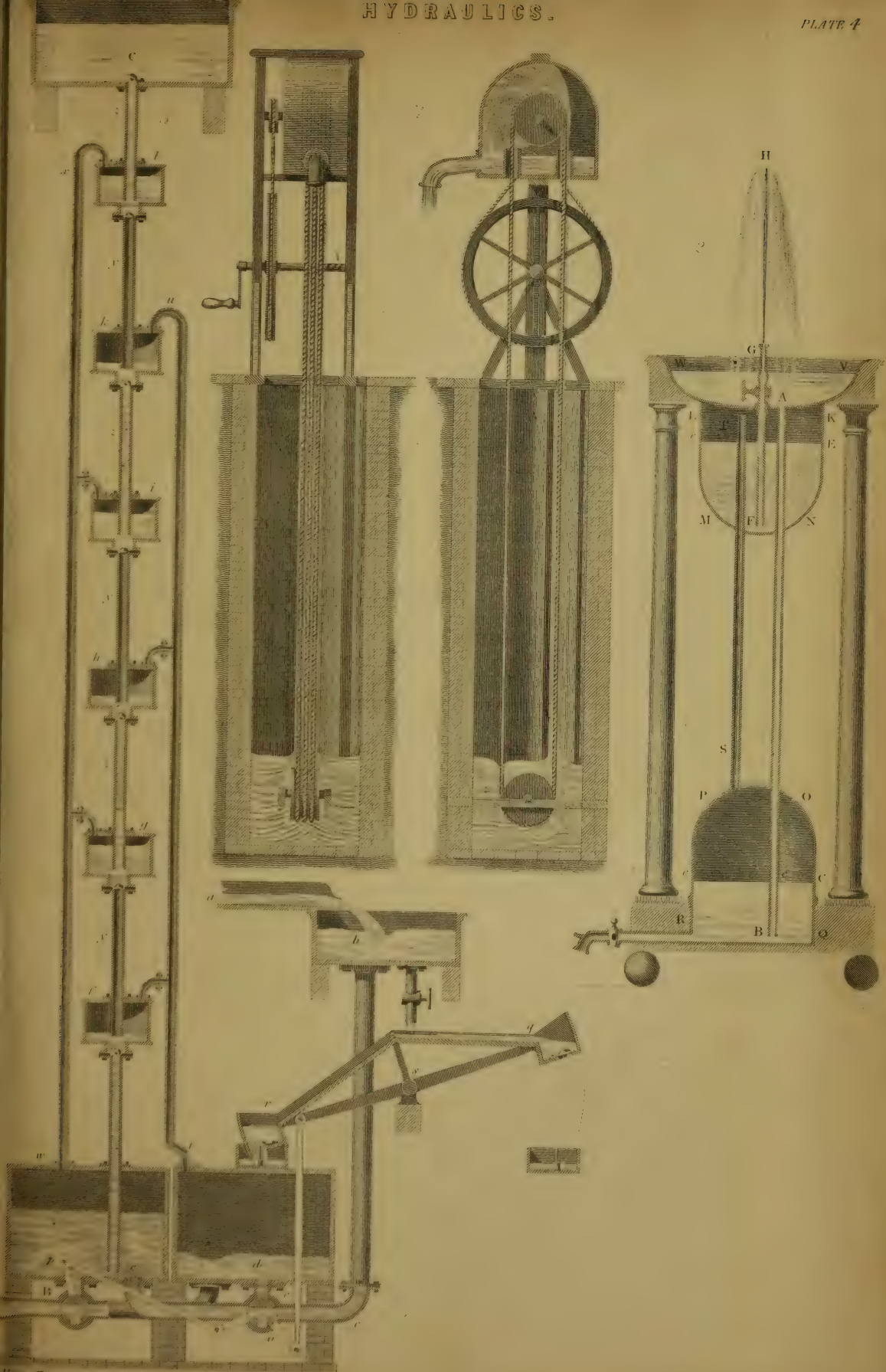
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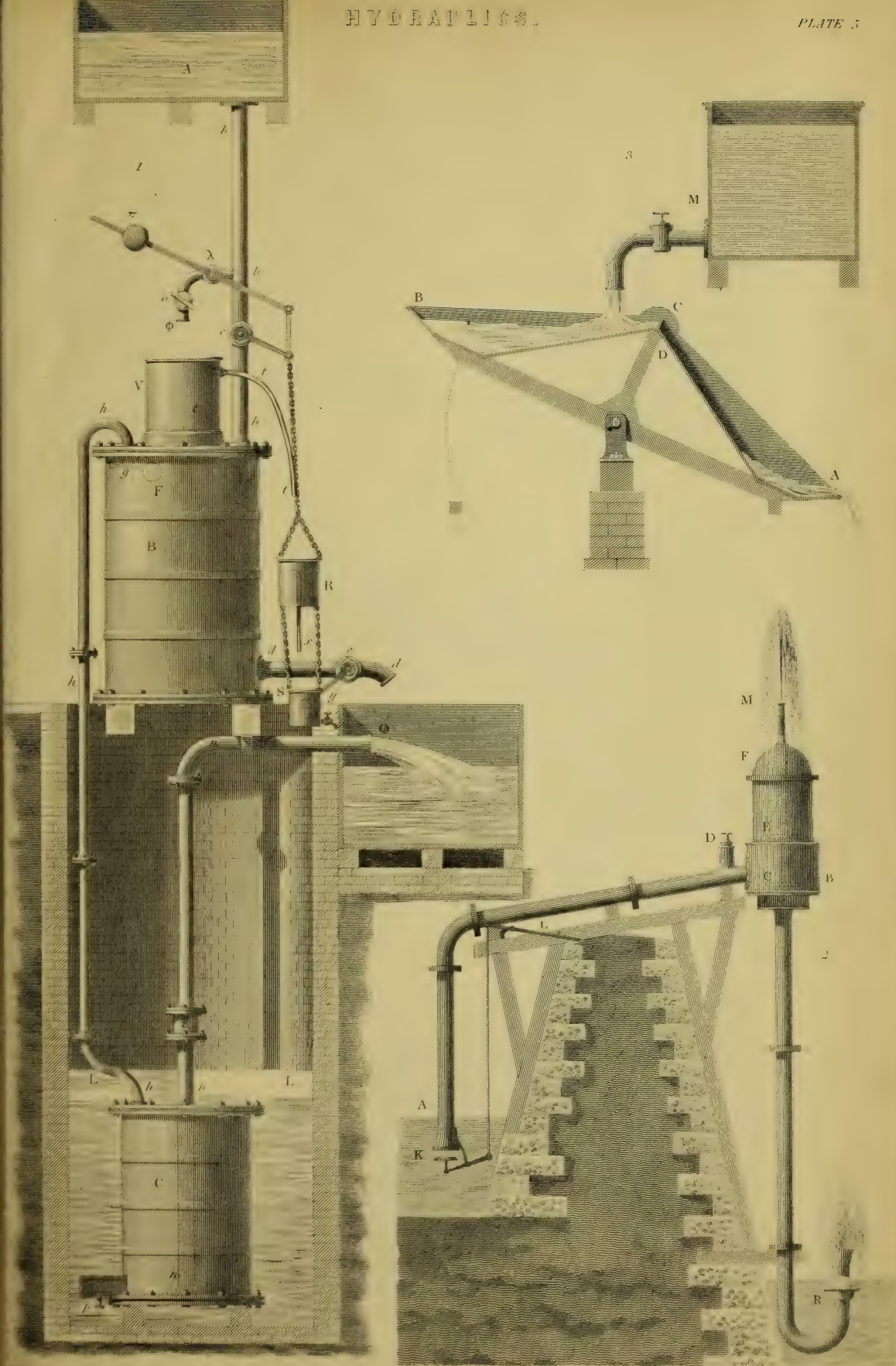
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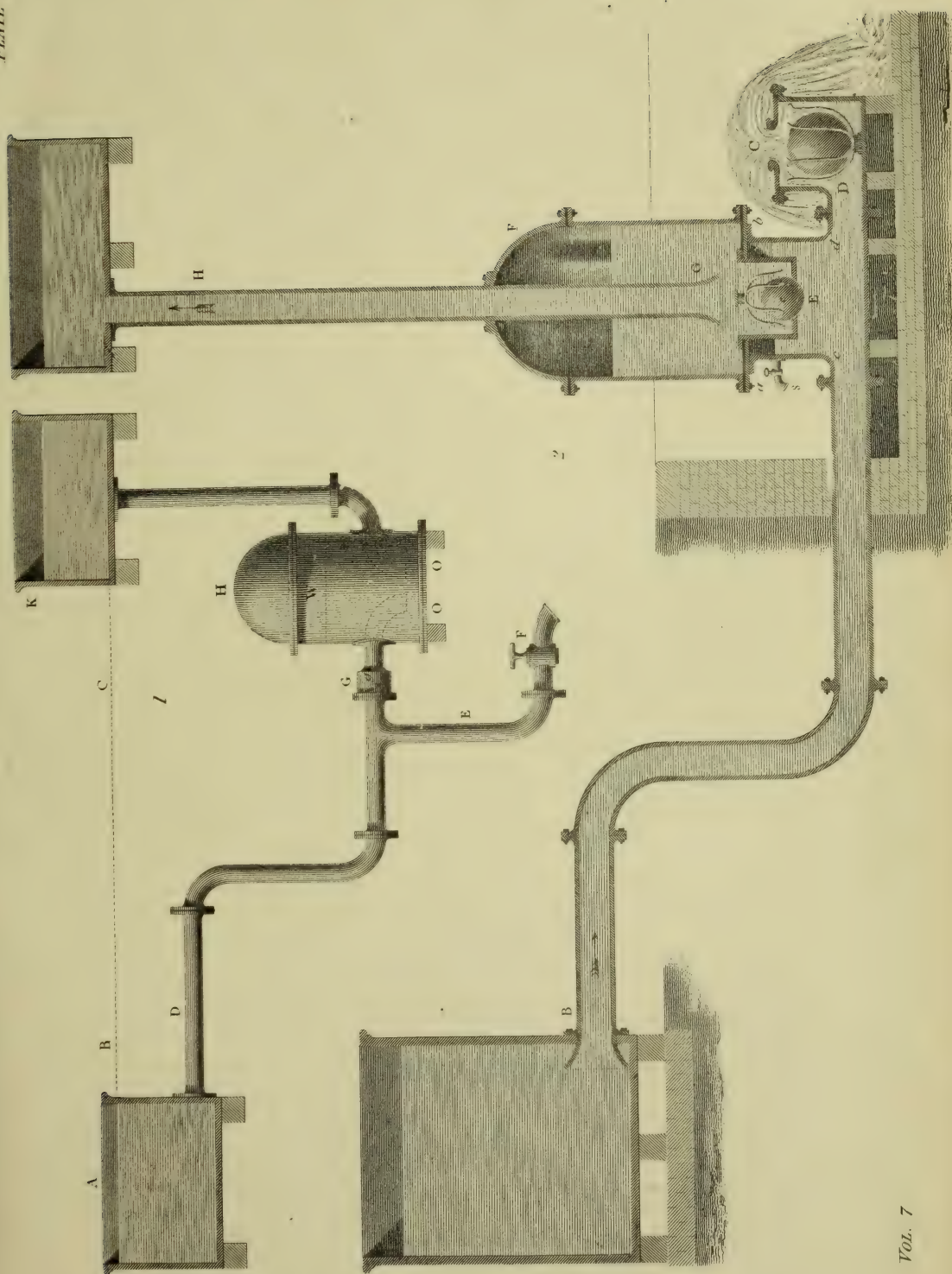
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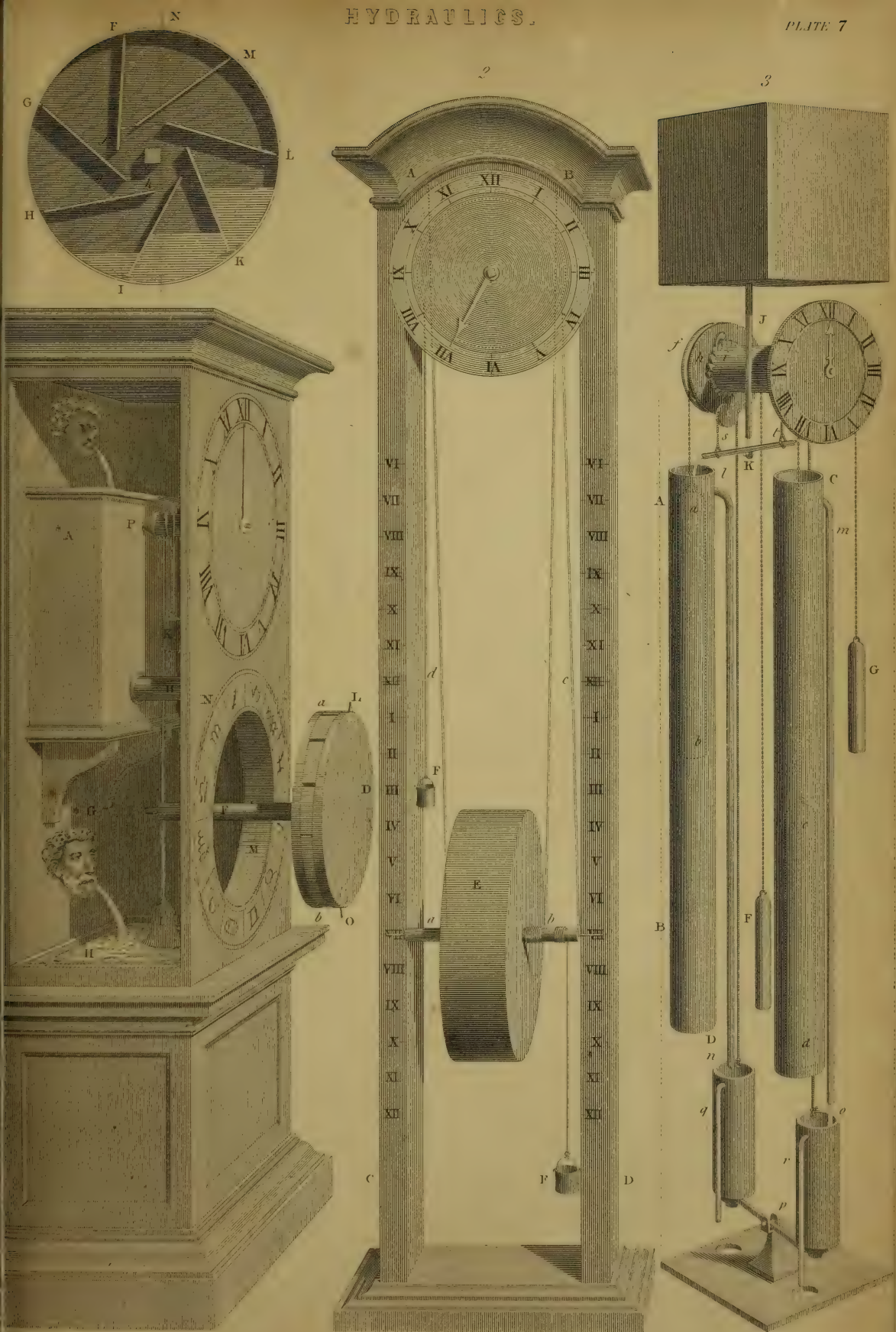
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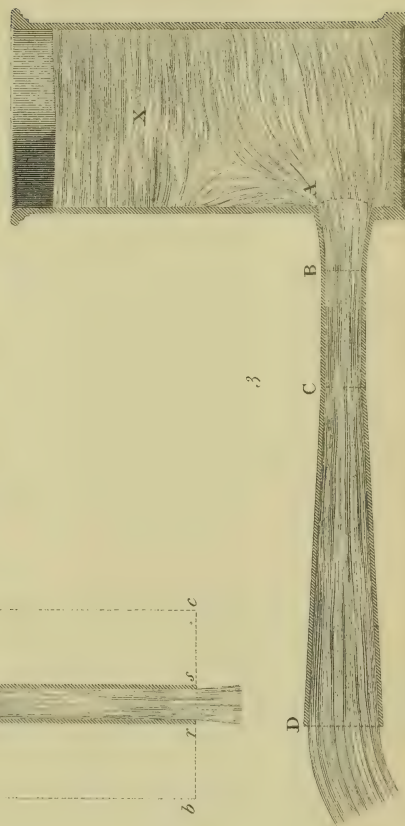
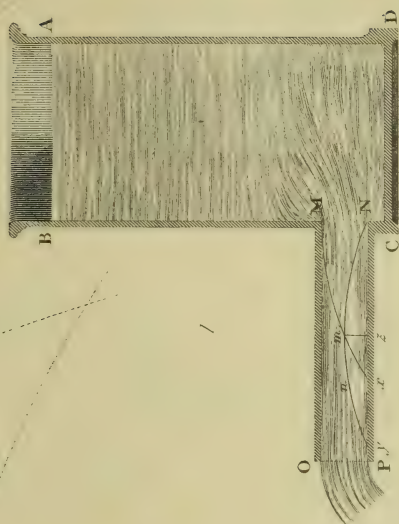
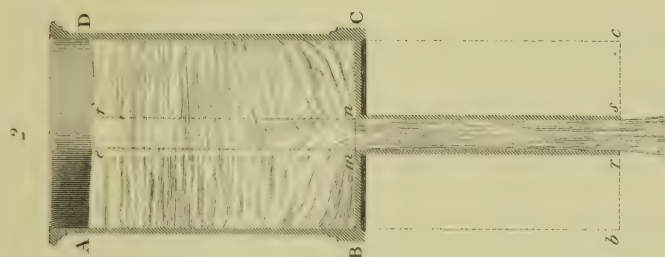
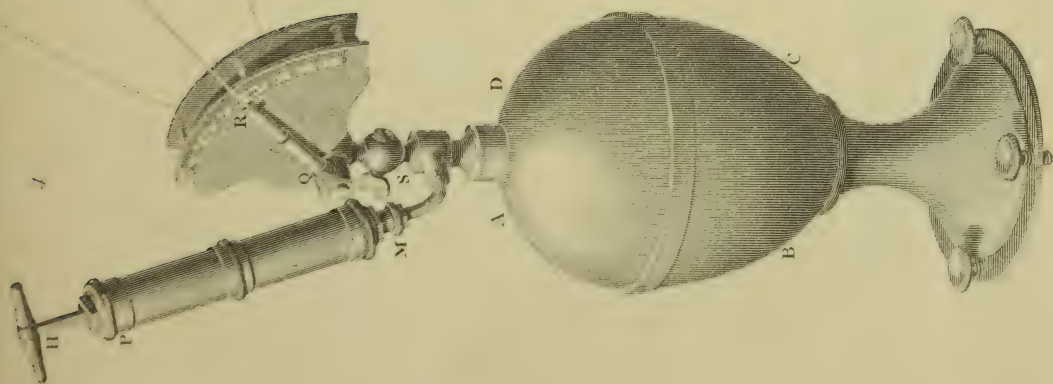
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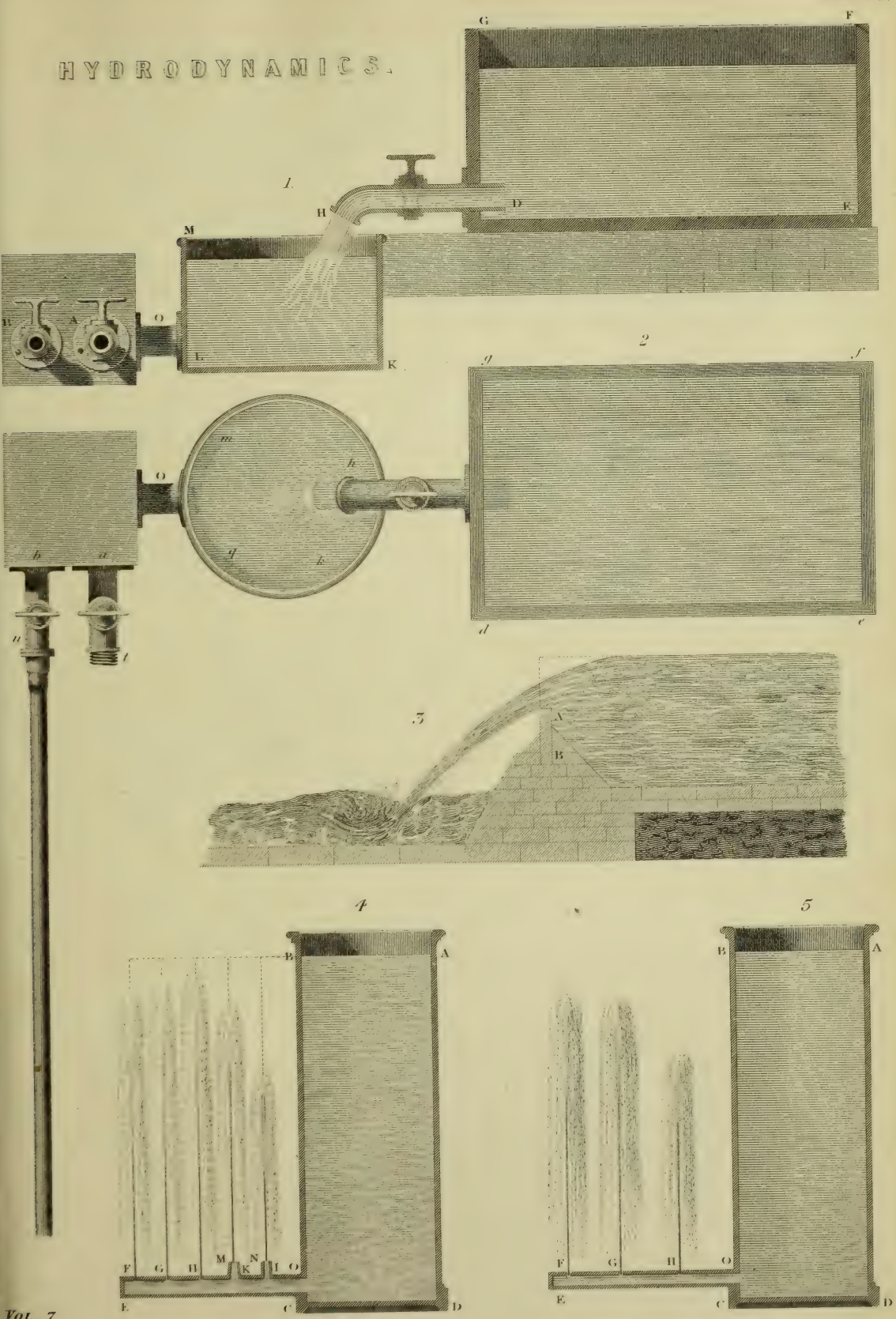


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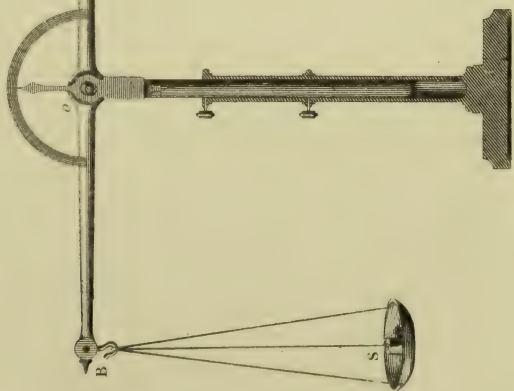
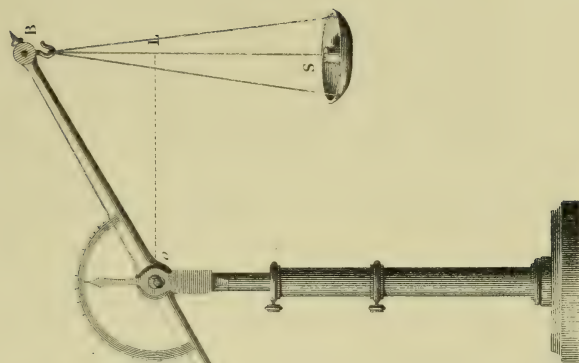
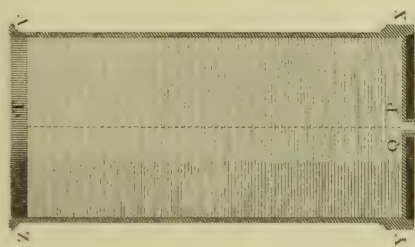
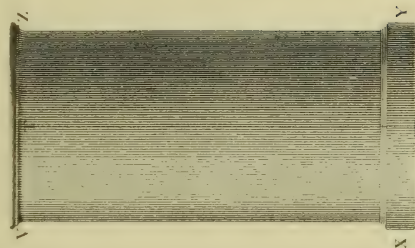
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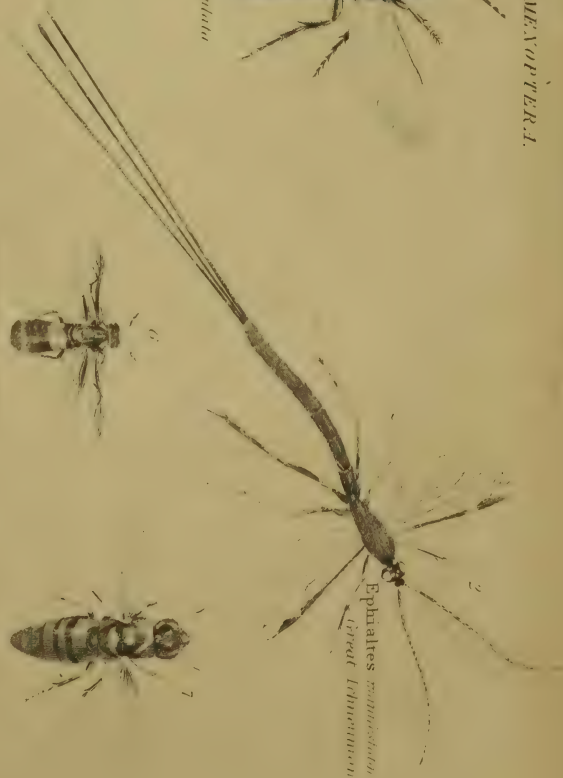
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HYMENOPTERA.



STREPSIPTERA.



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INFLORESCENCE.

(MODES OF)

PLATE I

Leaf

Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



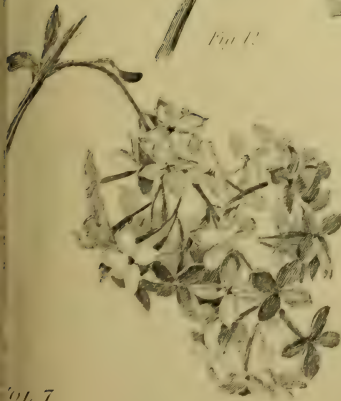
Fig. 9



Fig. 10



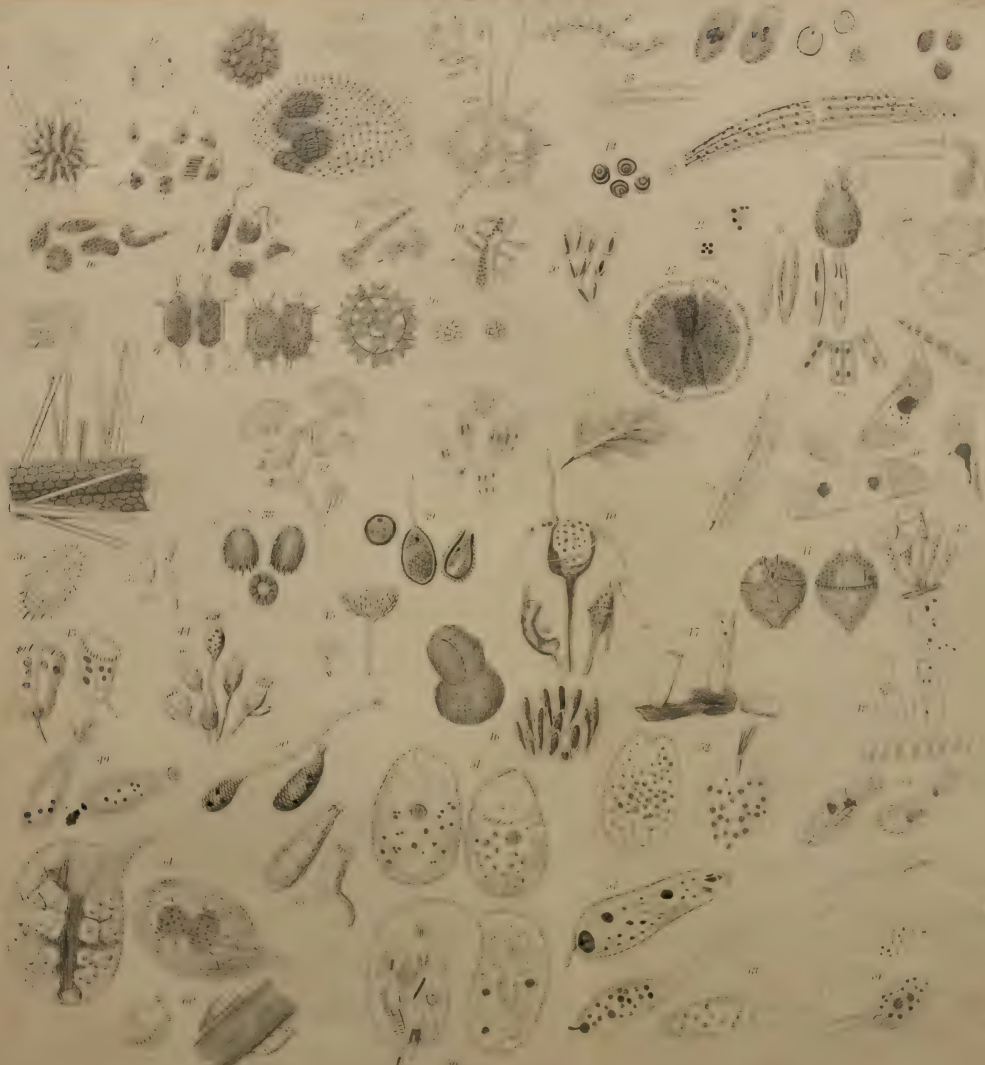
Fig. 11



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Genera & Species

- | | | | | | |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------|
| 1. <i>Monas triplexculum</i> | 31. <i>Sphaerocysta lobata</i> | 41. <i>Amoeba laticornis</i> | 51. <i>Stentor, China</i> | 61. <i>Glenosium, Tals. Antum</i> | 71. <i>Lamophrys, Butula</i> |
| 2. <i>Monas, tatalis</i> | 32. <i>Dallugia, Potamocera</i> | 42. <i>Edinella, splendula</i> | 52. <i>Stentor, Mulleri</i> | 62. <i>Procedon, Tereus</i> | 72. <i>Procedon, Tereus</i> |
| 3. <i>Pyella, Trezona</i> | 33. <i>Vibrio, subulata</i> | 43. <i>Synecchia, solpa</i> | 53. <i>Tricostatum, Turbo</i> | 63. <i>Coleps, Incuvus</i> | 73. <i>Coleps, Incuvus</i> |
| 4. <i>Dicococcus, Globulus</i> | 34. <i>Desmidium, viridis</i> | 44. <i>Nannema, lobocera</i> | 54. <i>Nautilia, Microstoma</i> | 64. <i>Trenchelus, Penn</i> | 74. <i>Phadon, Pennocarys</i> |
| 5. <i>Chlamydomas, lobata</i> | 35. <i>Chlosterium, Lundia</i> | 45. <i>Schizosomus, lobocella</i> | 55. <i>Zoothamnium, lobocella</i> | 65. <i>Chilodon, lucullus</i> | 75. <i>Chilodon, lucullus</i> |
| 6. <i>Richia, sordida</i> | 36. <i>Actinia, flammula</i> | 46. <i>Veledium, flammula</i> | 56. <i>Ophrydium, vesatile</i> | 66. <i>Nesocila, Rhomus</i> | 76. <i>Nesocila, Rhomus</i> |
| 7. <i>Cyphomorus, Prata</i> | 37. <i>Flagella, Prata</i> | 47. <i>Eumetrium, lobocellum</i> | 57. <i>Chlosterium, vesatile</i> | 67. <i>Trenchelocera, Oba</i> | 77. <i>Trenchelocera, Oba</i> |
| 8. <i>Trenchelomorus, lobocera</i> | 38. <i>Nauticaria, Phloccatoma</i> | 48. <i>Chlosterium, lobocellum</i> | 58. <i>Chlosterium, lobocellum</i> | 68. <i>Amphileptus, Prata</i> | 78. <i>Amphileptus, Prata</i> |
| 9. <i>Agass, tridentum</i> | 39. <i>Epipax, tridentum</i> | 49. <i>Bacillaria, Polygona</i> | 59. <i>Chlosterium, lobocellum</i> | 69. <i>Aspidocera, Prata</i> | 79. <i>Aspidocera, Prata</i> |
| 10. <i>Stereopoda, lobata</i> | 40. <i>Isthmia, Enervis</i> | 50. <i>Chlosterium, lobocellum</i> | 60. <i>Chlosterium, lobocellum</i> | | |

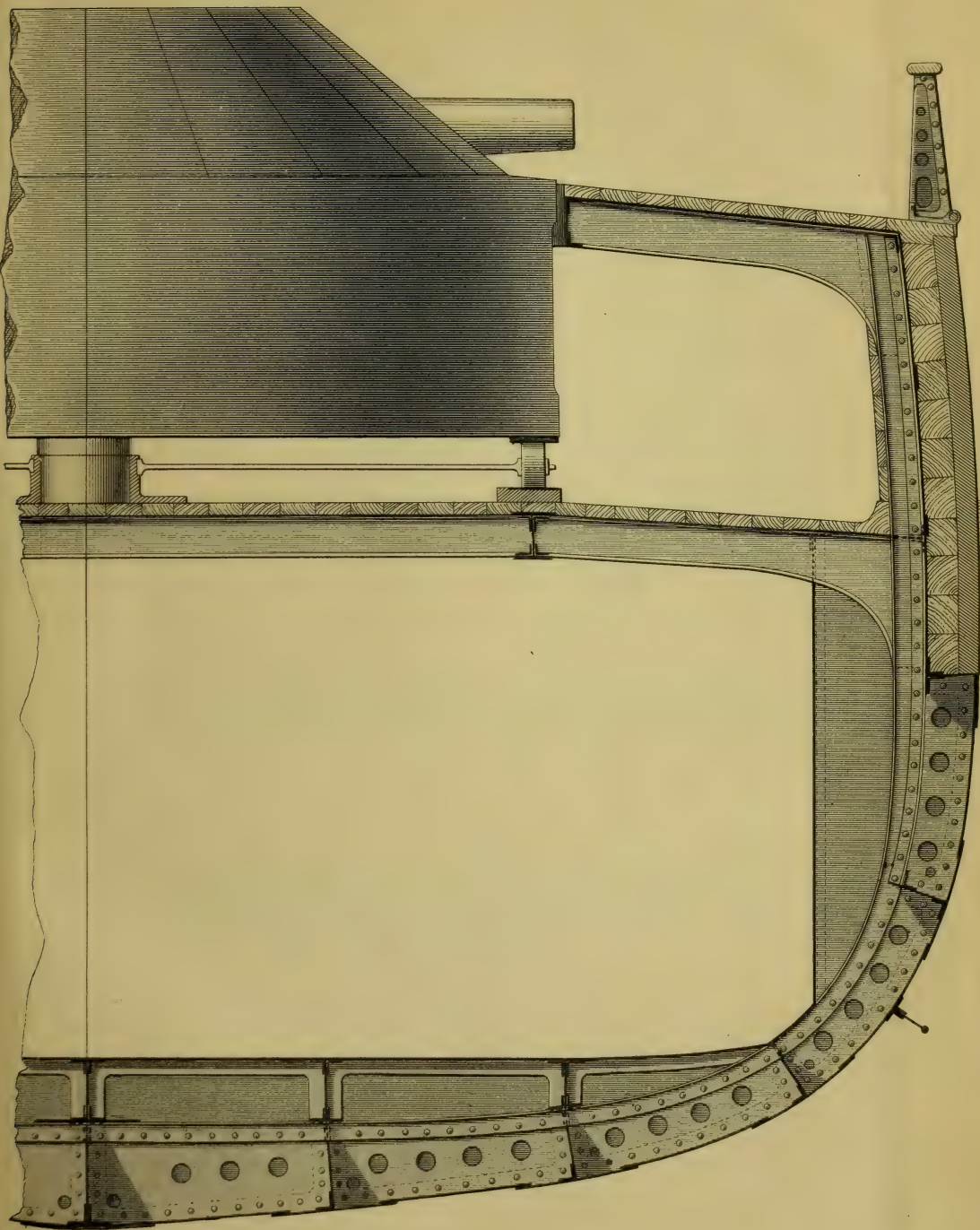


GENERA AND SPECIES.

- | | | | |
|--|---|---|---|
| 1. <i>Rotifera</i> <i>Rot.</i> | 3. <i>Dasyatis</i> <i>Melicer</i> | 15. <i>Tubicolaria</i> <i>Syns</i> | 27. <i>Triphthalmus</i> <i>Dorsalis</i> |
| 2. <i>Ophryotrocha</i> <i>Acuminata</i> | 4. <i>Ichthyotrocha</i> <i>Robini</i> | 16. <i>Plasmodaria</i> <i>Ornata</i> | 28. <i>Cyclostoma</i> <i>Lepus</i> |
| 3. <i>Oxytricha</i> <i>Clavata</i> | 10. <i>Charonimus</i> <i>Macrinus</i> | 17. <i>Melicer</i> <i>Longus</i> | 29. <i>Lepadella</i> <i>Orata</i> |
| 4. <i>Synchaeta</i> <i>Proclata</i> | 11. <i>Glenophora</i> <i>Proclus</i> | 18. <i>Lamias</i> <i>Centrophella</i> | 30. <i>Euchlamis</i> <i>Luna</i> |
| 5. <i>Discoccephalus</i> <i>Rotatorius</i> | 12. <i>Ægistis</i> <i>Hyalinus</i> | 19. <i>Hyalina</i> <i>Brachidactyla</i> | 31. <i>Colinus</i> <i>Guttatus</i> |
| 6. <i>Chamodotus</i> <i>Almonensis</i> | 13. <i>Cyphomantes</i> <i>Impressus</i> | 20. <i>Eurularia</i> <i>Alba</i> | 32. <i>Squamella</i> <i>Albida</i> |
| 7. <i>Euploche</i> <i>Cham.</i> | 14. <i>Microcodon</i> <i>Clavus</i> | 21. <i>Diglossa</i> <i>Grandis</i> | 33. <i>Brachomus</i> <i>Amphiceros</i> |
| | | | 34. <i>Pterodina</i> <i>Alata</i> |

MIDSHIP SECTION OF AN IRON CASED SHIP OF 1385 TONS.

CARRYING TWO OF CAPTAIN COLES' SHIELDS.

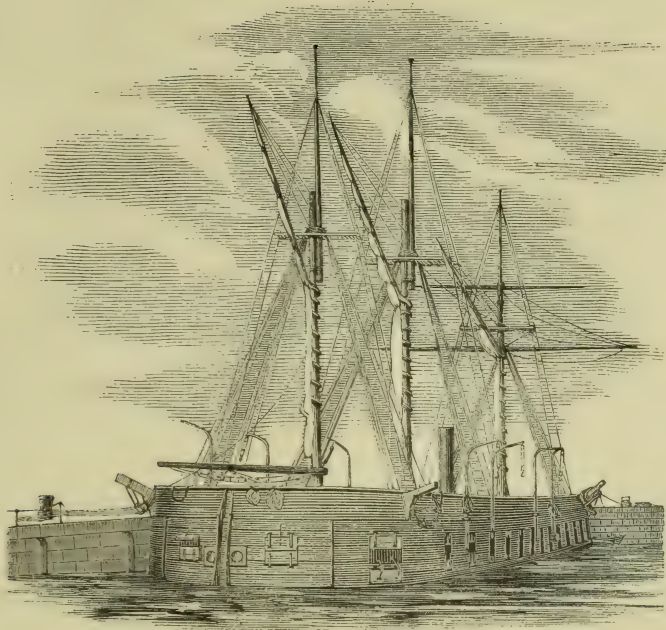


SCALE

0 1 2 3 4 5 10 15 20 feet

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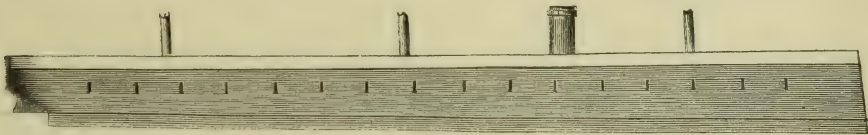
IRON-CLADS.



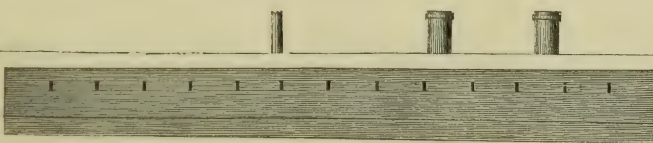
FLOATING BATTERY, TRUSTY.



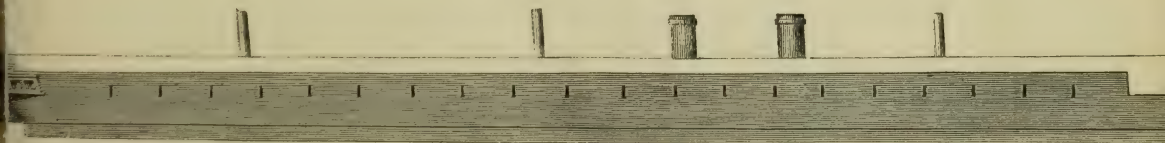
PRINCE ALBERT, 2529 TONS.



PRINCE CONSORT, ROYAL OAK, ROYAL ALFRED, OCEAN TRIUMPH, AND CALEDONIA, 4045 TONS.



WARRIOR AND BLACK PRINCE, 6039 TONS.



NORTHUMBERLAND, MINOTAUR, AND AGINCOURT, 6621 TONS.

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IRON MANUFACTURE.

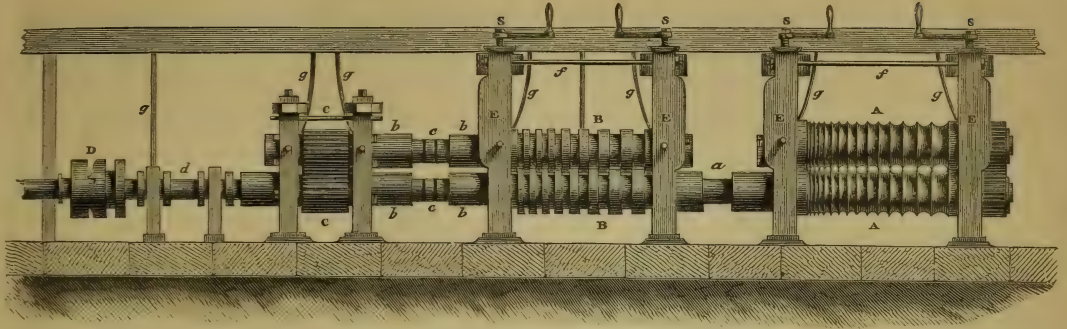
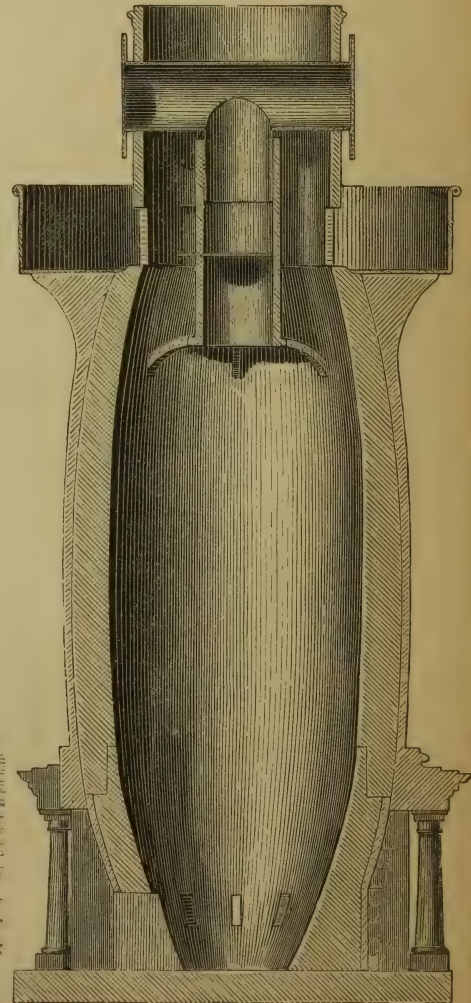


FIG. 1.—IRON ROLLING MACHINE



FIG. 2.—EXTERNAL VIEW OF MODERN BLAST FURNACE.



Sectional Elevation.

FIG. 3.—SCHNEIDER'S BLAST FURNACE.

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BESSEMER'S PROCESS.

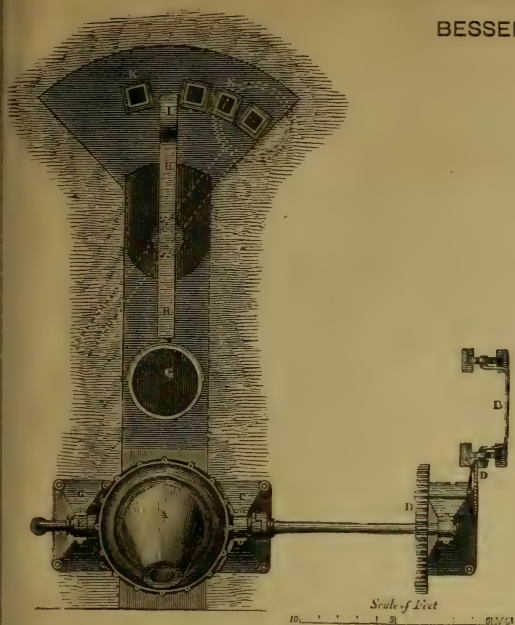


FIG. 1.—PLAN.

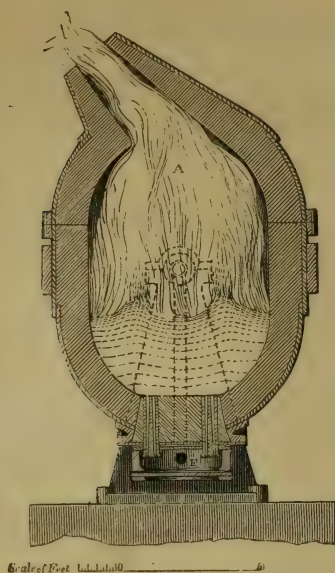


FIG. 2.—SECTION OF CONVERTING VESSEL.



FIG. 3.—PLAN OF TUYERE.



FIG. 4.—VERTICAL AND HORIZONTAL SECTION OF TUYERE.

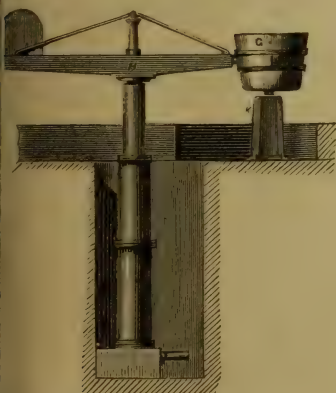


FIG. 5.—SIDE VIEW OF HYDRAULIC CRANE RAISED.

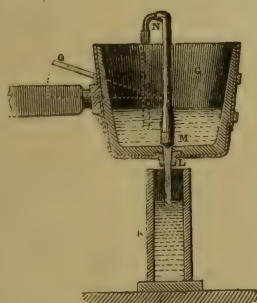


FIG. 6.—SECTION OF LADLE AND INGOT MOULDS.

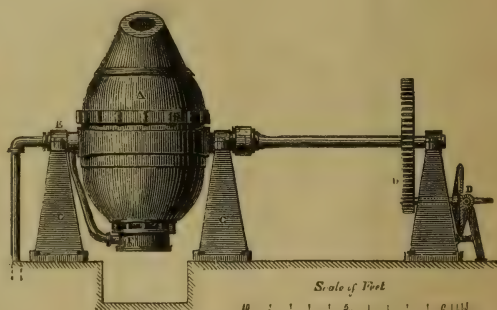


FIG. 7.—FRONT ELEVATION.

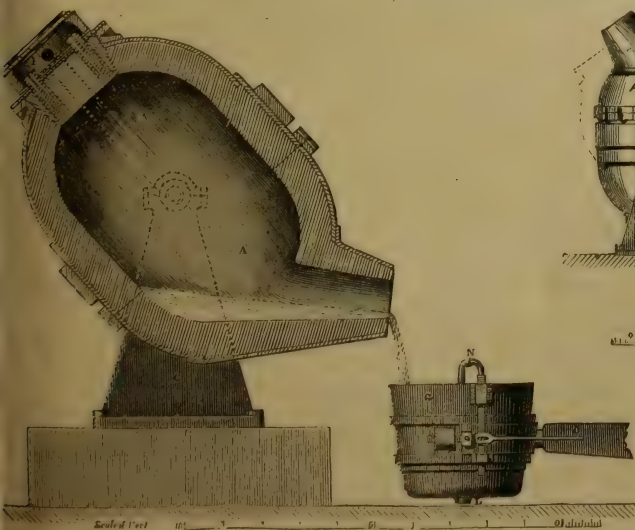


FIG. 8.—SECTION OF VESSEL, SIDE VIEW OF LADLE.

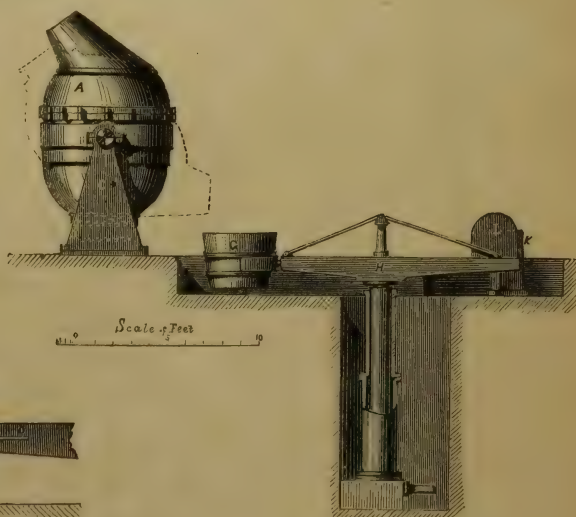
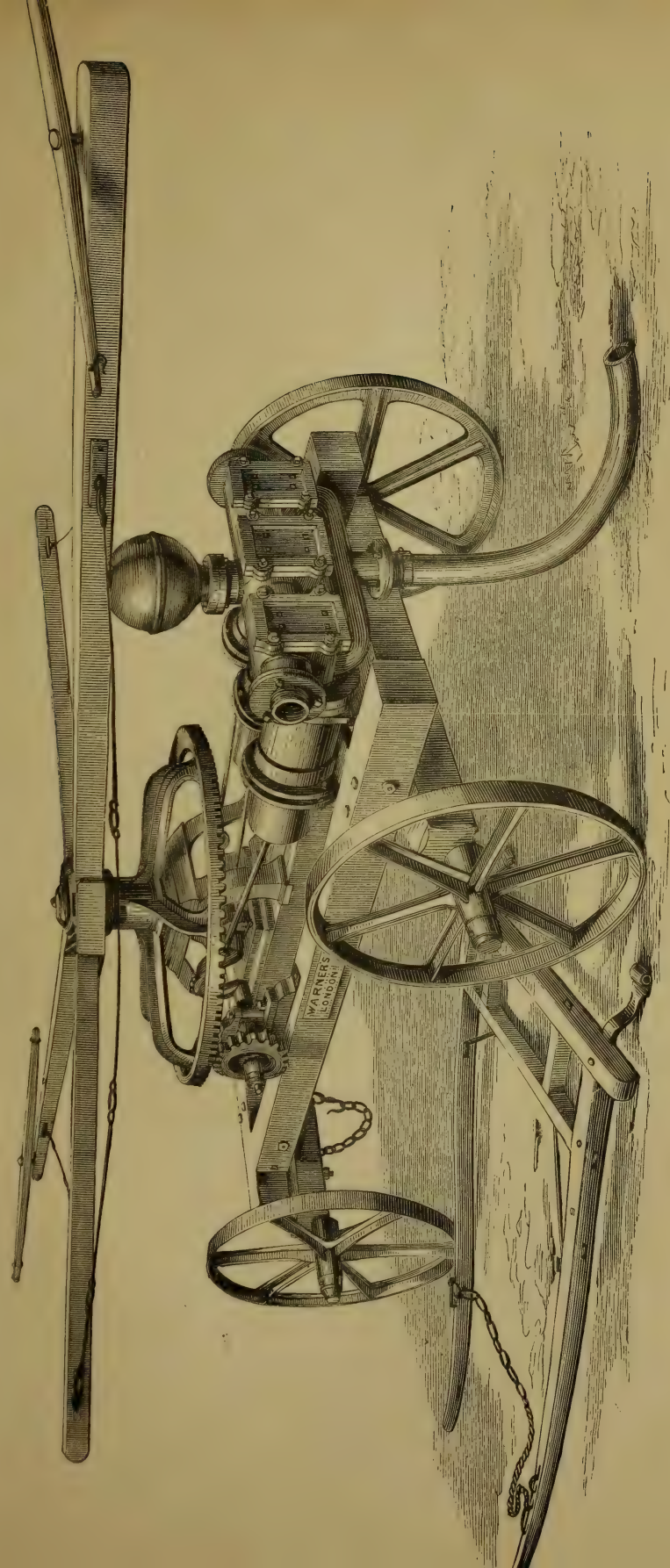


FIG. 9.—SIDE ELEVATION, PARTLY IN SECTION.

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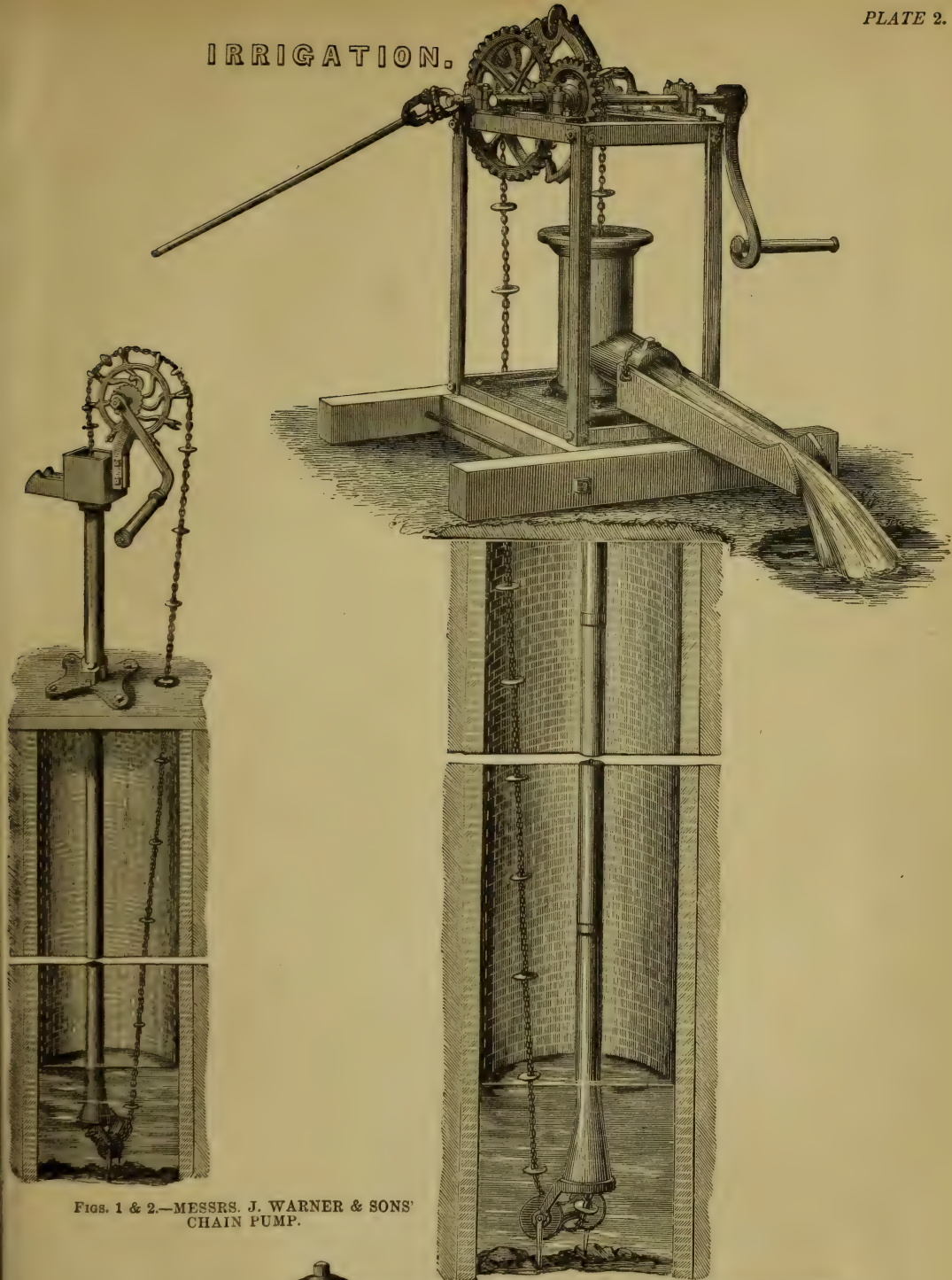
IRRIGATION.



MEERS. J. WARNER & SONS' IRRIGATOR OR PORTABLE FORCE PUMP, FOR INDIAN IRRIGATION.

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IRRIGATION.



FIGS. 1 & 2.—MESSRS. J. WARNER & SONS' CHAIN PUMP.

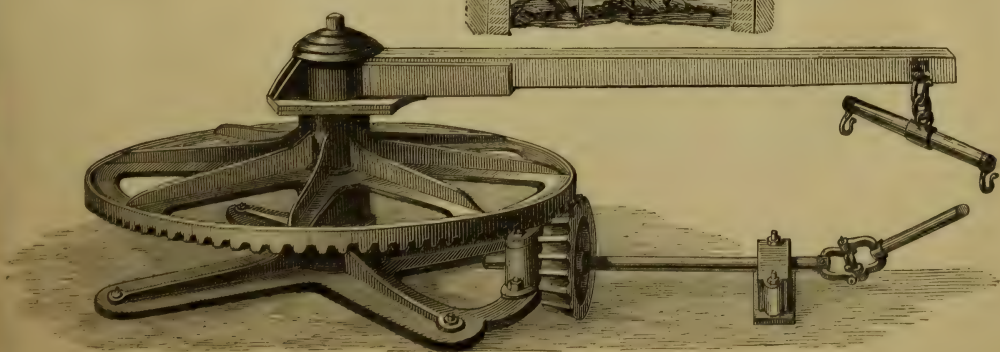


FIG. 3.—HORSE GEAR TO WORK CHAIN PUMP.

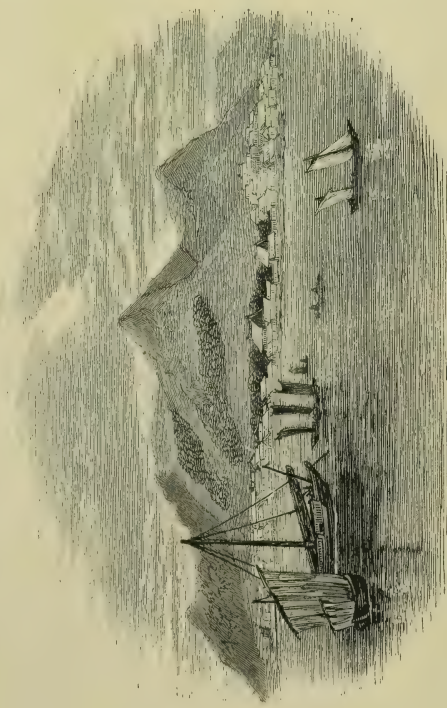
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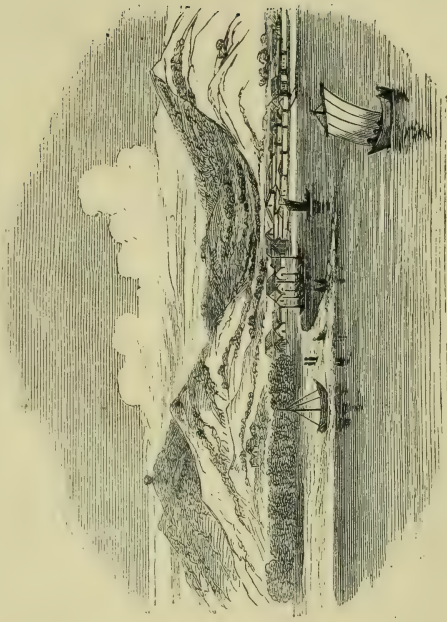
JEDDO, OR YEDDO.



VIEW NEAR HIOGO.



THE BAY OF HAKODADI.



HIOGO.

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Fig. 1

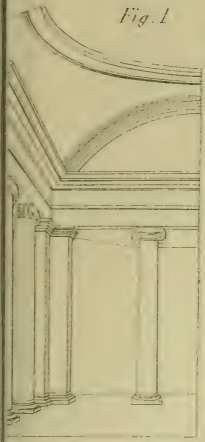


Fig. 7

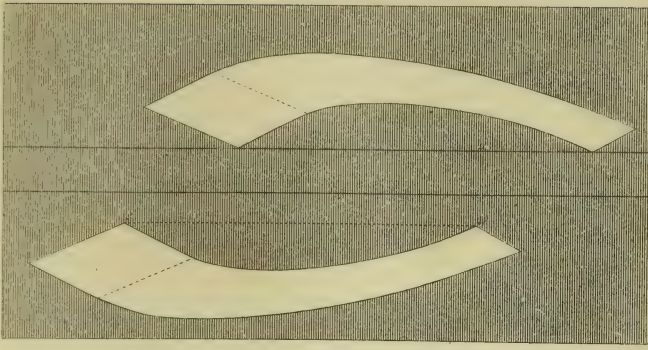


Fig. 5

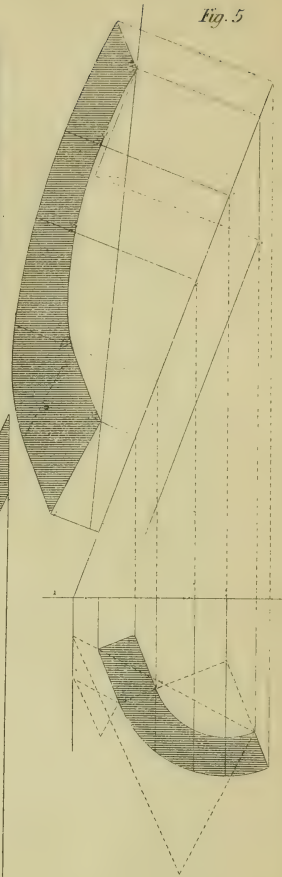


Fig. 2

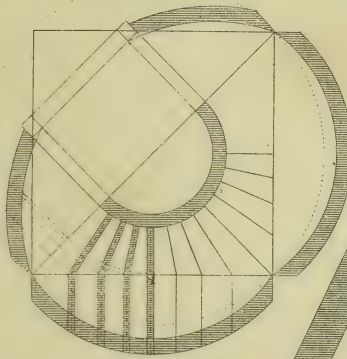
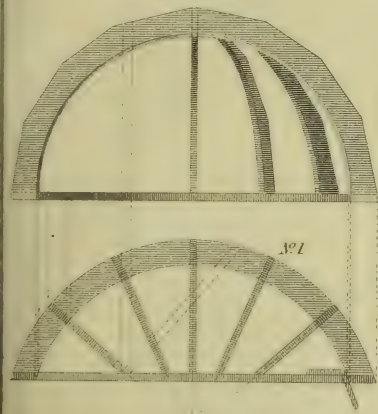


Fig. 3 N° 2



N° 1

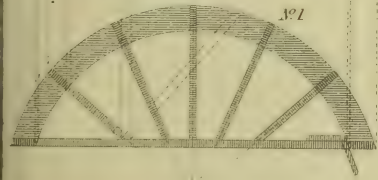


Fig. 6

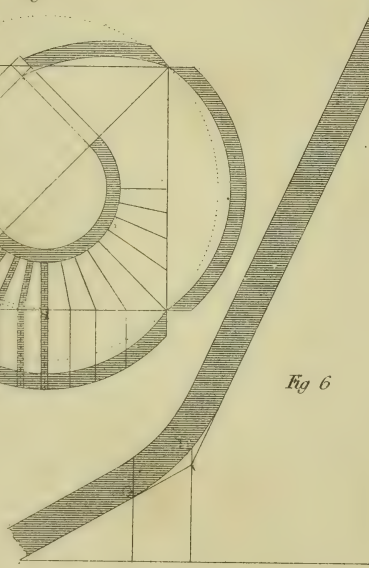


Fig. 10

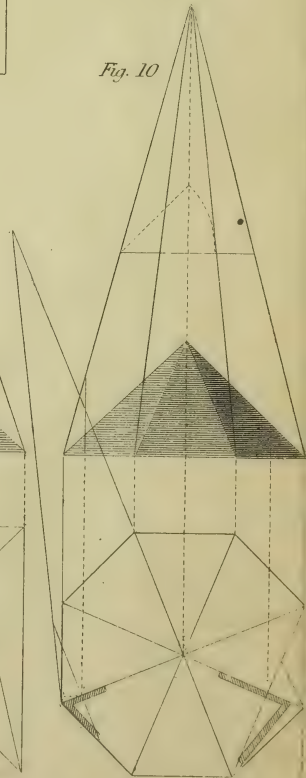


Fig. 9

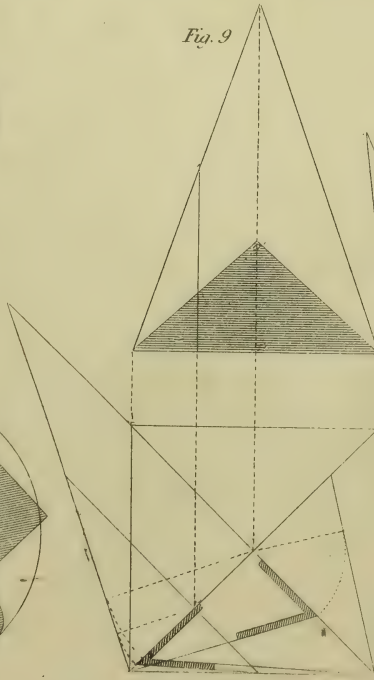
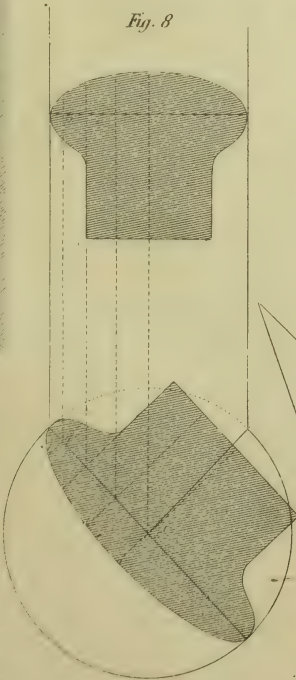
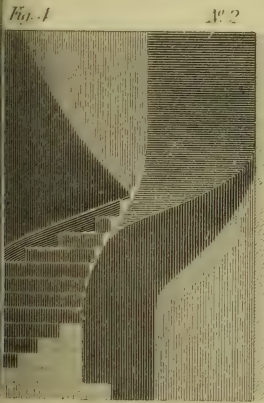


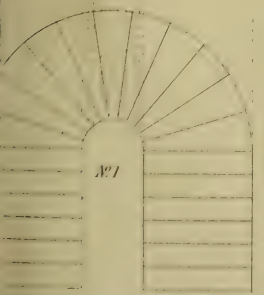
Fig. 8



N° 2



N° 1



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THE

NATIONAL ENCYCLOPÆDIA:

A DICTIONARY OF

UNIVERSAL KNOWLEDGE.

GUARDIAN.

GUARDIAN, one who has the care of a person and his property. Guardians are appointed only to infants. The law of England indeed provides guardians for idiots and lunatics, but the rules relating to them will be more conveniently considered under **LUNATIC**. In the Roman system the terms Tutor and Curator correspond in some degree to the English Guardian. [**CURATOR**.]

The usual division of guardians is:—I. Guardians by the common law. II. Guardians by custom. III. Guardians by statute.

I. *Guardians by the Common Law* were of four kinds; guardians in chivalry, in socage, by nature, and for nurture.

1. *Guardianship in Chivalry* is now abolished by the Stat. 12 Car. II. c. 24, which abolished the onerous portions of the feudal system. This guardianship, being considered more an interest in the guardian than a trust for the ward, was saleable, and, if not disposed of, passed at the lord's death to his personal representatives.

2. *Guardian in Socage*.—This also is a consequence of tenure, and takes place only where lands of socage-tenure descend upon an infant under the age of fourteen. Upon attaining that age, the guardianship in socage ends, and the infant may appoint his own guardian. The title to his guardianship is in such of the infant's next of blood as cannot have the estate by descent in respect of which the guardianship arises. The guardian in socage is entitled not only to the custody of the person and socage estates of the infant, but also to his hereditaments not lying in tenure, and even his copyhold estates, where no custom to the contrary exists in the manor of which they are held, and also his personal property. The guardianship in socage is not saleable or transmissible, but on the death of the guardian the wardship devolves on the person next in degree of kindred to the infant, who cannot be his heir, and the guardian is accountable to the infant for the profits of his estate.

3. *Guardian by Nature*.—This species of guardianship has no connection with tenure. It extends only to the custody of the infant's person, and lasts till he attains twenty-one. Any ancestor of the infant may be such a guardian, the first right being in the father, the next in the mother, and, if they be dead, the ancestor to whom the infant is heir has a right to the custody of his person. Until fourteen, it seems the guardian in socage is entitled to the

GUARDIAN.

custody of the person, and after that age the guardian by nature.

4. *Guardians for Nurture* are the father and mother of the infant. Both these last descriptions of guardianship are also superseded by the appointment of a guardian by statute.

Where an infant is without a guardian, the Court of Chancery has power to appoint one; and this jurisdiction seems to have vested in the king, in his Court of Chancery, upon the abolition of the Court of Wards. Where a proper case exists for the jurisdiction of this court, it will interfere not only with the property of the infant, but also with the custody of his person, and will, in case of any misbehaviour, remove a guardian, however he may have been appointed or constituted, and will appoint a proper guardian to the infant in his room. There was an instance of this jurisdiction in the case of the Duke of Beaufort *v.* Wellesley—where Lord Eldon deprived a father of the custody of his children, as not being a fit person to have the charge of them. All courts have power to appoint a guardian to defend a prosecution or suit instituted by or against an infant. (Co. Litt., 88, b. Hargr. note.) Guardians are now appointed by the judges of the Court of Chancery in chambers upon summons.

II. *Guardians by Custom*.—By the custom of the city of London the guardianship of orphans under age and unmarried belongs to the city; and in many manors particular customs exist relating to the guardianship of infants.

III. *Guardians by Statute*.—Guardians by statute are now appointed by virtue of 12 Car. II. c. 24. Under this statute, fathers, whether under age or of full age, may, by deed or will attested by two witnesses, appoint any person or persons guardians of their unmarried children until they attain twenty-one, or for any less period. But by 1 Viet. c. 26, §§ 7, 8, no will made by a person under twenty-one years of age is valid.

A guardian appointed under this statute supercedes all other guardians, except those by the custom of London, or any city or corporate town in favour of which an exception is made, and is entitled to the custody of the infant's person and his property. If two or more persons are appointed guardians under the provisions of this statute, the guardianship remains to the survivor.

The words guardian and warden are of the same signification: indeed they were formerly used indif-

ferently. Thus the Warden of the Cinque Ports was styled Guardian, or in the old French, Gardeyn, and Churchwardens were styled Gardeyns del Eglise.

GUARDS, in military matters a body of men, whose duty it is to secure the army, or any place, from surprise; and for this purpose there are various kinds of guards; as the *main-guard*, *van-guard*, *rear-guard*, *baggage-guard*, *mounted-guard*, &c. But in a special sense the term more immediately applies to the brigade of household troops, whose duty is to protect the person of the sovereign, and who never leave the country unless their services are specially required abroad. Of these, there are three regiments of foot and three of horse guards. Of the one there are the Grenadiers, the Coldstream, and Scots Fusiliers; and of the other, the First and Second Life-guards, and the Royal Horse-guards. Commissions in these regiments cost more than in others; but the pay is higher, and a grade of superior army rank accompanies each regimental commission. Thus a captain in the guards ranks as a lieutenant-colonel in the army, and a lieutenant as captain.

GUARDSHIP is the man-of-war in charge of a port. It is also used as a *dépôt* for naval recruits until they are attached to other vessels. The captain of a guardship is responsible for the safety of all the war-ships laid up out of use in the harbour.

GUARINI, GIOVANNI BATTISTA, was born at Ferrara in 1537, of a family which had produced several distinguished men of letters. After receiving a careful education he was taken into the service of Alfonso II, duke of Ferrara, who sent him on several missions as his ambassador. In 1582 Guarini left the court, and retired to his villa near Rovigo. After four years he was recalled by Alfonso, who appointed him secretary of state; but Guarini soon after resigned again, and passed into the service first of the duke of Savoy, and afterwards of Vincenzo Gonzaga, duke of Mantua. In 1591 he was once more recalled to Ferrara. In 1592, Alfonso having died, Guarini offered his services to Ferdinand de' Medici, grand-duke of Tuscany, by whom they were readily accepted; but having some time after quarrelled with him also, he passed into the court of Francesco Maria, duke of Urbino. Becoming dissatisfied here also, he left the duke of Urbino, and went to Rome, Ferrara, and lastly Venice, where he died in October, 1612. He often complained of the trammels, jealousies, and ingratitude of courts, and yet could not live away from them. Guarini wrote poetry of various kinds: the most celebrated of his compositions is his 'Pastor Fido' (the faithful swain), a pastoral drama. He wrote also a number of madrigals, and other specimens of lyric poetry. His works were collected and published in four vols. 4to., Venice, 1737.

GUASTALLA. [PARMA.]

GUATEMALA. [CENTRAL AMERICA.]

GUATEMALA LA NUEVA, capital of the state of Guatemala, the first of the republics of Central America in population and wealth, is situated in 14° 37' N. lat., 90° 30' W. long., on a plain, which is about 14 miles long, 9 wide, and 4372 feet above the sea-level; it is 120 miles from the Atlantic and 50 from the Pacific. Population about 60,000. It is built with great regularity; the streets are straight, and cross one another at right angles. They are 40 feet wide, and always terminate in some conspicuous

building; are well paved, and slope from each side towards the middle, where a stream of water runs. The houses have only one story, but occupy a great deal of ground, containing within their walls one, two, or even three court-yards, which have a basin full of water in the middle, and are surrounded by a portico of wooden columns, under which is the entrance to the rooms: the roofs are flat. The town is well provided with water brought by an aqueduct from a spring about four miles distant. The most remarkable buildings are round the market-place, which is situated nearly in the centre of the town. On three sides of it are projecting piazzas, which form a covered walk, under which various articles are exposed to sale. On the east side stands the cathedral, a simple but noble building, and near it on one side the palace of the archbishop, and on the other the University. Besides the cathedral there are twenty-four churches, and religious observances are incessant, chiefly attended by women, who throng the churches at matins and vespers. The town is the seat of an archbishop and of the government authorities; it has a mint, university, two colleges, an hospital, barracks, a public library, and several other literary and scientific institutions. Guatemala enjoys a perpetual spring. The thermometer rarely rises above 80°, and still more rarely descends below 60°. Earthquakes are frequent. New Guatemala has a flourishing trade with Vera Cruz, Mexico, &c., in sugar, cotton, coffee, dye-woods, and other native products. The inhabitants are apt in arts and manufactures; they produce muslins, fine cotton yarn, silver articles, artificial flowers, and embroidery, of high excellence.

Guatemala la Antigua (Old Guatemala), which is about 26 miles W.S.W. of the capital, is situated in a wide valley of great fertility, at the western end of which rise the two volcanoes of De Agua and De Fuego, each about 13,000 feet high. The town itself is at an elevation of 5817 feet. After its partial destruction in 1773, and the foundation of New Guatemala, the Spanish government ordered the place to be abandoned. But as a considerable portion of the town had not suffered by the earthquake, people still returned to it, and the population in 1863 was about 20,000. Among the buildings which have not been destroyed is the cathedral, and the town-hall, a magnificent edifice, and a sample of the style in which the place was built. The town has lately made great progress by the introduction of cochineal cultivation. [CENTRAL AMERICA.]

GUAVA. [PSIDIUM.]

GUAYANA. [GUYANA.]

GUAYAQUIL, an important river in Ecuador, South America. It may be said to be the only stream on the western coast of that continent which is navigable for sea-going vessels. It is navigable to Caracol, about 110 miles, and is known in its upper course successively as the Caracol and Babahoyo.

GUAYAQUIL, the capital of the department of Guayaquil, in the republic of Ecuador in South America, is situated in 2° 12' 12" S. lat., 79° 39' 46" W. long., on the river Guayaquil, which is about two miles wide opposite the town, and enters the sea 40 miles below it, near the island of Puna. Population in 1863, 22,000. Vessels of considerable burthen can sail up to the town, as the tide at full

and change rises 24 feet. The town is built on the northern side of the river, on a low ground devoid of drainage; in the rainy season it is very unhealthy, malignant fevers being then (from December to April) very prevalent. The whole town extends about two miles along the river, but its breadth is inconsiderable. The houses have commonly one story, and the framework is made of strong timbers, in order to resist the shocks of earthquakes, which are often experienced here. In the principal street, the Calle de Comercio, however, almost all the houses are two stories high; the ground-floors being divided into small shops, and occupied by artisans of different trades. The town is divided into two parts, the old and the new. The principal buildings are the cathedral, two hospitals, and two colleges; the last of which have faculties of theology, philosophy, and law. None of the public buildings are distinguished by architectural beauty. Several large balzas are constantly employed to bring fresh water down the river from a distant place. There are few spots, even between the tropics, which, for richness and vigour of vegetation, can vie with the wide valley traversed by the river of Guayaquil. The town has the best harbour on the Pacific shores of South America; and European goods, chiefly fine cottons, woollens, silks, liquors, grocery, soap, metals, and flour, are imported in considerable quantities, and sent up the river to Caracol, whence they are carried on the backs of mules to Quito. The exports from Guayaquil, in order of worth, are cocoa, straw-hats, timber, bark, hides, orchilla, tobacco, sarsaparilla, canes, india-rubber, and coffee. The exports and imports are each valued at about 500,000*l.* a year—one-fourth of which is to and from the United Kingdom. [ECUADOR.]

GUBBIO. [ROMAN SCHOOL OF PAINTING.]

GUBEN. [BRANDENBURG.]

GUDGEON, a small fish common in many of the rivers and other running streams of this country, and also in most other parts of Europe. It is generally about five or six inches in length. The upper parts of the head and body are of an olive-brown colour spotted with black, and the under parts are white. The dorsal fin and the tail are brownish, and spotted with a deeper colour.

The gudgeon belongs to the family *Cyprinidae*, and genus *Gobio*, which latter differs chiefly from the genus *Barbus* (the barbels) in having no strong bony ray at the commencement of either the dorsal or anal fins. Like the barbels, the gudgeons have both the dorsal and anal fins short, and are furnished with barboles, or cirri, about the mouth.

GUELDERLAND, or GELDERLAND, a province of the kingdom of Holland, lying between 51° 45' and 52° 32' N. lat., 4° 57' and 6° 47' E. long., is bounded N. by the Zuider-Zee and Overysse, W. by Utrecht and South Holland, S. by North Brabant, and E. by the Prussian Rhein-Provinz. Its area is 1972 square miles, and the population in 1862 was 411,947. The surface is in general level, but not so flat or low as the adjoining maritime provinces, and the climate is healthy; the soil is good and the pasture luxuriant; but there is a considerable quantity of heath and barren land, some of which is planted with firs, pines, and oak. Guelderland is watered by the Rhine, the Waal, the Yssel, the

Maas, and the Leck, besides which rivers there are several canals. It is crossed by the Amsterdam and Arnheim railroad. Wheat, rye, buck-wheat, potatoes, hops, and tobacco are the principal crops. Orchards are very numerous, and the province is altogether the finest in Holland. Portions of it bear the name of the 'Dutch Paradise,' being studded with country seats, parks, and gardens. Some few manufactures are carried on; among these, paper-making and tanning are the principal.

The capital of the province is ARNHEIM.

Nimeguen or Nymegen, the Roman *Noviomagus*, stands on the left bank of the Waal, and has 21,765 inhabitants. It is built on the slope of a hill, and strongly fortified. The town is well built, but the streets are narrow. The quay is separated from the town by a wall. The most remarkable buildings are the town-house and the church of St. Stephen. Some Roman antiquities have been discovered. On an eminence above the town is the fine café and promenade of the Belvedere, from which there is a very interesting prospect. Nimeguen is a large market for cattle and agricultural produce, especially grain. Beer is extensively brewed, Eau de Cologne distilled, and there are factories for spinning and weaving linen, cotton, and silk. It is famous for the treaties of peace concluded here, August 10, 1678, between Spain, France, and Holland; and February 5, 1679, between Spain and France, the emperor of Germany, and Sweden.

Zutphen, at the siege of which in 1591 Sir Philip Sidney fell, is a strongly fortified town on the right bank of the Yssel, and has 13,973 inhabitants. The ramparts are planted with trees, and form a pleasant public walk. The town is well built, and contains several pretty churches, a town-hall, a house of correction, and the S' Gravenhof, or palace of the counts of Gelderland, all of which are stately edifices.

Hardevyk is a port on the Zuider-Zee; the inhabitants, about 5500 in number, carry on the herring-fishery, and have a considerable corn trade. It was at one time a Hanse Town, is fortified after an ancient fashion, and has a good harbour.

Thiel, a fortress on the right bank of the Waal, is a place of some manufacturing industry, and has 6400 inhabitants.

GUELPHIC ORDER, a military order established in 1815, entitled the Royal Hanoverian Guelphic Order.

GUELPHS and Ghibelines, the names of two great political parties which divided Italy and Germany during the middle ages. The words originally were the war-cries of the partisans of Conrad, duke of Franconia, of the Hohenstauffen family, and Henry the Lion, duke of Saxony, the house of Welf, rival candidates for the empire; but in course of time the name of Guelphs was given to all who were disaffected to the emperor, and that of Ghibelines to the supporters of the imperial authority. The names of Guelphs and Ghibelines passed into Italy, and during the reign of Frederick II. it was divided, as it were, into two camps. When the emperors lost their hold upon Italy, the names of Guelph and Ghibeline were used to distinguish the municipal factions, the Ghibelines being for the most part animated by a spirit of aristocracy, the Guelphs professing to be favourers of a popular form of

government. In the fifteenth century the names of Guelphs and Ghibelines had become a mere traditional shadow, and were at length extinguished with the independence of the Italian republics.

GUENONS, the French name of a group of monkeys belonging to the ancient continent and its islands, and of which the type may be considered to be the Green Monkey (*Cercocebus Sabaeus*, Geoffroy) (*Cercopithecus Sabaeus*, Exleben).

The apes and monkeys of the Old World (family *Simiadae*) may be resolved into the following groups or subfamilies:—

Subfamily I.—Tail wanting; arms long; general figure anthropoid; stomach simple; cœcum with a vermiform appendix.—Genera, *Troglodytes*, *Pithecus*, *Hylobates*.

Subfamily II.—Tail long; no cheek pouches; stomach complex; figure slender; laryngeal sacculi; no vermiform appendix. Thumb of forehands short or rudimentary.—Genera, *Semnopithecus*, *Colobus*.

Subfamily III.—Tail variable; cheek pouches; stomach simple; laryngeal sacculi variable; general figure more robust than in the second subfamily, often massive.—Genera, *Cercopithecus*, *Macacus*, *Cynocephalus*.

It is to the genus *Cercopithecus*, including its subgenera, that the term Guenon strictly appertains. The leading characters are as follows:—Muzzle moderately prominent; the facial angle 45° to 50° ; head round; superciliary ridge moderate; molars crowned with acute tubercles; last molar of the lower jaw, except in one subgenus, with only four tubercles; cheek pouches usually ample; laryngeal sac variable; ischiadic callosities moderate; general contour light, but vigorous; limbs muscular; tail long; fur moderate; hair in general annulated. Locality, Africa.

The *Cercopithecæ*, or *Guenons*, are arboreal in their habits; they inhabit wild forests, and associate in large troops, being, as far as is known, all gregarious in their habits. Their actions are full of energy; restlessness, petulance, and inquisitiveness mark their disposition. During infancy they are gentle, but become irascible and malicious with age. Though their form is light, it is muscular and vigorous, and the limbs are well proportioned; hence the Guenons differ very materially from the *Semnopithecæ* [*SEM-NOPITHECUS*], having neither the meagre contour of body, the long slender limbs, nor the depressed face of the latter. The chest is deep, the loins narrow; the tail is long, and acts, though not so decidedly as in the *Semnopithecæ*, as a rudder and balancer in their motions, which are characterized by abruptness, energy, and decision. They express their displeasure by grinning and chattering, and though seldom venturing to make a decided attack, yet, congregated in large numbers in their native woods, they harass intruders with missiles, and are not to be repelled without difficulty. Their diet is almost exclusively frugivorous, and they often commit great havoc in fields of grain adjacent to the wooded parts of the country; and that not only by what they devour on the spot, but also by what they carry away in their cheek pouches, which extend beyond the angle of the lower jaw, and which, when opportunity serves, they cram with food to be eaten at leisure.

The *Cercopithecæ* are numerous, and resolve themselves into several small groups or sets, according to

the mutual alliances of the species: these are respectively represented by the Patas, the Green Monkey, the Talapoin, and the Pogonias. The White-eyed or Sooty Monkeys form a good subgenus. It is characterized by the presence of a fifth tubercle on the last molar of the lower jaw, by the magnitude of the upper middle incisors; and by the hair being destitute of annulation.

As an example of the genus *Cercopithecus*, we may select the Mona, or Varied Monkey (*C. Mona*) of Western Africa (Guinea).



Guenon (*Cercopithecus Mona*).

The specific characters of this elegant Guenon are as follows:—Head of a yellowish olive colour; a black frontal stripe above the eyebrows is surmounted by another of a whitish tint; back chestnut brown; haunches and limbs externally dusky black; tail black, with a white spot on each side of its origin, on the crupper; under parts and inside of the limbs white; whiskers very full, of a yellowish tint, slightly washed with black.

GUERCINO (properly GIOVANNI FRANCESCO BARBIERI) was born in the year 1590, at Cento, a village near Bologna, belonging to the province of Ferrara. He gave very early proof of his talents, by painting the figure of the Virgin on the front of his father's house when he was only ten years of age. He studied under his countrymen Cremonini and Benedetto Gennari. In his first style he followed the manner of Michael Angelo da Caravaggio. His second style, which is the best and most esteemed, was formed on the results of his observation, the study of the Roman, Venetian, and Bolognese schools, by his connection with the most eminent scholars of the Carracci, and the personal friendship of Caravaggio. He established an academy at Cento in 1616, to which numerous disciples resorted. The general applause which the public lavished on the works of Guido induced him to adopt a third style, in which he endeavoured to attain the suavity of manner of that artist. On the whole, his works are inferior. He died at Bologna in 1666, in the seventy-sixth year of his age. His works are at Rome, Parma, Piacenza, Modena, and Reggio, and in most of the museums and cabinets of Europe.

GUERET. [CREUSE.]

GUERRILLAS (Span. *guerra*, 'war'), a body of men who fight in a desultory manner, and more especially applied to those Spanish *guerrilleros* who

took up arms against the French during their invasion of the Peninsula. Hence the general operations of that war were distinguished by the activity and determination of the Spanish guerrillas, who, without discipline, but acting in concert, assembled in bands at a brief notice, and employed themselves in intercepting detachments and convoys as they passed through the mountains. General Mina, who had 3000 of these men under his command, was one of the principal chiefs, and many extraordinary feats are related as having been performed by him. This term was also applied to armed bodies of men during the recent American conflicts, when not embodied in the regular military services.

GUERIN, PIERRE NARCISSE, BARON, a distinguished French painter, born at Paris in 1774, was the pupil of J. B. Regnault. His works are the perfection of manner in imitation of the antique. The first which attracted general attention was—*Marcus Sextus*, having escaped the proscriptions of Sulla, returns, and finds his daughter weeping by the side of her dead mother; exhibited in 1798: in 1802 he exhibited an *Offering to Æsculapius*, and *Hippolytus* accused by *Phædra*, brought before *Theusis*; in 1808, Bonaparte pardoning those who had revolted at Cairo; in 1810, *Pyrrhus* and *Andromache*, and *Cephalus* and *Aurora*; in 1817, *Dido* listening to the story of *Æneas*, *Ægisthus* urging *Clytemnestra* to murder *Agamemnon*, and *St. Geneviève*.

Guerin was appointed a professor in the *Ecole Royale des Beaux-Arts* in 1814; and he was some years director of the French Academy at Rome: he was created Baron after his return from Rome in 1829. He died at Rome, July 16, 1833. He was member of the Institute and of many foreign academies, and chevalier of the *Légion d'Honneur*, and of the order of *St. Michael*. Many of his works are in the Louvre.

GUERNSEY, one of the islands of the English Channel, belonging to England, is situated between 49° 24' and 49° 30' N. lat., and 2° 32' and 2° 47' W. long. The form of the island approximates to that of a right-angled triangle: the sides face the south, east, and north-west, and are respectively about 6½, 6, and 9 miles long. The coast is somewhat difficult of approach, from the number of the rocks and the rapidity of the currents around it. The tides rise to the height of 32 feet. The northern part of the island is a level tract, and the coast for the most part lies low: the southern part is more elevated, but the high ground is intersected by narrow valleys and deep glens, and the coast is lofty and abrupt. Springs and rivulets are plentiful. The island is almost entirely of granitic formation: the rocks are chiefly gneiss, granite, and sienite.

The soil is fertile, but the improvement of the land has been checked in parts by the subdivision of property, under the law which gives to each son an equal share in his father's property. The country people live upon and cultivate their own estates, the largest of which is said not to exceed 200 Guernsey vergées, or about 74½ English acres, and few of them exceed half that size. A man who farms 20 or 30 acres is accounted a large farmer; the holdings commonly vary from 5 to 12 acres; and the subdivision is progressively going on. Agriculture is carefully attended to; and as much as 54 Winchester

bushels of wheat have been raised per acre. The ashes of sea-weed are the manure chiefly used for corn crops. Neither sheep nor horses are carefully reared; but cows are bred in large numbers, and are much valued for the quantity and richness of their milk. The dairy is on all farms of any size the principal object of attention, and the chief source of the farmer's profit. The butter is in high repute. Rents vary from 10s. to 10*l.* an acre. The chief crops are vegetables, wheat and barley, and apples for cider. The climate is moist, but healthy, and so mild that oranges, melons, figs, myrtles, and the Guernsey lily, flourish luxuriantly. In the north are many tracts of heath; and as wood is not plentiful, fences are commonly made of stone or turf. In some parts, however, there is tolerable abundance of wood, and gentlemen's seats are generally shaded by trees. The shores are abundantly supplied with fish.

The only division of Guernsey is into parishes: these are ten in number, and are as follows:—*St. Andrew*, *Câtel*, *Forest*, *St. Martin*, *St. Peter du Bois*, *St. Sampson*, *St. Saviour*, *St. Torval*, *the Vale*, and *St. Peter's Port*. The population at the last census was 29,804, the area being 15,560 acres. The manufactures are of no importance. Granite, from *Sampson* harbour, employs most of the shipping. The principal articles made in the island are soap, candles, cordage, vinegar, and cider. There are several brick-fields and ornamental pottery works. There are also three or four breweries and manufactures of imitation West India cordials. Guernsey is often used as an entrepôt for strong wines by the London houses. Provisions are extremely cheap.

The only town in Guernsey is *St. Peter's Port*, situated on the slope of a hill about the middle of the eastern coast. What is termed *Hauteville* (the upper town), on the slope of the hill, to the south-west of the old town, is the most modern and best built quarter. The appearance of *St. Peter's Port*, on approaching it by sea, is imposing. As the houses rise one above the other, little or nothing is lost to the eye. The streets, however, are narrow, steep, and crooked; and the houses, though substantial, are dusky-looking and old. The government house is a substantial building. Near to it is *Elizabeth College*, a handsome and extensive building, of mixed architecture and monastic appearance, surrounded with spacious ornamental grounds. *St. Peter's church*, a court-house, prison, hospital, three markets, public library, theatre, assembly room, mechanics' institution, savings bank, two joint-stock banks, are among the chief institutions and buildings of the town. *St. Peter's church* is a fine building of the fourteenth century. The harbour, formed by two piers, is small, but sufficient for the trade of the place. The roadstead affords convenient anchorage. The harbour is defended by *Castle Cornet*, and *Fort George*, a regular fortification on the heights, which stands about half a mile south of the town. It is considered to be of great strength, having barracks for 5000 men. The town is the residence of military and civil governors, both appointed by the Crown. The population of the parish and town in 1861 was 16,388.

In trade and commerce Guernsey is far behind Jersey. There is, however, steam communication with Southampton, Weymouth, and London, and

in 1858 telegraphic communication was also established with England.

The exports from the Channel Islands, Guernsey, Jersey, &c., to England were valued in 1863 at 648,508*l.*, but of this amount not more than one-third was the produce of the islands, the greater part being goods from France. The principal articles were butter, 65,819 cwt*s.*, value 300,918*l.*; granite, 143,307 tons, value 85,626*l.*; potatoes, 107,961 cwt*s.*, value 41,794*l.*; cows and calves, 2580 in number, value 40,395*l.*; and eggs, value 28,136*l.* The other articles supplied by the islands are apples, pears, hides, chestnuts, pork, and rags. The imports from the United Kingdom were of much greater importance; the value in 1863 being 1,012,872*l.*, consisting chiefly of the following articles:—

	Quantity.	Value.
Apparel and haberdashery, ...		£311,680
Beer and ale, ...	6,806 b <i>rls.</i>	20,298
Coal, ...	69,379 tons	32,188
Furniture, ...		21,988
Hardware and cutlery, ...	8,741 cwt <i>s.</i>	34,505
Iron, wrought and unwrought, ...	1,569 tons	29,109
Plate, jewellery, and watches, ...		39,789
Woollen manufactures, ...	761,281 yds.	70,833
Foreign produce, provisions, &c., ...		145,096

Guernsey has a political constitution of its own. The island is under a lieutenant-governor, who represents the sovereign in the Assembly of the States, a parliamentary body composed of the bailiff (who is the speaker), and twelve jurats or judges of the royal court; eight rectors, and two constables of each parish; and fifteen deputies from the whole island. These have the power of making laws and imposing taxes. The latter are very moderate, providing an annual revenue of only about 10,000*l.*, and are derived from harbour dues, publicans, and spirit licenses, and other sources.

The chief court of justice in the island is the royal court, which consists of the bailiff and twelve jurats, the former appointed by the Crown, the latter by the islanders. There is an appeal in certain cases to the Queen in council. Norman customs and ancient precedents form the basis of the civil jurisprudence, which is a complex mixture of Norman and English law. The power of the royal court is very extensive and undefined: it has jurisdiction over all the Channel Islands, except Jersey. Pure French is used in judicial and other public proceedings.

The island constitutes a deanery in the diocese of Winchester. There are eight livings and one perpetual curacy. There are eleven churches and three chapels. The incumbents receive only the small tithes, and the livings are very poor. The great tithes are the property of the Crown, and are appropriated to the governor. The glebe-houses are kept in repair at the expense of their respective parishes. The churches are all of great antiquity. Methodists and other dissenters are numerous. An attempt was recently (1865) made to induce the Government to constitute the Channel Islands into a separate diocese, but without success.

Guernsey contains a considerable number of wealthy inhabitants, and there is a greater degree of refinement than in Jersey; but also a greater spirit of exclusiveness, which has excited the notice, and, in some cases, the ridicule of visitors. The best society is, in dress, manner, and language, on

a level with society of the same rank in England. The country people may be divided into three classes: 1, the substantial landowners and farmers; 2, the small proprietors; and 3, the cottagers. The latter often combine many industrial pursuits within their daily range. The natives of the lower order speak the old Norman French. The knowledge of English is very general among the upper and middle classes. The principal place of education is Elizabeth College, at St. Peter's Port. In each of the parishes there is a school with a small endowment; and there are several other schools and benevolent institutions.

In the sixth century Christianity was introduced into the Norman isles by Sampson, archbishop of St. David's, and by St. Magloire or Maglorius. The religion of the island previous to this period was Druidism, and several cromlechs and other supposed relics of that system remain in the northern portion.

The Channel Islands were included in the duchy of Normandy, and are the only relics of that duchy which remain to the English crown. Guernsey was unsuccessfully attacked by the French in the reigns of Edward I. and Edward VI. In the civil war of Charles I., the island sided with the king's party. Protestantism was introduced into the islands in the reigns of Henry VIII. and Edward VI., and made considerable progress. The islanders have ever since been remarkable for their adherence to the faith of the Reformation, but have always shown a leaning rather to the Presbyterian than to the Episcopal discipline.

Dependencies of Guernsey, viz., Alderney, Sark, Herm, and Jethou.—Of Alderney an account is given elsewhere. [ALDERNEY.] *Sark, Serk, or Sarco*, is about seven miles east of Guernsey. It measures about 3 miles by $1\frac{1}{2}$; but it is so contracted near the centre that it may be regarded as consisting of two parts, one of which is called Little Sark, and they are connected by a high and narrow ridge or isthmus called the Coupée. The coast is indented on every side by small bays; and is so girt with cliffs that there is no way of landing on the island but by scrambling up the cliffs or ascending by a tunnel cut through the solid rock in the little harbour of Creux, on the north-east side. Sark is a table-land, and when approached from the sea presents the appearance of an inaccessible wall of rock, from one to two hundred feet high; but it is broken into romantic valleys, watered by little tumbling brooks, diversified with wood, and, wherever possible, under cultivation. Near the west side is the islet of Brechou, about $1\frac{1}{2}$ miles in circumference.

The healthiness of Sark is attested by the fact that, on the average of ten years, the yearly mortality is not quite one in a hundred. The population in 1861 was 583. The land is generally under tillage. The produce consists of wheat, barley, oats, beans, potatoes, parsnips, and mangel-wurzel, of which more is grown than requisite for home consumption. From the indivisibility of property the inclosures are larger than in the neighbouring islands. The total number of acres is 1400. Many sea-fowl and fish are taken round the coasts. The inhabitants manufacture cheese, stockings, gloves, and Guernsey jackets.

The island, in civil, military, and ecclesiastical affairs, is a dependency of Guernsey, but a power of

making local enactments is vested in the lord of the manor and forty copyholders, who form a little parliament that meets three times in the year. The island forms a curacy, to which the Seigneur of Sark presents. There is a church, a Wesleyan chapel, and school.

In the sixth century Sark was uninhabited. In the middle ages it was a nest of pirates, but these having been destroyed by an expedition fitted out by the men of Rye and Winchelsea, the island was again uninhabited till the time of Edward VI. Then it was occupied by the French, but was retaken by some Flemings in the reign of Mary I., Edward's successor. After this it was uninhabited till 1565, when it was settled by a colony sent by Hillary de Carteret, Lord of St. Ouen's in Jersey, under a patent from Queen Elizabeth.

Herm is within two miles and a half of Guernsey; it measures about $1\frac{1}{2}$ miles by half a mile. It is loftiest in its southern part, where the coast is bounded by cliffs; the northern part has a low shore, with sands extending some distance beyond high-water mark. It is rich in corals, sponges, and corallines. The shores afford abundance of sea-weed for manure. The island is composed of gneiss and granite, which last has been quarried in large quantities for the Thames embankment. It has one little harbour. *Herm* attracts conchologists by a beach extending from a half to three-quarters of a mile, composed of small perfect shells and fragments of larger ones, without the least intermixture of sand or pebbles.

Some hundreds of acres of land are under indifferent cultivation. The produce of the island is mostly corn, potatoes, and a few sheep; wild rabbits are abundant. The population of the island in 1861 was 38.

Jethou lies south by west of *Herm*, distance half a mile from it, and two miles and a half from Guernsey: it is less than half a mile long and about a quarter of a mile broad. It is considerably elevated in proportion to its extent, and the sides are precipitous, except at one spot. It is chiefly composed of gneiss, which has been largely used in constructing the harbour of refuge at Alderney. Very little land is under cultivation, the island being principally a rabbit warren. A most valuable and comprehensive work on the Channel Islands, by Professor Ansted, was published in 1862.

GUESCLIN, BERTRAND DU, was born in 1314, at the castle of Motte Broom, near Rennes. He received in the house of his father that military education which was usually given to the nobles of his time, but could never learn to read or write. At the age of seventeen he distinguished himself at a tournament, and soon afterwards fought successfully in many battles and sieges against the English. After the capture of King John of France at the battle of Poitiers, he upheld by his efforts the cause of France against the formidable Black Prince, the son of Edward III. of England, and obtained many advantages over the English, but was at length taken prisoner by Sir John Chandos in 1364. Peace being soon afterwards concluded, Du Guesclin was liberated, and he led a large company of the disbanded military, who had become a scourge to the country by their depredations, to the aid of Henry

de Transtamare, against his brother Peter the Cruel of Spain, but not till they had plundered Avignon, at that time the residence of the pope, and forced him to give them absolution. Supported by this force under Du Guesclin, Peter was driven from his throne, and Henry established in his place. Peter, however, obtained the assistance of the Black Prince, who led a large army to his support, defeated Du Guesclin, took him prisoner, and sent him to Bordeaux. But, it having been hinted to the Black Prince that he kept Du Guesclin prisoner through fear of him, he instantly offered him his liberty on payment of 100 francs ransom; but Du Guesclin refused this, and valued himself at 70,000 gold florins. Being released, Du Guesclin again joined Henry de Transtamare against Peter the Cruel, who was defeated and put to death, and his rival established on the throne of Castile.

In 1369, when war had begun again between France and England, Du Guesclin was very successful, and took many places from the English; but, having at last met with some reverses, he was calumniated to the king, who loudly manifested his discontent. Du Guesclin felt the injury so deeply that he resigned his command, and resolved to go to Spain; but, staying to assist his friend Sancerre in the capture of the castle of Randam, he died during the siege, in 1380.

Du Guesclin is one of the most popular heroes of France, and his life has often been written.

GUIANA. [GUYANA.]

GUICCIARDINI, FRANCESCO, born at Florence, in 1482, of a noble family, distinguished himself early in the study of the law, of which science he was made professor in his native city. In 1512 he was sent by his countrymen as ambassador to Ferdinand of Aragon, and in the following year on a mission to Leo X., who took him into his service, and appointed him governor of Modena, and afterwards of Parma. After the death of Leo, and the short pontificate of Adrian VI., Clement VII. retained Guicciardini in his service, and trusted implicitly to him as his chief adviser, especially on the affairs of Florence. After the surrender of that city to the imperial and papal arms, in 1530, Guicciardini, as the agent of the pope and the Medici, had a considerable share in the changes that took place in the government of the republic, in which a commission of twelve was appointed, called 'the reformers of the state,' of which Guicciardini was by far the most influential. Afterwards, he and the other adherents of the Medici resorted to the old expedient of calling together a parliament.

On the appeal being made to the Emperor Charles V. against the cruelty and licentiousness of the new duke, Alessandro de' Medici, Guicciardini defended his master in an able though sophistical manner, and succeeded in getting the complaint dismissed; he at the same time prevented the duke from yielding to the request of the emperor that he should acknowledge himself his feudatory. When the Duke Alessandro was murdered in January, 1537, Guicciardini by his timely measures prevented a popular explosion, and obtained the appointment of Cosmo de' Medici as governor of the Florentine republic. Here, however, Guicciardini miscalculated. Cosmo soon exchanged his title as governor for that of duke.

Guicciardini resigned his office, and withdrew to Arcetri, where he employed himself in writing the contemporary history of Italy. He died in May, 1540, at the age of fifty-eight.

Of Guicciardini's history the first sixteen books were published in 1561; the other four appeared afterwards, and the whole twenty together were published for the first time at Venice in 1569, 'Istoria d'Italia di Francesco Guicciardini, Gentiluomo Fiorentino, libri xx.' The most complete and correct edition is that by Professor Rosini, of Pisa, 10 vols. 8vo., 1819-20. Guicciardini stands by common consent at the head of the general historians of Italy. In his tone, however, he cannot be called either moral or patriotic.

GUIDES, in military matters, a corps for obtaining intelligence respecting the country through which an army is passing, and for ascertaining the route or position of the enemy. They invariably accompany head-quarters in time of war. They formerly consisted of the country people in the neighbourhood where an army was encamped, or through which it was marching; but of late years the guides have been formed into a regular corps, with proper officers to command them; and often very useful have they proved in military operations.

GUIDO D'AREZZO was born at Arezzo, in Tuscany, towards the end of the tenth century. When young, he entered a Benedictine monastery, and afterwards became a monk of the order. There he first conceived a new method of writing music, and of instructing in the art; and having well digested his plan, he there also carried it into effect, at a school opened by him for the purpose. He went to Rome on the invitation of Pope John XIX., and then visited the abbot of Pomposa, in the duchy of Ferrara, where he wrote his 'Micrologus,' or brief discourse on music, in which most of his inventions are described, as well as his method of instruction. But his doctrine of solmisation, or the use of the syllables *ut, re, mi, &c.*, is explained in a small tract under the title of 'Argumentum novi Cantus inveniendi.' To Guido we are indebted for the invention of the staff, *i.e.*, the lines and spaces in music, for the reformation of the scale, as also of the mode of notation, and for the art of solmisation.

GUIDO RENI (whom we place here as being, like Raphael, more generally known by his Christian name) was born at Bologna in 1574, where he studied painting, first under Denis Calvart, a Flemish artist, and afterwards visited the school of the Carracci. His genius was not equally adapted to all subjects. He preferred and excelled in those in which tenderness, pathos, or devotion predominate; and in these he is distinguished from all other painters. His standard of female beauty was founded on the antique, the Venus de' Medici, and the Daughters of Niobe. Among his most celebrated works were, an altarpiece in the church of St. Philip Neri at Fano, representing Christ delivering the keys to St. Peter; a St. John in the Archiepiscopal Gallery at Milan; the Virgin and Child and St. John, in the Tanaro Palace at Bologna; and the Penitence of St. Peter after denying Christ, with one of the Apostles comforting him, in the Zampieri Palace, one of his most excellent works. Died in 1642, aged sixty-eight.

GUYENNE. [GUYENNE.]

GUIGNES, JOSEPH DE, born in 1721, at Pontoise, studied the Oriental languages under Etienne Fourmont. In 1745 he was nominated Oriental interpreter to the royal library in the place of Fourmont, and in 1752 was chosen a member of the Académie des Belles Lettres. The French Revolution reduced him to great destitution, but he supported his misfortune with perfect equanimity. He died at Paris in 1800.

His 'Histoire Générale des Huns, des Turcs, des Mogols, et des autres Tartares Occidentaux,' Paris, 1756-58, 5 vols. in 4to., is written with great industry, and founded upon Oriental authorities; but the work is considered defective in criticism and style. He was also the author of twenty-eight memoirs, inserted in the collection of the 'Mémoires' of the Académie des Inscriptions, and of some other learned works.

GUILDFORD. [SURREY.]

GUILDHALL, the building in London answering the purpose of a town hall. In it nearly all public business connected with the different offices of the corporation is transacted. Various courts are also held there, such as the courts of Queen's Bench, Common Pleas, Common Council, Aldermen, and a police court, presided over by one of the aldermen. The building was commenced in 1411, and additions were made at different times till the great fire of London in 1666, when the roof was entirely destroyed. The interior was renovated by Sir Christopher Wren, and again in the last century by Dance, who added the present front. During the last few years great improvements have been made, especially with respect to light and ventilation. In 1865-66, the old roof was replaced by a very handsome one of oak, ornamented with Gothic tracery, and the interior of the building thoroughly cleansed and re-embellished—the entire cost amounting to upwards of 30,000*l*.

The building is situated at the end of King Street, Cheapside. The large hall is 153 feet in length, 49 in breadth, and 60 in height, and is capable of containing from 5000 to 6000 persons. In it are placed the giant statues of Gog and Magog, and it is celebrated for the magnificence of the civic entertainments held there.

The Guildhall is the place where the citizens have for many centuries been accustomed to assemble, not only to transact municipal business, but also freely to discuss public grievances, to consider and suggest remedies for great social evils, and to promote the general interests of humanity. Within its walls events of deep public interest and importance have taken place.

GUILDS. [MUNICIPAL CORPORATIONS.]

GUILLEMOTS (*Uria* of Brisson, Temminck, and others), a genus of sea-birds which Linnæus regarded as a section of his genus *Colymbus*, and which Cuvier places in his family of the *Plongeurs* or *Brachyptères*, a family which includes the Grebes (*Colymbus*), the Guillemots (*Uria*), the Auks (*Fratercula*, *Alca*, &c.), and the Penguins (*Aptenodytes*, *Spheniscus*, &c.)

By most modern ornithologists the Guillemots are placed in the family *Alcade* [ALCA; AUK], as a transition link between the Divers (*Colymbus*), and the more typical Auks, and other genera. [PENGUIN.]

The generic characters are as follows:—Bill of

moderate length, straight, strong, compressed, and cultrated; upper mandible slightly arched towards the tip; angle of the lower mandible gently ascending; commissure nearly straight; nostrils basal, lateral, concave, longitudinally cleft, and half covered by a feathered membrane advancing from the forehead and sides of the face; wings short, narrow, and acute; tail of twelve or fourteen feathers, very short; legs situated at the back part of the abdomen; the tibiae concealed within the integuments; tarsi short and compressed; feet of three toes, all directed forwards, and palmated; outer and middle toes of equal length; the inner one much shorter; claws falcate and sharp pointed.

Geographical Distribution and General Habits.—

The Guillemots seem specially framed for existence in the Arctic and even Polar regions, and are seldom comparatively found in the warmer latitudes. In the north they swarm on all the rocks and islets of the chilling seas. In the short but bright summer that gilds some of their northern haunts they make haste to deposit their eggs, sometimes only one, on the bare rock, without wasting the precious days in making a nest. On the naked ledge that overhangs the sea the young Guillemot is hatched, and, as soon as it is able to bear the shock, is conducted or rather tumbles from its hard nursery into the bosom of the ocean, where a plentiful harvest is spread for it. Here the Guillemots are indeed in their element. Plying their way with wings and feet beneath the waves, and even beneath the ice, they make prey of the small fish and crustaceans which form their principal food. Their native rocks or the ice-caverns shelter them from the storm, and it is only when the winter is more than hyperboreally severe that some of these species are driven to a temporary resort to more temperate climates. Their flight is sharp and rapid, though of no long duration, and generally directed just above the surface of the sea. Their eggs, which are reckoned palatable, notwithstanding their fishy diet, have a thick shell, which has a dull appearance.

The species of the restricted genus *Uria*, as given by Prince Lucien Bonaparte, are—1. *Uria Troile*. Locality, Northern Europe and America. 2. *Uria Brunnichii*. Locality, north of Europe, and north-western parts of North America. 3. *Uria Grylle*. Locality, north and central parts of Europe, and North America generally. 4. *Uria Maudtii*, Licht. Locality, north-east of Europe.

All are subject to a double moult, and the summer dress differs in many respects from that of the winter.

Two species only are truly British: the Foolish Guillemot (*Uria Troile*), and the Black Guillemot (*Uria Grylle*). By way of example, we may describe the Foolish Guillemot as a type of the genus.

Description of both sexes (adult) in their Winter Dress.—Summit of the head, space between the eye and the bill, longitudinal band behind the eyes, and all the upper parts, of a velvety black, slightly inclining to ash; all the lower parts and the extremity of the secondaries pure white: white is also found between the band behind the eyes and the back of the nape, and advances towards the occiput, where it forms on each side an open angle. The ashy blackish colour of the lateral part of the neck seems to form

towards the breast, a kind of collar, feebly indicated by bright ash. Bill ashy black; inside of the mouth livid yellow; iris brown; feet and toes yellowish brown; posterior part of the tarsus and membranes black. Length from the bill to the claws rather more than fifteen or sixteen inches. The female is rather less than the male.

Summer or Nuptial Plumage.—Head, region of the eyes, throat, and all the upper part of the neck, of a velvety brown; inside of the mouth bright yellow: the rest of the plumage as in winter. Thus clad, it is the *Colymbus Troile* of Linnæus and Gmelin; *Le Guillemot* of Buffon; *Foolish Guillemot* of Latham.



Foolish Guillemot (*Uria Troile*).

Young of the Year.—Principally distinguished from the old birds in their winter plumage by the comparative shortness of the bill, which is ashy and yellowish at the base; the black of the upper parts is clouded with ash-colour; the stripe or longitudinal band is not distinct, and mingles by means of ashy spots with the white of the sides of the occiput. Ashy brown predominates on the lower parts of the neck, and the white of the lower parts is not so pure; the tarsi and toes are of a livid yellowish hue.

Geographical Distribution.—The Arctic Seas of the Old and the New Worlds; migratory in winter in large companies along the coasts of Norway and Holland; very common at that time along the shores of the Baltic and the maritime coasts of Holland and France; more rarely found 'upon our seas and great lakes of the interior.' (Temminck.) Spitzbergen, Lapmark, and the White and Icy Seas as far as Kamtschatka. Along the whole coast of Hudson's Bay, Labrador, and Newfoundland. (Nuttall.) The great body of the American birds of this species winter in the Bay of Fundy. (Audubon.)

In the British Islands they are numerous (among other localities) in the Orkneys, on the Bass Rock, the Farn or Fern Isles, the cliffs of Scarborough, the Needles and the cliffs of the Isle of Wight, the Goodeve Rocks not far from St. Ives in Cornwall, and the Isle of Priestholme, contiguous to the island of Anglesey, &c.

Habits, Propagation, Food, &c.—The appellation of Foolish Guillemot has been given to this species from its often suffering itself to be taken by the hand or killed on the spot, especially in the breeding

season, rather than quit the cliff it has chosen for its abode. The sea is the favourite resort of these birds when they leave their cliffs, and there they seek their food, consisting principally of small fish, small marine crustaceans, and small bivalves; they dive with the greatest facility. They are with difficulty roused to flight. Early in April and May, or at the end of March, they begin to assemble on their favourite cliffs in Britain, and lay their single unprotected egg on the flat bare ledge of rock. This egg is generally of a pale green, blotched and stained with black and dark brown (umber). Sometimes the egg is white, with or without a few spots. It is a remarkable sight to see these birds, where they abound, sitting upon their eggs on their rocky shelves, often in line, and so close that they nearly touch each other. As soon as the young are capable of migrating, which is in August, or by the end of that month, they are said to disappear from our shores. Mr. Selby, whose observations are always valuable, gives the following interesting account of these birds:— 'Incubation lasts for a month, and when the young are first excluded they are covered with a thick down, of a blackish gray colour above, and white beneath. This gradually gives place to the regular plumage, and in the course of five or six weeks from the time of hatching they are capable of taking to the water. During the time they remain upon the rock the parents supply them plentifully with the young of the herring and herring-sprats, which form the principal food of this and other species belonging to the *Alcedæ*. Upon the Northumbrian coast these Guillemots breed in great numbers on the Fern Islands, a locality that has afforded me ample opportunities of attending to their economy and watching the changes they undergo. They have selected the summits of three fine isolated pillars, or masses of whinstone (trap-rock), that rise upwards of thirty feet above the level of the sea. Upon these the eggs are laid as close as possible, merely allowing room for the birds to sit upon them, which they do in an upright position. The appearance they make in a dense mass is curious, and the interest is increased by the number of kittiwakes (*Larus tridactylus*) which hover around, and which breed in the small side clefts, or on the projecting angles of the rock; and by the nests of two or three crested or green cormorants, which, from the unusual confidence they display in continuing to sit upon their eggs, even when overlooked from the opposite precipice at only a few yards' distance, seem to be well aware of the security of the station they have chosen. The great body of the breeding birds arrive towards the end of March or the beginning of April, at which time most of them have acquired the perfect nuptial plumage.'

GUILLOTINE, an instrument for the infliction of capital punishment, proposed to the National Assembly of France by Joseph Ignace Guillotin, a physician, a native of Saintes, and a member of the Assembly. It was adopted by a decree of 20th March, 1792.

This instrument, under other names, had existed as a means of public execution long before, in Germany, Bohemia, Italy, Scotland, and England. In German this instrument was called der *Planke der Diele* (the plank of wood), and in older language *Falbeil* (the falling hatchet). In Italy it was known by the name of *Mannaia*. Evelyn, in his Memoirs,

vol. i. p. 170, states that he saw a similar instrument at Naples. Pennecuik, in his 'Description of Tweeddale,' pp. 16, 17, speaks of the Regent Morton of Scotland being executed by the *Maiden* at the cross of Edinburgh, as 'art and part' of the murder of Darnley, 'which fatal instrument, at least the pattern thereof, the cruel Regent had brought from abroad to behead the Laird of Pennecuik of that ilk.' In England, what has been since called the Guillotine was used only at Halifax in Yorkshire, as far back as the time of Edward III. It was in 1650 that the last malefactors there suffered by it. Joseph Ignace Guillotin, who revived the use of this instrument in France, is supposed by many to have perished by his own invention. But this is not correct. He died a natural death, May 26, 1814, at the age of 76.

GUIMARAES. [ENTRE-DOURO-E-MINHO.]

GUINEA, an extensive country on the west coast of Africa, between 15° 41' S. to 10° 20' N. lat., and 10° E. and 14° W. long. The coasts are in general low and unhealthy, but very fertile. The principal rivers are, the Niger or Quorra, the Volta, the Coanza, the Zaire or Conga, and Assinie. The south and west coasts are watered by numerous small streams. The country is divided into North and South Guinea. The chief products are indigo, gold-dust, pepper, cotton, and the sugar-cane. In the forests the elephant, the lion, the rhinoceros, and numerous serpents are found. Fetichism is the prevailing superstition. On the south-west coast is the republic of LIBERIA. The mountains in South Guinea are said to contain copper and iron. The country was discovered by the Portuguese in 1487, and they have always retained nominal possession of the southern districts. The countries along the sea-coast are known to European sailors under six names—Sierra Leone, Grain Coast, Ivory Coast, Gold Coast, Slave Coast, and Benin. Referring for other details to ASHANTEES; COAST, GOLD; DAHOMY, LIBERIA, and SIERRA LEONE, we here treat of Grain Coast, Ivory Coast, Slave Coast, and Benin.

The *Grain Coast* extends from the Sierra Leone peninsula (7° N. lat.) to Cape Palmas (4° 30' N. lat.), a distance of somewhat less than 300 miles. The coast is rocky; the interior is a succession of mountain ridges and of valleys; the mountains are mostly wooded, and the valleys wide and fertile, producing rich crops of rice. Cattle, sheep, pigs, goats, poultry, rice, pepper, camwood, and ivory are plentiful. The species of palm, *Elais Guineensis*, is very abundant and furnishes the palm-oil of commerce, extracted from the seed or nut. Thousands of tons of oil are annually sent to the ports of London, Liverpool, and Bristol, for the manufacture of composite candles. The natives of the neighbourhood, called Kroomen, are an industrious race, very expert seamen, and well known to traders from the Gambia to the Equator. The whole country is divided into three kingdoms, namely Cape Mount, with the towns of Coseeaa and Kingston; Sanguin, with its port Bassa [BASSA]; and a negro kingdom near Cape Palma, inhabited by the Settra Croo tribe. The Grain Coast comprises most part of the republic of Liberia. [LIBERIA.]

The *Ivory Coast* occupies the countries between Cape Palmas and Cape Three Points, a distance of nearly 400 miles. It was so called from the tusks of

the African elephant formerly exported from it in large numbers. In this part the high land of the interior does not come close to the beach, but is divided from it by a low tract, about ten or twelve miles wide on an average. This part of Guinea is inhabited by a number of small negro tribes. The English and Dutch had some establishments west of Cape Three Points, but they have been abandoned. Near Cape Palmas is a spacious and secure harbour formed by a reef.

The *Slave Coast* begins on the west at the Rio Volta, which empties itself into the Gulf of Guinea, near the meridian of Greenwich: it extends eastward to the neighbourhood of the river Formosa, or Benin, a distance of more than 400 miles along the sea-shore. The Rio Volta, which comes down from a great distance, is a broad river in the interior, but towards its mouth it divides into several branches, and forms a kind of delta. The shores of this coast are flat and low, and partly rendered inaccessible by sand-banks. They are covered by extensive salt-marshes and numerous lagoons, traversed by several rivers, among which the Lagos is the most considerable. The interior is partly fertile savannahs, and partly forest. It is divided between the kingdoms of Dahomey, Ardrah, and Lagos. Dahomey occupies the western portion, lying contiguous to the country of the Ashantees. Its capital, *Abomey* ($7^{\circ} 12' N.$ lat.), lies in the mountain-region, and is stated to contain 30,000 inhabitants. The town is walled, and has gates. It trades in oil, ivory, and gold; and is the residence of some English missionaries.—*Calmina*, 15 miles S.E. Abomey, has 15,000 inhabitants. *Whydah* is a town on the shore, being the first city in the state for commerce, though only one of the second in population (15,000). The medium of exchange is the cowrie shells. It is situated in $6^{\circ} 17' N.$ lat., and $2^{\circ} 5' E.$ long. The province of Whydah borders on the Gulf of Guinea, in $0^{\circ} 30' N.$ lat., and $2^{\circ} 10' E.$ long. It is highly fertile, and the inhabitants manufacture and dye good cloths, which, with gold-dust, palm-oil, ivory, and slaves, they exchange with American and Portuguese traders for European manufactures and other produce. Many slaves were lately, and some still are, exported from this district. The chief town is Griwhee, about 8 miles inland.

Several small states lie eastward in the basin of the Niger. *Lagos* is a town 160 miles W. of Benin, with a population of 6000. It was captured and destroyed by the British in December, 1851, and proclaimed a British possession in 1861; since which time the slave trade has been abolished. Revenue (1862), 7130*l.*; expenditure, 6510*l.* Imports, 77,933*l.*; exports, 61,932*l.* This town is the principal port for the country called *Yoruba* or *Yarriba*, which extends from lat. 6° to $9^{\circ} N.$, and from long. 2° to $6^{\circ} E.$ Its length is 350 miles; width, 200 miles. The population is estimated at 2,500,000, the area being about 70,000 square miles. The towns in this district are numerous and large, many of them being ten or twelve miles in circumference, and containing thousands of houses. The state is constantly engaged in petty wars and human sacrifice, and the slave trade still exists. The sea-coast supplies palm-oil; the interior is rich in shee-butter and ivory; and is now (1865) covered with cotton

plantations. *Katunga* is an important town on the Niger, with a population of 15,000.

Benin is a maritime state between lat. 4° and $9^{\circ} N.$, and long. 4° and $8^{\circ} E.$, bounded by Dahomey, Yarriba, the Lower Niger, and the Bight of Benin. Area, 50,000 square miles; population, unknown. The country is well watered, and extremely fertile. Principal rivers, the branches of the Niger at its delta. The religion, government, and customs, are similar to those in ASHANTEE and the rest of Guinea. The export trade is in salt, palm-oil, blue coral, jasper, leopard skins, pepper, native-dyed cloths, and slaves. The town of Benin, capital of the kingdom, is in $6^{\circ} 20' N.$ lat., $5^{\circ} 50' E.$ long., at some distance from the right bank of the river Benin. It occupies a large area, but the population is not probably more than 15,000. It is a mart for live stock, yams, cotton, ivory, and European wares. The king's palace is of great extent, including several squares, with ranges of apartments for officers of state, servants, and others, and with long galleries supported by wooden pillars. The traveller Belzoni died in the town in 1823. (*Johnston's Dictionary of Geography*, 1865; *Milner's History of Geography*, 1864; *Consular Reports*, &c.)

GUINEA, NEW. [PAPUA.]

GUINEA. [MONEY.]

GUINEA-FOWL. [POULTRY.]

GUINEA PEPPER, the seeds of two species of *Amomum*, found on the west coast of Africa, within the tropics; the one, *A. Grana-Paradisi*, the other, *A. grandiflorum*. They are powerfully aromatic, stimulant, and cordial, and are used for the same purposes as cardamoms.

GUINEA-PIG (*Cavia Cobaya*, *Restless Cavy*), the well-known Brazilian rodent now domesticated in Europe.

GUINEA WORM (*Filaria*), a genus of nematoid, or thread-like worms, belonging to the class *Entozoa*. They are long, slender, cylindrical, and slightly attenuated at both extremities. The *Filaridæ* inhabit different animals, and various parts of the body. One of the best known is the Guinea worm (*F. medinensis*), which infests the subcutaneous tissues of the natives of hot climates. Having penetrated the skin a painful and often dangerous tumour is raised. Two other species of *Filaria* are parasitic on man; one in the bronchial tubes, the other in the eye. Other forms are found infesting molluscs, insects, fishes, reptiles, birds, and mammals.

GUINES. [PAS-DE-CALAIS.]

GUINGAMP. [CÔTES-DU-NORD.]

GUIPUZCOA. [BASQUE PROVINCES.]

GUISCARD, or WISCARD, R. [SICILIES, TWO.]

GUISCHARD, CARL GOTTLIEB, was born at Magdeburg in 1724, and died in Berlin, May 15, 1775. He became a colonel in the service of Frederick the Great, and distinguished himself in the Seven Years' War, after the end of which he wrote several works on the military art of the ancients, among which are, 'Mémoires Militaires sur les Grecs et les Romains,' and 'Mémoires Historiques et Critiques sur plusieurs Points d'Antiquités Militaires.'

GUISE, or GUYSE, DUKES OF, the title of a branch of the sovereign house of Lorraine, which settled in France at the beginning of the sixteenth

century. Claude of Lorraine, fifth son of René II., duke of Lorraine, and of Philippa of Guelderland, after contesting his father's succession with his elder brother, went to France, where he married Antoinette de Bourbon in 1513. In 1527 Francis I. made him duke of Guise in Picardy, and peer of France. He died in 1550, leaving a numerous family. One of his daughters married James V., king of Scotland, by whom she had Mary Stuart. Claude's eldest son, Francis, born in 1519, succeeded to the title of Duke of Guise. He had been previously made, by Henry II., Duke of Aumale, in 1547, and he married Anna of Este, daughter of the duke of Ferrara, and granddaughter, by her mother René, of Louis XII. Francis of Guise was the most illustrious of his family, both for his military talents and for his humanity and generosity. He fought in the wars against Charles V., and afterwards against Philip II., and took Calais from the English, who had possessed it for more than two centuries. He and his brother Charles, cardinal of Lorraine, had the principal share in the government of France under the reigns of Henry II. and Francis II. The conspiracy of Amboise (as it was called) by the Calvinists and the prince of Condé, was intended to overthrow the power of the Guises; but the duke, having had timely information of it, removed King Francis II. to Amboise, and had himself appointed lieutenant-general of the kingdom, upon which most of the conspirators were arrested and executed. Under Charles IX. the influence of the Guises somewhat declined. The war of religion having broken out in 1562 by the affray at Vassy, where the duke of Guise's servants and attendants killed a number of Calvinists, the duke fought under the Constable of Montmorency at the battle of Dreux. Shortly after he was murdered in his camp before Orleans by Poltrot de Méré, a Calvinist. Francis' eldest son, Henry, succeeded to his father's titles, and became the leader of his party. Less magnanimous and more factious than his father, he mixed deeply in all the intrigues and plots of the League. Henry of Guise was one of the advisers of the St. Barthélémy massacre, and he ordered the murder of Coligny. He excited the fury of the populace against the Calvinists, whom he not only defeated in battle, but hunted down in every part of the kingdom. After the death of Charles IX., he ruled at will over Henry III., and obliged him to break the promises of peace and toleration which he had made to the Calvinists. Henry III., however, and even his mother Catherine de' Medici, became jealous of the ambition and weary of the insolence of the Guises, and the duke was forbidden to appear at the court and at Paris. Upon this he raised the standard of revolt against his sovereign, and defeated him in his own capital on the 12th May, 1588. The king withdrew to Chartres. The states were assembled at Blois on the 16th October, 1588, and the deputies were found to be almost wholly in the interest of the duke of Guise and his brother the cardinal, who were present. The duke demanded to be appointed high-constable and general-in-chief of the kingdom. Henry then resorted to assassination in order to get rid of the Guises. As the duke was entering the royal apartment on December 23, 1588, he was pierced with daggers, and died at thirty-eight years of age. The

cardinal, his brother, was arrested and killed in prison the next day. Their brother, the duke of Mayenne, escaped. Charles, eldest son of Henry of Guise, was arrested at Blois, and confined in the castle of Tours, from which he escaped in 1591. He and his uncle of Mayenne, and his cousin Charles, duke of Aumale, became the leaders of the League against Henry IV. After that king's abjuration, Charles, duke of Guise, submitted to him in 1594, and the duke of Mayenne followed his example next year. Charles was made governor of Provence, but, under the following reign of Louis XIII., Cardinal Richelieu, jealous of his name and influence, obliged him to leave France. He retired to Tuscany, where he died in 1640. His son Henry II., born in 1614, was at first brought up for the church; but after the death of his elder brother he quitted the clerical state, and assumed the title of Duke of Guise. Having conspired against Cardinal Richelieu, he was tried by the Parliament, and condemned *per contumace*, in 1641. In 1647 he placed himself at the head of the revolted Neapolitans, but was taken prisoner by the Spaniards; and, being released in 1652, he returned to Paris, where he died in 1664, leaving no issue. His 'Mémoires' were published after his death. His younger brother, Louis, duke of Joyeuse, left a son, Louis Joseph of Lorraine, duke of Guise, who died in 1671, leaving an infant son, who died in 1675, five years of age. The line of the Guises thus became extinct.

GUITAR, a musical instrument which, in various shapes, may be traced to the remotest periods of antiquity. The word is derived from the Greek *κίθάρα*; and the terms *Cittern* and *Gittern*, used by the old English poets, are but corruptions of the primitive word.

The English and French guitar of the last century was wide and thin in the body, short in the neck, and strung with wire. The modern guitar, which is of the Spanish kind, and differing little from the lute, consists of a body from seventeen to eighteen inches in length, four in depth, and of a neck of about sixteen inches, the latter carrying a finger-board, divided by seventeen frets. It has six strings, three being of silk, covered with silvered wire, and three of catgut. The instrument is much esteemed in Spain and Italy.

The compass of this elegant instrument is from κ below the bass staff to Λ above the treble staff, including all the intermediate tones and semitones. The best and cheapest guitars are made in Germany.

GUJERAT, or **GUZERAT**, a considerable walled town of the Punjab, 72 miles W.N.W. of Lahore, rendered memorable as the scene of the last effort made by the Sikh army against the British forces, under Lord Gough, February 21, 1849, when they were signally defeated, and their territory annexed to the British dominions. In this action the Sikhs lost fifty-three guns, and their army of 60,000 men was entirely broken up and dispersed. [**HINDUSTAN.**]

GULF. [**BAY.**]

GULF-STREAM. [**ATLANTIC OCEAN.**]

GULL. [**LARIDÆ.**]

GULO, the name of a genus belonging to the family *Mustelidæ*, but which Cuvier places within the pale of his *Plantigrade Carnassiers*, though he

acknowledges that the species approach the *Mustelidae* in dentition and habits.

M. F. Cuvier, in the 32nd number of his 'Dents des Mammifères,' says that he might have treated of the *Grison*, the *Tayra* (*Gulo barbatus* of Desmarest), and the *Glutton*, in his preceding article, where he treats of the dentition of the *Putorius* (*Putorius* of G. Cuvier), *Zorille* (*Zorilla*), and *Martes* (*Martens*); for, he remarks, the dental arrangement of the *Grison* and *Tayra* resemble that of *Putorius*, and that of the *Grison* is similar to the formula observed in *Martes*. The first two, he states, have two false molars above and three below, and the last has an additional one in each jaw. For the rest, these animals have nothing in their teeth to distinguish them; that is to say, he continues, they have the same incisors, the same canines, and the same tubercular teeth. They have consequently all a relish for blood, and could not be separated from each other, were it not for the plantigrade feet of the *Grison*, the *Tayra*, and the *Glutton*, an organization which does not, however, change their propensities, and only leads to the modification of the means by which they satisfy their appetites.

Under the genus *Gulo* Desmarest and Cuvier include the *Glutton* of Northern Europe (*Mustela Gulo* of Linnæus), the *Glutton* of America (*Ursus luscus*, Linn.), the *Grison* (*Viverra vittata*, Linn.), and *Taira* or *Galera* (*Mustela barbata*, Linn.), and the *Ratels*. By zoologists the genus *Gulo* is restricted, and contains only two known species, namely, the *Glutton* of Northern Europe, or *Rossomak* of the Russians, and the *Glutton* of North America, the *Wolverene* or *Quickhatch* of the English residents at Hudson's Bay. It is remarkable that while Linnæus placed the latter among the bears, he regarded the former as a different form, and termed it *Mustela Gulo*. Pallas and Gmelin conferred upon it the title of *Ursus Gulo*.

The characters of the genus *Gulo*, as at present restricted, are as follows:—

Incisors, $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{5-5}{6-6} = 38$.

There are three false molars above, four below; the carnassière is well developed, and behind it there is a little tuberculous tooth.

The body is rather low on the limbs; the ears are short and rounded; the feet five-toed, with hooked nails; the sole of the hinder feet rests almost completely on the ground; tail moderate, with a fold underneath at its base, in lieu of a pouch. Habits, nocturnal. It is not clearly ascertained that the Old World *Glutton* (*Gulo arcticus*, Desm.) and the American *Glutton* (*Gulo luscus*) are specifically distinct; indeed, most naturalists regard them as mere varieties; the former, however, is darker in colour than the latter, being of a deep chestnut, passing into black on the limbs, with a brown disk on the back.

The American variety is the *Quickhatch* of Catesby and of the English residents at Hudson's Bay, *Wolverene* of Ellis, and *Wolverene* of Pennant.

The *Glutton* inhabits all the countries bordering on the Northern Ocean, both in Europe and Asia. In Norway it is very common in Drontheim. In America it inhabits Canada, the Fur Countries, and the uncultivated portions of the north of the United

States, where it is well known in consequence of the depredations it commits. It is a fierce and voracious animal, but by no means formidable to man or the larger beasts, though its strength is very great in proportion to its size. Slow in its movements, it makes



Wolverene (*Gulo luscus*).

up by perseverance and industry for this defect, and at a steady pace pursues its prey for miles, hunts out weak or dying animals, robs the hunter's traps of their booty, and destroys hares, marmots, and birds, which it seizes unawares.

GUM is a proximate principle of vegetables, of more universal occurrence than any other secretion by plants. It is the material generally prepared by them for their own nourishment, and is at first in a state of solution; but when it escapes to the exterior of the bark it frequently becomes thickened, and even solid and pulverizable.

The purest gum (arabic) consists of a principle termed *arabin*, and is soluble in water, forming with it a mucilage. Other gums contain *bassorine*, either alone, or with *arabin* and other matters. Gum-arabic, according to Gay-Lussac and Thénard, consists, in 100 parts, of C 42.23, H 6.93, O 50.84. The term gum is sometimes erroneously applied to gum-resins, such as *assaftetida*, &c.

Most of the commercial gums are obtained by incisions made in the bark of several species of acacia growing in Arabia, India, Upper Egypt, Senegal, &c. The specimens differ considerably in colour, even when obtained from the same species. Genuine gum-arabic occurs in pieces from the size of a pea to that of a walnut, or larger, which are irregular in shape, or roundish or angular; either white, yellowish, or dark wine-yellow; scarcely any odour; taste mawkish, glutinous. Gum, when in powder, is often adulterated with starch, the presence of which is detected by tincture of iodine; or, when cold water is used for the solution of the gum, the starch will remain undissolved. The mucilage made with cold water is not only purer, but keeps better, and for all purposes for which it can be used is preferable to that made with warm water, which is the common method.

Gum is highly nutritive, six ounces in twenty-four hours being deemed sufficient to sustain the life of an adult; yet it is not very easily digested when taken alone, and will often pass through the stomach nearly unchanged, if not associated with some bitter or astringent principle. This property, however, renders it demulcent in affections both of the throat

and also of the intestines, by sheathing the membrane from air or the irritation of acrid secretions. Hence allowing a portion to dissolve slowly is often useful in common colds. Mucilage is also used to suspend many insoluble matters in water. Its agglutinating properties render it valuable in many of the arts.

There is no duty on the importation of gum. The following table shows the amount and value of each sort imported into the United Kingdom in the year 1863:—

GUMS.	Quantity. cwts.	Value. £
Animi, ...	4,035 ...	31,946
Arabic, ...	70,903 ...	166,114
Benzoin, ...	3,342 ...	29,615
Copal, ...	8,073 ...	37,606
Dammar, ...	3,291 ...	7,696
Dragon's blood, ...	422 ...	2,492
Euphorbium, ...	68 ...	61
Gedda, ...	6,983 ...	9,550
Lac-dye, ...	11,194 ...	52,851
Lac-seedlac, ...	1,117 ...	5,564
Lac-sticklac, ...	6,553 ...	22,940
Lac-shellac, ...	35,138 ...	268,967
Mastic, ...	228 ...	6,514
Sandarach, ...	2,524 ...	11,857
Senegal, ...	3,007 ...	9,159
Tragacanth, ...	1,008 ...	9,776
Unenumerated, all } other sorts, }	23,311 ...	41,753
Total, ...	181,197 ...	714,461

British India, the northern, eastern, and western coasts of Africa, Portugal, and Holland supply most of the gum for the English market. A considerable quantity is exported to the non-producing countries, the following being the returns for 1863:—

GUMS.	cwts.	£
Animi and copal, ...	9,275 ...	48,267
Arabic, ...	20,140 ...	47,161
Shellac, ...	23,395 ...	179,069
All other sorts, ...	43,971 ...	144,237
Total, ...	96,781 ...	418,734

GUM-BOIL, a very painful form of abscess near the root of a tooth, usually superficial, but sometimes more deeply seated in connection with the bone, and causing considerable swelling, with risk of caries and necrosis. At first it will generally be found sufficient to protect a gum-boil against cold and external injury; but when matter appears, it is generally a good plan to withdraw it by means of a pretty free incision.

GUM-DRAGON TREE, the *Dracena draco* of the botanists, is a plant of gigantic growth, and so called from the astringent resin (dragon's blood) which it yields. Its native island is Teneriffe; and tradition relates that this tree was venerated, from the remotest antiquity, by the aborigines of the island. Humboldt mentions the 'gigantic tree of Oratava,' as measuring forty-five feet in circumference a little above the ground, and that in 1400 it was as large and hollow as it is at the present time.

GUM-RESINS are secretions of plants, which are produced in the greatest quantity, and most perfectly

elaborated, in warm countries. They are obtained chiefly from trees and shrubs of particular tribes of plants, rarely from herbaceous plants, except the large herbaceous umbellifera, which yield the fetid gum-resins. They either exude spontaneously, or are procured by incisions of the stem and branches. When they first escape to the surface they are fluid, and of a light colour, but gradually harden, and become of a deeper hue, either by the evaporation of some of their volatile oil, or by the absorption of oxygen from the air, and the conversion of the oil into a resin. Some remain in a semi-liquid viscid state, such as sagapenum and galbanum, which are only pulverizable in winter. Most gum-resins possess a strong odour, which in many instances is disagreeable, such as that of assafetida, with a warm acrid taste, and by application to the skin for any considerable time they cause redness and inflammation.

Gum-resins are with difficulty soluble in the animal juices; yet, as they must be assimilated before they produce their characteristic effects, they require to be used for some time before the secretions of the body acquire their peculiar odour. They influence the secretory and excretory processes, which they rouse to continued action. They also act upon the skin as sudorifics, and more permanently than the volatile oils. They possess considerable antispasmodic powers, and hence are much used in nervous complaints. They greatly promote digestion when the stomach is feeble, owing to a defective supply of nervous energy. Their utility in the treatment of hysterical and other paroxysms is very much increased by administering them in a state which admits of ready solution in the gastric fluids; hence the acetous preparations of them are much more potent than any other form. They may be administered either by the mouth, or, in case of spasm closing the teeth, or the patient being refractory, in the form of elyster, the dose being doubled in the latter instance.

Gum-resins are likewise applied externally, owing to their rubefacient powers, in the form of liniments or plasters, in spasmodic and rheumatic affections, and also to assist in dispersing indolent tumours.

Gum-resins should be kept in cool well-closed places, to prevent the evaporation of their volatile principles.

Besides the different kinds of gum-arabic and gum-resins already noticed, there are various species, which, as being of great use in medicine and the arts, and forming important articles of commerce, may be here alphabetically enumerated:—

Gum-ammoniacum, an exudation from the bark of the Dorema Ammoniacum of Persia; *Gum-anime*, the resinous production of the Locust-tree in the West Indies; *Gum-benjamin*, a fragrant resin obtained from the bark of the *Styrax benzoin*, of Sumatra, and a principal ingredient in the tincture called Friar's Balsam; *Gum-copal*, the exudation of the *Elaphrium excelsum* of Mexico; *Gum-cystus*, the produce of the genus *Cistus*, or Rock-rose, of the natural order *Cistaceae*; *Dragon's blood*, a red-coloured resinous exudation obtained from the bark of the *Calamus rotang*, a native of the East Indies; *Gum-elastic*, or Caoutchouc, which is the milky juice of the *Jatropa elastica*, of the *Urceola elastica*, and other tropical plants; *Gum-elemi*, or Amyris taxandra, a native of the island of Nevis, from which

is produced a fragrant-resinous juice; *Gum-galbanum*, the secretion of *Galbanum officinale* of Syria; *Gum-guacum*, dark-coloured resinous gum extracted from a tree, the *Guaiacum officinale*, or *Lignum vitæ*, a native of the West India Islands; *Gum-juniper* (or *Gum-sandarach*), a resinous exudation from the *Juniperus communis*; *Gum-lac*, the produce of the *Butea frondosa*, of the West Indies; *Gum-mastic*, extracted from the *Pistacius lentiscus*, of the island of Chios, and used as a stiff varnish; *Gum-senegal*, an exudation of the *Acacia-senegal*, which is sold as gum arabic; *Gum-storax*, a fragrant gum-resin, extracted from the *Styrax officinale*, and used by perfumers to give to spirits of wine a jessamine-like smell; *Gum-tragacanth*, the production of the *Astragalus tragacantha*—with several others noticed under their respective heads.

GUM-TREE. This tree has been described, by Mr. Buckland, as obtaining an immense size, and forming one of the great wonders of vegetable creation. In Australia it is called *Stringy Bark*; and is, as he says, 'the most gigantic tree of Van Diemen's Land. Some of the specimens exceed 200 feet, rising almost to the height of the Monument in London, before branching. Their trunks also will bear comparison with that stately column both for circumference and straightness. One of them was found to measure 55½ feet round its trunk at five feet from the ground; its height was computed at 250 feet, and its circumference was 70 feet at the base.' [EUCALYPTUS.]

GUMBINNEN. [KÖNIGSBERG.]

GUMS. [DENTITION, DISEASES OF.]

GUN. This general name comprehends under it **ARMS, ARTILLERY, and CANNON**, and may be applied to tubular vessels of all forms that are used in the propulsion of shot, shell, or bullets to a greater or less distance by the action of gunpowder exploded within them. The present article relates to the improvements that have recently been made in small arms, such as rifles, pistols, and fowling-pieces. It has been long understood that the most effective method of increasing the military resources of a country open to the gunsmith, was to increase the accuracy and the range of fire-arms. The essential properties of a gun are to confine the gases liberated on the explosion of the gunpowder as completely as possible, and to direct the motion of the bullet in a rectilinear path; hence arises the necessity of an accurate bore for the gun barrel. The advantage of a rifle barrel is principally derived from the more perfect contact of the bullet with its cavity; it is also supposed to produce a rotation round an axis in the direction of its motion, which renders it less liable to deviations from its path, on account of irregularities in the resistance of the air. The old regulation musket, facetiously called 'Brown Bess,' failed to answer the ends of a good fire-arm; and in 1851 it was beginning to be discarded for the Minié rifle. The peculiarity of this latter weapon lay more in the form of the bullet than in the character of the barrel, as shall be presently explained. The old rifle barrel had seven indentations inside, running up in a spiral form. A spherical bullet just a little larger than the bore was driven into the barrel by blows from a hammer, so that it fitted very accurately, and when fired it followed the direction of the rifle barrel,

twisting along with its spiral axis, and leaving the muzzle when discharged with a decided rotation on its own axis. Mr. Jovell, director of the Royal Manufactory at Enfield, suggested a form of rifle barrel and of ball, the former having only two spiral grooves, with the ball accurately fitting to them, so as to slide in as easily as the ordinary musket ball. Experiments made with this rifle showed that it produced more effect than the old musket at double the distance, and that it could be loaded with greater ease and speed. The invention of M. Delvigne was esteemed a further improvement. In his rifle, the ball, which falls freely down into the barrel, rests at the end of a chamber wrought in the breech, and a single stroke of an iron ramrod makes it change its dimensions when it has got there, so as accurately to fill the whole surrounding space of the grooves and barrel. The perfect certainty of effect which this gives is very remarkable. The *Chasseurs de Vincennes* can with this rifle aim with accuracy at a distance of 600 or 700 yards. In rifles, the regular movement along the grooves gives a perfectly regular motion of rotation round the axis, which, like all motions of rotation, destroys and renders insensible whatever lesser irregularities might exist. It will have been noticed that in order to this the ball had to be crushed, so that a considerable part of the force of impulse was spent in undoing this. Hence there is a limit in the Delvigne rifle to its capacity as a weapon. It was besides found inconvenient in cleaning, as the chamber gets foul; and the operation of loading is also fatiguing after a few rounds. M. Minié removed these objections by making his bullet conical in form, and cavitous at its lower end; the lead of this hollow space was, by the explosion, forced into the grooves of the rifle with great diminution of the windage, and a consequent increased accuracy of aim of the rifle takes place as before. In experiments made in 1850 with the Minié bullet, the hollow part was sometimes entirely separated or blown off from the conical part, and occasionally driven violently into some part of the barrel. The more careful construction of the bullet entirely prevents this, as in the case of the regulation Minié bullet used in the British service. It was in 1852 that the British government completely adopted the French invention of expanding bullets for rifles, and in the following year the present Enfield rifle was designed, and in a few years more smooth bores in all branches of the service were totally superseded by arms on the rifle principle. The Enfield now in use is stronger than those first introduced in 1851. It is rifled with grooves on the old system, with one turn in 6 feet 6 inches. Its diameter is .577 of an inch, and at a limited range it fires a bullet weighing 530 grains with great force and accuracy. During the fourteen years that have elapsed since its adoption, the Enfield has proved its efficiency in many battle-fields. Defects, however, still exist, and these were made manifest by the disqualifying comparison this fire-arm was made to present to the later improvements of Mr. Whitworth. The sum of the objections to the Enfield rifle was, that the velocity of the ball proved to be lower than had been looked for, its trajectory was consequently higher and its precision and penetration less; the tendency to foul was considerable, and there was a want of

uniformity in the properties and performances of the weapons compared among themselves. Whitworth's improvements consisted primarily in more perfect workmanship than that expended on the Enfield. He introduced a better system of rifling; a turn in the spiral four times greater than in the Enfield; a bore in diameter one-fifth less, being a reduction from '557 to '451 of an inch, and an elongated projectile capable of an exact mechanical fit.

As cognate to the same general subject, are the methods of rifling guns that have been recently devised. The old rifling tool of gunmakers for small arms consisted mainly of a square rod twisted to the same extent as the grooves were intended to have in the barrel. This rod carried a suitably formed cutter at one end, and was made to slide through a square hole in the centre of a plate with a divided circumference. The divisions of the latter determined the number of grooves round the whole interior of the barrel and the spaces between, and the form of the grooves were fixed by it and that of the cutter; the twist, as has been said, being that of the bar. A rifling machine, invented by F. J. Manceaux, a gunmaker of Paris, and patented in England in 1852, contains the germs of much that has since been achieved in this path. The rifling machine of Mr. Lancaster, and that designed and subsequently improved by Mr. J. Anderson, C.E., superintendent of the Royal Gun Factories, Woolwich, are examples of British invention in the same department of machine construction. Whitworth's cannon are bored cylindrical, and then rifled to a hexagonal form.

Whitworth also invented an important auxiliary to rifle practice, the 'Patent Machine Rest' (see Plate 'Gun,' figs. 1 and 2), by which the mean deviation of the rifle is accurately tested. The process of trial embraces the determination of the angle of deviation at each distance, the amount of deflection, due to the wind and other causes, the effects on the trajectory of different quantities and qualities of powder; and, in fact, all the elements necessary for reducing the manufacture of rifles to a certainty, are by the aid of this apparatus most readily obtained. It is true that the shooting of a rifle so confined differs from its performance when it is discharged from the shoulder, but still much valuable information may be derived from the use of this machine. Figs. 1 and 2 represent a side elevation of the rest and the plan of the bed. The frame, which is stiffened by tension bars, carries a narrow table, on which the gun metal bed or slide is mounted with adjusting screws, so as to be capable of adjustment both in the angle of elevation and in the horizontal plane, to compensate for the fall of the bullet and its deviation from the action of the wind. The rifle is mounted in a light steel cradle, which slides steadily on the bed, and which is removed with the gun from the bed each time it is loaded. A clinometer attached to a steel bar, which fits down the bore of the rifle, gives the true angle of elevation, and serves to detect any accidental change of position.

Besides Whitworth, the names of Needham, Lancaster, Rigby, Adams, Henry, Ingram, Baker, Dougall, Erskine, Dawe, and many others, British and foreigners, should be enumerated as among the distinguished improvers of small arms during these years.

Great attention, also, has been given by recent inventions to the mode of placing the charge in the gun barrel with a view to expedite firing. Although the method of introducing the charge through the muzzle recommends itself by its simplicity and the strength of construction it permits in the breech, still many and important reasons have caused experimentalists, from the earliest invention of fire-arms, to attempt some arrangement which would permit the opposite course, namely, the rapid removal of the breech and introduction of the charge through the opening so made, and its effective closure. Many obstacles combine to render this difficult; the force which we can apply is small; the time necessarily short; the forces operating during the explosion tending to displace the breech very great; the expansion of the metal by the heat evolved in firing is considerable; the passage of a jet of flame (no matter how minute) through the joint is most destructive, as the effect is that of a blow-pipe flame of great intensity; the hard deposit left after the explosion of the charge impedes and deranges the mechanism; and other causes might be added which combine to render breech-loading a practical problem hard to solve satisfactorily. Two distinct systems have been pursued in modern efforts (and it must be remembered that *successful* breech-loading does not date back more than twenty years, although experiments extend over centuries), namely, one in which the joint of the breech and barrels is rendered so close by some arrangement of the parts as to prevent the escape of the imprisoned gases, and another in which a separate case or cartridge which contains the charge is used, which, by its expansion at the moment of ignition, intercepts effectively the escape of the gas through the joint. The latter method has been most successfully developed by the French, the former by the English, in arms designed for military purposes. (See Plate 'Gun.') Figs. 3, 4, 6, and 7 show breech-loaders, the last being 'Dougall's Patent,' styled by the inventor the 'lockfast.' The barrels are secured to the breech-piece, and disengaged therefrom, by the action of an eccentric. The breech-piece and the solid piece attached to the barrels are shown in fig. 3.

Needle Guns.—Figs. 4 and 5 are views of the operative parts of one variety of these guns, known as Needham's patent. Fig. 4 is a side view of this gun with the breech closed. Fig. 5 is a view of the barrels separated from the stock, one action or breech being represented open, and the other closed. The action which contains the lock mechanism consists of two parts which screw into one another: one of these is hung on a cross axis in the rear of the recess; the other is fitted with a finger-piece, which, when the breech is closed, lies close by the side of the stock. To open the breech, the forefinger is applied to this, which, when the breech is closed, lies close by the side of the stock. By means of the finger-piece, the cap is then turned round about a third of a revolution. This movement retracts the needle, i.e., cocks the lock, and at the same time withdraws the nose of the action or breech-piece from the barrel sufficiently to permit the whole mechanism to be thrown into a position at right angles with the bore, as in fig. 5. The charge can thus be introduced, and the breech-piece replaced. The needle

is held back by a catch, which is released by the action of the trigger, and a strong spring then darts into the rear of the cartridge. On opening the breech to reload, a cam in the action pushes back the needle, and so cocks the lock for the next shot.

Rigby's needle-gun, fig. 6, deserve notice because of the ingenious way in which the difficulty of withdrawing the exploded cartridge case is solved. The barrel is hinged to the breech-piece, and held in its place by a peculiar contrivance. In the breech-piece, and opposite the bore of the barrel, a hole is bored and tapped with a four-threaded screw of rapid pitch. A screwed plug fits in this hole, and has a nose which enters the breech end of the barrel for about $\frac{3}{4}$ of an inch. Close alongside the gun, and attached to this plug, is a lever or handle, by means of which the plug can be screwed back and the barrel released. Fig. 7 represents Adam's breech-loader, showing the method of attaching the barrels to the breech-piece. Underneath a steel T-piece, attached to the barrels, and in the centre of the breech-piece, is a lever hung on a cross-pin, the longer end of which projects downward, and is bent to lie around the trigger-guard.

Revolving Pistols.—Those by Adams, shown in fig. 8, are well known. Most pistols of this kind, of the more valued varieties, are provided with a double action, so that they can either be cocked by the thumb, before taking aim, or fired by repeated pulls of the trigger only. Fire-arms of this kind, since their introduction in 1851 by Colonel Colt, have undergone great improvements.

Fig. 9 represents an air-gun, showing the air chamber in the stock, with a condensing syringe, which screws on to that part when the latter is to be charged, by the operation of a T-headed piston acting in the cylinder of the syringe. There is a valve, opening inwards, in the air chamber, and as the piston is driven home, the charge of air it carries before it opens the valve, which again closes all the more closely as repeated charges are sent into the chamber.

Fowling Pieces.—Here, as in the case of the rifle, the most essential part is the barrel, the interior of which is usually a smooth cylinder, but the exterior is made slightly conical by thickening the metal at the breech or under end. The commoner barrels are formed of tenacious soft iron, which is rolled into the form of flat bars, called *skelps*, each of which is sufficient to form a single barrel. The length of a skelp is usually about three feet, and the breadth about four inches at one end, and two and a half at the other. This laborious process of welding is now to a great extent superseded by improved methods. In one of these methods, the barrels, instead of being formed of skelps forged to the length of the barrel, are made from slabs of refined bar-iron, ten or twelve inches long, and weighing from ten to eleven pounds. [GUN-BARREL ROLLING-MILL.] *Twisted* barrels are made of long and very narrow strips of iron; one of which, being moderately heated to increase its pliancy, is wrapped spirally round a cylindrical mandril, in such a way as to form a tube, which may be slipped off the mandril at pleasure. *Damascus* barrels are composed of similar metal, but the rods are twisted upon their own axes until their component fibres have from twelve to fourteen turns in an inch, and the rods are

thereby doubled in thickness and proportionately reduced in length. Most barrels are now *bronzed* by the application of some chemical liquid aided by heat.

The wooden *stock* upon which the barrel is mounted is most commonly made of walnut-tree. When the shaping of the stock is completed, it is shod with brass, the trigger-guard and other metallic fittings and ornaments are let into the wood, and every part is fitted with suitable screws and fastenings, after which the whole is taken to pieces; the woodwork is finished by staining and polishing, the brasswork is filed and polished, and the barrels are sent to be finished, which is done in various ways. Sporting guns are often made with two barrels fixed side by side upon one stock. Such barrels are made separately, and have their adjacent sides filed flat, in order that they may lie close together. They are secured together by ribs running between them from end to end.

GUN-BARREL ROLLING-MILL. The use of machinery for rolling gun-barrels has been of great advantage in this branch of mechanical art. The process has been made both much cheaper and speedier than before. If the reader will turn to the Plate with this title, he will find a good illustration of one of the best machines in use for this purpose. It was designed and constructed by Mr. Joseph Taylor, of the Derwent Iron Works, Birmingham, for the Colt's Small Arms Company, Hartford, United States, and supplied by him soon after the breaking out of the recent war. Fig. 1 is a side elevation of the rolling mill and its driving gear, and in vertical section through the foundation. Fig. 2 is a transverse vertical section of the large set of rollers for the final welding and shaping of the gun-barrels. The principal part of the mill only, which is shown in the engraving, comprised three pairs of rolls for bending the 'skelps,' and three pairs for welding the barrels and rolling them out into the proper form, with one furnace to each set of rolls; and similar machinery has been supplied to the government Small Arms Manufactory, at Enfield, Middlesex. He also sent out, in 1862, to the American Government eleven sets of these rolls for the rolling mills at Harper's Ferry, and Springfield, U.S., to replace some Mr. Taylor had supplied a few years before, which, it will be remembered, were taken possession of by the Confederates when they entered Harper's Ferry; and this valuable prize was removed by them to Richmond, where the mill was employed rolling gun-barrels night and day, until that place was taken possession of by the troops of General Grant. Fig. 3 represents an end view of a piece of iron technically called a 'skelp,' from which the barrel is to be formed. Fig. 4 represents the form it receives after being heated in the furnace, and passed through the first aperture in the bending rolls. Figs. 5, 6, 7, and 8, represent the form it takes during its progressive passage through the bending rolls, A. The 'skelp' is now in the form required for 'welding up,' for which purpose it is put in the furnace, and when in a thorough welding state, is taken out on a mandrel, *a*, and being applied to the largest, or 'welding grooves' of the rollers marked B, is instantaneously caught and forced through the aperture by the rapidly-revolving rolls; it will be understood by the transverse

section, fig. 2, that the mandrel is firmly held in its place by the shoulder, *b*, coming in contact with the front bars, *c*, the end of the mandrel extending no farther than the centre of the rolls, and thus preventing the hole in the centre of the barrel from being collapsed by the outward pressure from the rolls. The barrel being now welded, it requires only to be moderately heated and passed through the other grooves, which are so formed as to give its proper size and required form. This operation completes the forging of the barrel, with the exception of a piece of iron suitable to screw the nipple to, which is placed under a forging machine made for this particular purpose, after which it is bored or turned, and placed under other cutting tools to bring it to its proper shape.

The barrels are now ready for *proving*, which consists in firing them in a building in which their explosion can do no harm, with a charge four or five times as great as they will have to bear when in use. A great number of barrels are fired at once, by laying them upon a strong framework of wood, with their touch-holes downwards, and connected with a train of powder which is conducted outside the building, within which is laid a heap of sand to receive the bullets. They are then carefully examined, and such as show any defect are returned to be reformed, after which they must be proved again, while such as have stood the test satisfactorily are stamped with a distinguishing mark.

GUN-CARRIAGE. [ORDNANCE.]

GUN-COTTON. [COTTON, GUN.]

GUN-FACTORIES. [ORDNANCE.]

GUN-SHOT WOUNDS. Under this head writers on military surgery have usually considered not only all the injuries produced by cannon-balls, bullets, &c., striking against the body, but those which arise from the projection of stones, splinters of wood, and other substances broken off and thrown about by heavy balls, or by the explosion of shells, &c. The former are alone properly included in this term.

When a shot strikes the body, it seldom produces much immediate pain; a slight stinging sensation is felt, but the wounded man often becomes aware of the injury only by his inability to move the part, or by feeling a trickling of blood. Whole limbs are known to have been shot off in the heat of action, without the consciousness of the individual. Sometimes, when discovered, the injury produces but little effect on the system: the courage and intellect remain unaffected; the pulse and respiration unaltered. Most frequently, however, if the injury be at all severe, it is followed by intense depression; the man becomes deadly pale, and is covered with profuse sweat; he trembles, and imagines death instantly at hand; he has shivering, nausea, and sickness, and remains unconscious of pain from his wound. These symptoms may soon subside if stimuli be given; but if they continue unabated for some hours they afford strong reason to fear that some important organ has been injured. If the heart or the brain be struck, the man is often seen to leap from the ranks into the air, and fall at once dead.

A part may suffer seriously from a shot without the skin being injured. These cases were long considered by surgeons (as they are still popularly) to be owing to the wind of the ball—that is, to the

impulse of the air, set in motion and compressed by its swift passage. The real cause of this kind of injuries is, that the ball, whose force has, perhaps, been somewhat spent by the obstacles it has previously met with, strikes the part obliquely, and therefore with only a small part of its surface, so that the force applied is not sufficient to break through the skin, which is not only remarkably tough and elastic, but, being placed on soft tissues, which serve it as a cushion, will yield considerably without tearing. The muscles and other tissues beneath the skin, however, being compressed between the ball and the bones, are more or less injured; there may be only a common bruise produced, but frequently the parts are found completely disorganized, broken down into a pulp with the blood effused from the vessels (often of considerable size) that have been ruptured, and sometimes even the adjacent bones are split and broken into fragments. If the ball penetrates the skin, a ragged opening is seen where it entered, with its edges inverted, and appearing somewhat smaller than the ball itself. The part around has a bluish or black colour from the bruise, and the cellular tissue in the track becomes black and dead. If it has struck a part perpendicularly, the ball will most likely enter straight; but if it have struck obliquely, it may be altogether slanted off, or at least its course through the skin will be made more oblique, so that it will fall on the subjacent muscles at a still more acute angle than it did on the surface of the body. Its force too being somewhat expended, it will be the less likely to penetrate the dense fascia of the body; and hence it is often found to have run for a considerable distance beneath the skin, till its force is completely spent, or till, meeting with a greater obstacle to its course onwards than outwards, it passes through the skin again, at a part considerably distant from that at which it entered. This remark, however, is only true of the old round ball. The new conical ball, now almost universally employed in warfare, is not thus deflected, but passes straight through the part, destroying all before it. The peculiar shape and motion, together with the great velocity of the conical ball, impart to its wounds characters of special severity.

When the ball passes quite through the part, the aperture by which it makes its exit has, in general, characters just the reverse of those which we have mentioned as belonging to that by which it entered. Its edges are everted, it looks somewhat larger than the ball, and it is less bruised. In these cases no foreign body may be found in the track of the wound.

Lastly, a part of the surface, or of the whole substance of a limb, or of the trunk, may be completely shot off, either by one large ball, or by a whole charge of small shot. The surface thus left is uneven, ragged, and bruised, the vessels and nerves lie exposed, or hanging out, the bone protrudes, and is often split up, even to the next joint.

Gun-shot wounds partake of the natures at once of penetrating, lacerated, and contused wounds, and they present the characters of all these in an extreme degree of intensity, from the velocity with which the ball, ill fitted by its shape for penetrating, has been propelled. The general rules of treatment are, however, the same as for similar injuries from common

causes, but there are some specialities requiring attention. If, on examination of the wound (which should be made as much as possible with the finger), the ball and the substances it has carried in with it be felt tolerably movable, and in a part where forceps can be easily applied, they should certainly be at once extracted, and sometimes it will be advisable to dilate the wound by incisions along its sides for this purpose.

It has been already said that the ball may pass through a part, and lodge just beneath the skin of the opposite side, or that, after a circuitous course, it may be found under the skin at a distance. In either case, if it can be felt, it should be cut down upon and removed, the usual precautions as to avoiding blood-vessels, &c., being attended to. If the ball or other substances be not extracted at first, and remain fixed after the sloughing and suppuration, no further attempt to remove them should be made till the inflammation that has supervened is fairly subdued: then, if much irritation continues to be excited, if abscesses form about its track, and much constitutional disturbance is produced, it may be necessary to use every effort to find out their seat, and if possible remove them.

Whether the ball be extracted or not, the simplest possible dressings should be at first applied. Lint dipped in cold water covered with oil-skin, is the best and most comfortable application.

The question of amputation, when that operation is applicable, must be decided as in common cases by the character of each; no general rule can be given except that amputation will be advisable in many cases in military practice in which, in civil practice, it would be scarcely justifiable.

Secondary hæmorrhage not unfrequently ensues, when the parts around the track of the wound slough by ulceration of the larger vessels injured by the ball. The bleeding vessel must, if possible, in this case, as well as if it is observed at the first receipt of the injury, be at once cut down upon, and tied both above and below the opening.

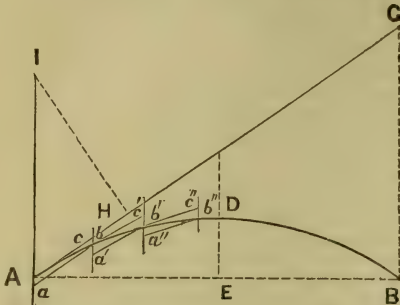
GUNNERY, or the science of artillery, is that branch of the art of war which comprehends the theory of military projectiles, and the method of the employment of ordnance in the attack and defence of fortresses and positions. The introduction of heavy guns or cannon into the western part of Europe cannot be traced to an earlier period than the commencement of the fourteenth century, although a species of artillery, similar to our cannon, must have been common in the far East, in India and China, many ages before. When first employed by European nations, cannon received the name of *bombarda*, on account of the noise they made; and are described as mere cylinders like barrels, constructed of long bars of iron soldered together lengthwise, and strengthened by iron hoops. The celebrated Mons Meg, at Edinburgh Castle, is a good extant example of this kind of gun. The upper part of the chambers being made to open for the admission of the can which held the charge. The cannon of this period were fixed on sledges, and made of large calibres, for the purpose of throwing stone balls, some of which were five feet in circumference. Guns of this sort were unwieldy and unmanageable, and of course unfit for quick or expeditious use, and incapable of any precision in firing. Cannon are stated to have been first employed for

naval purposes on the Baltic Sea in 1350, and by the Venetians in 1380.

It appears to have been early noticed that the line of flight taken by projectiles described with tolerable accuracy a definite mathematical curve; and greater accuracy of aim, it was naturally thought, might be attained by giving attention to the mathematical and mechanical conditions of the discharge. The first author professedly treating on the flight of cannon shot was Nicholas Tartaglia, a distinguished Italian mathematician, who in 1537 published his work, '*La Nuova Scientia*.' He showed that no part of the track of a projectile is a straight line; and to him artilleryists owed the invention of the *Gunner's Quadrant*. Later investigations showed that the path of a projectile, supposed to move without resistance, is always a parabola. This interesting proposition was first discovered by Galileo ('*Dialogues on Motion*,' 1638), and it follows very readily from the doctrine of the composition of motion, combined with the laws which that philosopher established concerning the fall of heavy bodies. [PROJECTILES.] Galileo expressly says, however, that this curve would be described by the shot if it were not resisted by the air, and he proposes a method of finding the effects of that resistance. Subsequent writers, with the exception of Newton and Bernoulli, till the time of Robins, 1742, assumed that the atmospheric resistance was but nominal, and consequently asserted that all shot described parabolas in their course. Some practical artilleryists, or officers in charge of the working of guns, in the meantime wrote treatises of some value on gunnery, without adding much to the theory of the art. The real founder of the science of gunnery was Benjamin Robins, whose work, the result of long and elaborate experiment, entitled '*New Principles of Gunnery*,' appeared in 1742. It was soon found in practical cases on a large scale, where the velocity of a projectile is considerable, the resistance of the atmosphere is so great as to render the Galilean proposition of little or no use; and a complete determination of the path, including all the circumstances which may influence it, is attended with difficulties almost insuperable. It appeared from Robins's experiments, that the resistance of the air to an iron ball of $4\frac{1}{2}$ inches in diameter, moving at the rate of 800 feet per second, is equal to four times its weight; and that where the velocity is much greater, the resistance increases much more rapidly, or nearly as the square of the velocity. His experiments appear to have been conducted with defective smooth bores, inasmuch as he found a ball sometimes deviates three or four hundred yards laterally, without any apparent reason. By means of the BALLISTIC PENDULUM, he measured the speed of balls at the very cannon's mouth. Using the work of Robins as a basis, Euler, towards the end of the eighteenth century, extended our knowledge of this subject considerably. The mathematician and physicist, Dr. Hutton, laboured successfully in the same field. From the experiments of the latter it was found that the resistances that a shot meets in passing through the atmosphere, are rather in a higher ratio than the squares of the diameter of the ball. It was found, also, that there is a gradual increase in the exponent of the resistance as the velocity increases.

As the parabolic theory of gunnery, which this speculation on military projectiles is called, continues to have a place in treatises on the subject, it may be proper to indicate the fundamental proposition, and explain a little the principal deductions that are usually made from it.

Let AB represent a horizontal line on the ground,



and ΔG the produced axis of the gun at A ; then, if Δc be taken on ΔG to represent the space which the shot would describe in that direction by the force of the powder in a small portion of time, and Δa , or cb , the space through which the shot would descend by gravity in the same time; by the theory of the composition of motions, the shot would describe the diagonal Δb in the same time, and Δb may be taken to represent the velocity at b in the path. Producing Δb and making $b'c'$ equal to Δb , the line $b'c'$ will represent the space which would be described by the shot in an interval of time equal to the former, if the action of gravity were to cease; then if we make $b'a'$, or $c'b'$ equal to Δa , to represent the deflection caused by gravity in this next interval of time, the shot would evidently describe the line $b'b'$ in the same time; and this would represent the velocity in the path at the end of the second interval. Therefore, producing $b'b'$, making $b''c''$ equal to $b'b'$, and proceeding as before, we should have a series of points, $A, b, b', b'', \&c.$, in the path of the shot; being considered as a curve, the several lines $\Delta c, b'c', b''c'', \&c.$, would become tangents at those points.

On account of the equality of the lines $a\delta$ and $b\epsilon'$, $b\delta'$ and $b'\epsilon$, &c., respectively, it is evident that the parallel vertical lines passing through A , b , b' , b'' , &c., will be equally distant from each other; and as the deflections which are produced by the action of gravity in equal times are equal to each other, we have also $c b$, $c' b'$, $c'' b''$, equal to each other, which is a known property of the parabola. And thus the trajectory of the shot is proved to be that species of curve.

The tangential spaces $A, C, b', b'', \&c.$, being, by hypothesis, described in equal times, they may be taken to represent the velocities of the shot at the points $A, b', b'', \&c.$, in the curve; and these being resolved in directions parallel and perpendicular to $A B$, will give the velocities of the shot in the horizontal and in the vertical directions respectively at the same points. It is evident from the equality of the distances in directions parallel to $A B$, between the vertical lines passing through $A, b, b', b'', \&c.$,

that the horizontal velocities will be the same at every point in the trajectory.

The initial velocity of the shot and the angle BAG , or the elevation of the gun, being given, if the vertical line AI be taken to represent the height due to the initial velocity, and IH be drawn perpendicularly on AG ; on making AG equal to 4AH , and drawing GB perpendicularly on AB , the length of the line AB will express the extent of the range. This will be a maximum, the original velocity being given, when the angle BAG is 45° ; and it is evident that to every other range there will correspond two angles of elevation, of which one will exceed 45° as much as the other falls short of it. The whole time of flight is equal to that in which a body would descend by gravity through a height equal to GB .

The following circumstances relating to the path of the shot is proved by writers on dynamics:—1. With equal initial velocities, the ranges are proportional to $\sin. 2 \text{ B A G}$, or the sine of twice the angle of elevation. 2. In the same case, the greatest height, E D , varies with $\sin. 2 \text{ B A G}$. 3. When the elevations, B A G , are the same, the ranges are proportional to the squares of the initial velocities. 4. The times of flight vary with the sines of the angles of elevation. The theory of the motions of projectiles would therefore be abundantly simple if it were permitted to neglect the effects produced by the resistance of the air during the flight of the shot; but, in fact, when high charges of powder are employed, the trajectory bears no resemblance to any other kind of curve, and can only be expressed by equations of a transcendental nature.

The mathematical theory of gunnery, from the resistance of the air and many other disturbing causes, general and incidental, has been found of little avail in practice. As an essential datum in calculation, it is of great service; but the practical artillerist deduces his rules from experiment, superimposed upon theory, and the following are a few of the maxims thus arrived at:—

For a given charge and weight of projectile, there is a certain length of bore for the gun that gives the greatest velocity, because in this length the full combustion of the powder is realized in impelling the shot before it leaves the muzzle. If the gun is short of the required length, a part of the powder will be expelled undecomposed; and with more than the proper length, the combustion is spent too soon; the ball having to contend with the friction of the gun in making its escape, so much of the impulse given to it is thus lost under the most disadvantageous circumstances. Additional length given to the gun, with a proportionate increase of charge, increases the velocity in the proportion of the cube root of the additional length.

The elasticity of the air affects its resistance, so as to exalt the effect on the shot as it passes through it, by causing the condensation of the air in front, and its rarefaction behind. The displaced air behind does not return freely to fill up the vacuum, until the speed of the ball is reduced to 1400 feet per second. The maximum effective velocity is computed to be 1600 feet, and that, or any higher speed, is reduced to 1400 feet, after a flight of 400 feet.

The resistance to bodies by the air is as their surfaces; in the case of round or cylindrical bodies

as the squares of their diameters; and the power of such bodies themselves to overcome resistance is as their weights, or the cubes of their diameters. Hence the great range of solid as compared with hollow shot. Solid shot, impelled with equal velocities and elevations, range as their weights—the heavier overcoming the atmospheric resistance better than the lighter. Shot of the same weight and diameter will range according to their velocities, but obviously not in direct proportion, for the retarding power of the atmosphere varies as the square of the velocity. Velocities of shot of equal diameters are as the square roots of the charges.

The influence of the atmosphere in retarding shot is well exemplified in the gradual diminution of velocity experienced by a projectile discharged from a 32-pounder, whose initial velocity is taken at 1600 feet per second:—

Velocity, 500 yards from the gun, 1126 feet.

" 1000	"	" 1000
" 1500	"	" 608
" 2000	"	" 465
" 2500	"	" 367

What is called point-blank range, is the distance from a point on the ground, vertically under the chamber of the gun or howitzer, to the point at which the shot strikes the ground after the discharge—the axis of the bore being supposed to be in a horizontal position parallel to the ground if the latter should be inclined to the horizon. It is experimentally demonstrable, that a shot dropped from an equal height with the axis of the gun, and another shot at that moment fired point-blank from the gun, they will both strike the ground at the same instant of time. This same fundamental proposition was in form established by Tartaglia to the effect, that the trajectory or path of a point-blank discharge, is in time equal to that taken by a ball in falling by gravity from the muzzle of the gun. The following table shows the effect of varying the charge and elevation on different sorts of guns:—

Ordnance.	Elevation.	Charge.	Range in Yards.
12-pounder iron gun, ...	Point-blank,	4 lbs.	300
	1 degree,	"	700
	3 degrees,	"	1200
	6 "	"	1800
12-pounder Armstrong, ...	Point-blank,	1 lb. 8 oz.	330
	1 degree,	"	700
	3 degrees,	"	1425
	6 "	"	2440
32-pounder iron gun, ...	10 "	"	3590
	Point-blank,	10 lbs.	390
	1 degree,	"	790
	3 degrees,	"	1500
40-pounder Armstrong, ...	6 "	"	2220
	12 "	"	3060
	Point-blank,	5 lbs.	360
	1 degree,	"	730
68-pounder iron gun, ...	3 degrees,	"	1455
	6 "	"	2505
	12 "	"	4470
	Point-blank,	20 lbs.	400
110-pounder Armstrong, ...	1 degree,	"	950
	3 degrees,	"	1715
	6 "	"	2465
	12 "	"	3400
	Point-blank,	12 lbs.	345
	1 degree,	"	680
	3 degrees,	"	1335
	6 "	"	2280
	12 "	"	4035

With a 12-pounder, and 1·75 lbs. of powder, Whitworth has attained a range at 35° of 10,000 yards, or nearly six miles, being about the same distance that an old-fashioned musket-bullet would go, *in vacuo*, at 45° elevation.

The recoil of a gun on its discharge is a consequence of the well-known law in physics, that action and reaction are equal and opposite in direction. This effect is to be overcome as much as possible; and in the case of the mounting of the heavy Armstrong guns on dwarf platforms, the result has been the production of a severe recoil. The weight of the gun itself, and its secure attachment to a ponderous carriage, and by making the beam of the gun carriage, by which it fits into the waggon that goes before, so long that it lies at an acute angle to the ground, are the best counteractives. The existence of an interval between the rear of the shot and cart-ridge, which is apt to occur in breech-loaders, increases the recoil; and rifled guns recoil more than smooth bores. When the shot is too heavy for the gun, a severe recoil is a consequence. The momentum of the free recoil being the product of the weight of the shot into the velocity, its amount is easily calculated. It is held as a general principle among artillerymen, that it is desirable to obtain the lowest possible trajectory, and to do this they should put as much powder into the gun as it can consume. The common charge of a 24-pounder gun being one-third the weight of the shot, or 8 lbs., the momentum of both shot and gun, in the recoil, will be 1600 (the initial velocity) $\times$ 24 = 38,400, which, divided by 5600, or the gun's weight in pounds, gives about seven as the unpurged kick or recoil; if the gun is attached to a carriage, the weight of it must be added to that of the gun for a divisor. The service charges of the Armstrong rifled 100-pounder gun, 7 inch bore and four tons weight, and of the Whitworth 150-pounder same calibre, 7 tons, are severally 14 lbs. and 25 lbs., or about one-sixth of the weight of the shot. The quantity of powder that a gun can consume depends on its calibre.

As regards the penetrating power of guns, this has recently been tried variously, and in innumerable instances, by the 'Committee on Iron,' acting under the orders of the British Admiralty. Mr. Whitworth's success in this, by means of peculiarly formed steel projectiles, has been remarkable, when solid elongated steel shot, and hollow shell of the same form, from a 70-pounder have pierced 4½ in. plates of iron. It was found by experiments against a martello tower at Eastbourne, with a range of 1832 yards, that solid spherical shot from the 40-pounder Armstrong penetrated into good masonry from 47 to 65 inches, and from an 80-pounder Armstrong 51 to 90 inches. For other particulars relative to the art of gunnery, the reader is referred to **LOADING, PROJECTILES, WINDAGE, &c.**

GUNPOWDER, a mixture of nitre, sulphur, and charcoal, possessing great explosive power. The proportions of these ingredients vary according to the uses that are to be made of the powder:—

	Common Gunpowder.	Shooting Powder.	Shooting Powder.	Mining Powder.
Saltpetre, . .	75	78	76	65
Charcoal, . .	15	12	15	15
Sulphur, . .	10	10	9	20

The explosive force of gunpowder depends upon the sudden formation of nitrogen and carbonic acid gases, which, at the high temperature at which they are evolved, may be considered as amounting to about 2000 times the volume of the powder employed. The fetid odour that attends the explosion of gunpowder comes of sulphide of potassium that is formed. The Chinese have long been acquainted with the use of gunpowder, and that as early as the year A.D. 85; and singularly enough, the composition of their powder in the 100 parts was, on analysis, found to be almost exactly that employed by European nations, as the following table will show:—

	Nitre.	Charcoal.	Sulphur.
English, . . .	75·	15·	10·
French, . . .	75·	12·5	12·5
Prussian, . . .	75·	13·5	11·5
Chinese, . . .	75·	14·4	9·9

It was very probably also an invention of the Greeks, and employed by them in the fabrication of fireworks. It has been asserted upon doubtful evidence that the knowledge of this substance was conveyed to Europe from the Arabs by the Crusaders; and it has been further alleged, that the Arabs employed it at the siege of Mecca in 690, and that they obtained a knowledge of it from India. The earliest authentic record that we have of this composition is to be found in a work written by Roger Bacon at Oxford in 1216, and entitled 'The Secrets of Art and Nature,' wherein he states, that 'from saltpetre and other ingredients we are able to make a fire that shall burn at what distance we please, and that sounds and coruscations resembling thunder and lightning might be formed in the air, much more to be dreaded than those that happen naturally, inasmuch as by its power armies and cities might be destroyed.' Roger Bacon has been supposed to allude in an enigmatic way, by a formula of Latin words, to the composition of gunpowder. A knowledge of its destructive power, and the advantages to be derived from it in war, is said to have originated early in the fourteenth century, through an accidental discovery of Bartholdus Schwartz, a German chemist: while operating in a mortar with a pestle on a mixture of charcoal and nitre, an explosion occurred which blew the vessel to a considerable distance. The introduction of cannon into the operations of warfare by sea and land soon followed the discovery of gunpowder; as we find the Moors using artillery against Alonzo, king of Castile, in 1343 and 1346. Edward III. of England used five field-pieces against the French at the battle of Cressy. Cannon, and of course gunpowder, are said to have been first employed for naval purposes on the Baltic Sea in 1350, and by the Venetians in 1380.

In the manufacture of gunpowder, the nitre (nitrate of potash) and sulphur must be pure, the charcoal carefully selected and prepared, and the whole perfectly mixed in fine powder. This mixture is moistened, ground, and pressed into a cake; it is then dried and granulated, and, associated with plumbago in powder, it is afterwards polished by attrition in revolving barrels. The granular form of the powder increases the rapidity of its combustion, by enabling the flame to penetrate it so as to kindle every grain nearly at the same time. For this rea-

son, the powder used for artillery and mining, where it is desirable the combustion should be comparatively slow, is coarse-grained. The corning or graining of the powder is effected in wooden mortars, by wooden pestles actuated by machinery, and a certain number of blows is given to a definite amount of the material. Parchment sieves are in succession employed to separate the grains of a required size from the pulverized mass. The process of glazing the powder by attrition then follows the operation of corning. Another method is that of pressing the composition into a firm cake in the corning house; after which it is broken up into small lumps, and the graining process is conducted in revolving sieves, each containing a flat circular piece of lignum-vitæ. The sieve-holes are sized, to permit the escape through them of the grains as they are formed by the abrading action of the plate of wood. The grains are separated from the dust by proper sieves and reels; they are then hardened, and the rougher edges are taken off by being run a sufficient length of time in a close reel, which has a proper circular motion given to it. A cubic foot of good gunpowder should weigh about fifty-eight pounds; and two ounces of it when exploded in a mortar eight inches in diameter, and placed at an angle of 45°, should throw a sixty-eight pound shot about 270 feet. Gunpowder is sometimes tried by placing two heaps of about sixty grains each upon clean paper, three or four inches asunder, and firing one of them by a red-hot wire. If the flame ascends quickly with a good report, sending up a ring of white smoke, leaving the paper free from specks and not burnt into holes, and if no sparks fly from it so as to set fire to the contiguous heap, the powder is good. The temperature at which gunpowder explodes is about 600° Fahr.

White Gunpowder.—In this composition, the charcoal of the ordinary gunpowder is substituted by the carbon contained in tannic or gallic acid, or the resin of commerce, and a mixture of chlorate and nitrate of potash. This new gunpowder—the discovery of Ehrhardt, a German—is stated to possess three times the explosive force of that now in use, and to be one-half cheaper. It leaves little or no solid residuum when exploded. It can be stored in magazines with safety, by the resin and potash salts being kept separately, and mixed as wanted.

Protected gunpowder—the invention of Mr. Gale—is a method of rendering ordinary gunpowder inexplosive. The means employed for this purpose is simply glass ground down to an exceedingly fine powder, which, on being mixed with the gunpowder, prevents it from exploding, even if touched with a red-hot iron. Three pounds of pounded glass to one of the powder is found to be the safest proportions. With equal parts of each the gunpowder will burn, but not explode. Slow matches may be burned in vessels holding gunpowder mixed with the protective powder, and they only serve to ignite a few grains. A red-hot poker may be stirred through the mixture without ignition. Even a quantity of pure gunpowder may be exploded in the centre of the protected powder, and no other effect will follow but the dispersion of a part of the mixture by the explosion. The mixture can be stored in magazines or on shipboard, or transported by land to any point, without more risk than attaches to commodities in general.

This novelty of protected gunpowder assists, as by experiment, to explain the theory of the ignition of gunpowder under ordinary circumstances. That particle of gunpowder on which a spark falls undergoes combustion, which it transmits to adjoining particles, and these to others with such rapidity, that their united inflammation takes the form of an explosion. The pounded glass mixed with the gunpowder acts in keeping the particles of the latter apart, and so prevents the local transmission of the necessary heat to cause ignition of the mass. Besides, the glass powder melts under the intense heat caused by the ignition of the gunpowder when it may be fired by any heated body, and it surrounds the spot with a glassy flux, which prevents sparks, and intercepts the heat. The chemical changes produced by the explosion of gunpowder are rather complex, and are attended with the production of a variety of new compounds. The most simple representation of the reactions that take place, and of the chief products that are formed, is expressed in the following equation— $\text{KO NO}_3 + \text{S} + \text{C} = 3 \text{CO}_2 + \text{N} + \text{KS}$: or otherwise, from the nitre, sulphur, and carbon of the powder, there result carbonic acid three parts, free nitrogen, and sulphide of potassium. Doubtless carbonic oxide, sulphurous acid, and sulphuretted hydrogen are also at the same instant formed from the same original ingredients.

The exports of gunpowder from the United Kingdom in 1864 amounted to 15,466,844 lbs., of the value of 432,208*l*. The whole of this was British and Irish produce. The countries taking the largest quantities were Western Africa, 3,614,088 lbs.; India and Ceylon, 2,102,305 lbs.; China, 1,755,189 lbs.; Chili, 1,466,737 lbs.; Brazil, 1,432,355 lbs.; Australia, 940,460 lbs.; and British North America, 876,378 lbs.

GUNPOWDER-PLOT. [FAWKES, GUIDO.]

GUNDAMUK, a village of Afghanistan, 28 miles W. from Jellalabad. Here the last surviving portion of the British force (100 soldiers and 300 camp-followers) retreating from Cabool in 1842, was massacred, one man only making his escape.

GUNJAH, the Indian name for the dried hemp plant (*Cannabis sativa*) before the resinous juice has been removed. It is chiefly sold for smoking with tobacco.

GUNSTOCKS are turned by machinery from strong light wood. Walnut-wood is best adapted and principally used for the purpose. In 1863, the quantity of stocks for guns imported into the United Kingdom was 28,882 cwt*s*., value 65,465*l*. Sardinia supplied 22,398 cwt*s*., value 50,769*l*.; Belgium 3482 cwt*s*., value 7891*l*., and other parts 3002 cwt*s*., value 6805*l*. In the same year 160 cwt*s*., value 363*l*. were exported.

GUNST, PIETER VAN, Dutch portrait engraver, was born at Amsterdam about 1667. He engraved a set of ten full-length portraits, after Vandyck, from drawings made in England in 1713 by Arnold Houbraken. He also engraved a set of portraits after Vander Werff, for Larrey's 'History of England,' and he engraved the portrait of Franciscus Junius, after Vander Werff, which is inserted as a frontispiece to the 'Pictura Veterum,' Rotterdam, 1694. His works are extremely neat in execution, especially the heads. Among his historical or figure pieces,

which are inferior to his portraits, are nine Loves of the Gods, after Titian. The date of his death is not known.

GUNTER, EDMUND, was born in the county of Hertford, but of a family originally from Gunter's Town, in Brecknockshire. He was educated on the royal foundation at Westminster School, and elected from thence to Christchurch College, in Oxford, in the year 1599, being then eighteen years of age. He invented the sector, and wrote the description and use of it in Latin. He was appointed professor of astronomy in Gresham College, March 6, 1619. He died on the 10th of December, 1626, about the forty-fifth year of his age.

Gunter's writings (the 'Canon Triangulorum' excepted, which is a table of logarithms) consist almost entirely of a description of graphical methods of constructing problems in trigonometry, navigation, &c. He was the first who laid down a logarithmic scale upon wood, and used it for the purposes of the draughtsman. This scale is still used, and goes by his name. The common chain used by surveyors also goes by his name. The first observation of the variation of the compass is due to Gunter.

Gunter is the first who introduced the words cosine, cotangent, &c., in place of sine of the complement, &c. In the preface of the 'Canon,' he speaks of the 'sine of the complement, which in one word may be called the cosine,' as if he were introducing a new word. There is also the testimony of Briggs ('Arith. Log.,' cap. 13) that Gunter suggested to him the use of the arithmetical complement. Whatever, in short, could be done by a well-informed and ready-witted person to make the new theory of logarithms more immediately available in practice to those who were not skilful mathematicians, was done by Gunter.

GUNTER'S SCALE. [SLIDING RULE.]

GUNTOOR. [HINDUSTAN.]

GURNARD. [TRIGLA.]

GURWAL. [HINDUSTAN.]

GUSTAVUS ERICKSON, commonly called *Gustavus Vasa*, a descendant of the ancient Swedish kings, was born May 2, 1490, at Ockestadt, near Stockholm. The independence of Sweden, which had been recovered by a successful insurrection, being again lost through the success of the Danes, Christian, the Danish monarch, caused himself to be crowned king of Sweden. Before his coronation he promised to release all prisoners, and to maintain the rights and freedom of the Swedish nation; but within three days after, on November 8, 1520, he violated his promise, by ordering the chiefs of the most respectable Swedish families, and also the members of the senate, to be arrested, and afterwards beheaded in the market-place. Thus perished in one day eighty-four persons, all belonging to the first families, and among them the father of Gustavus Vasa. The Danish troops then rushed upon the unarmed multitude, and massacred all who fell into their hands, without distinction of age or sex. These executions were continued for several days. In the meantime young Erickson had escaped the prison where he had been confined, and fled to the mountains of Dalecarlia, where he could obtain neither food nor shelter from the peasants, who feared the threats of Christian. He wandered about the country half dead with cold and hunger, but succeeded in obtaining employment for

a short time as a labourer. He was soon recognized, and in danger of being betrayed and taken. At length, after a variety of adventures and some narrow escapes, he succeeded in reaching Rattwik in safety.

Here Gustavus began his preparations for his great undertaking. With unwearied zeal he went from house to house, and from hut to hut, and soon found himself surrounded with a number of resolute combatants. With this force he marched towards Stockholm. His forces increased with each step, and in May, 1521, Erickson was at the head of 15,000 men. Victory crowned the arms of the Dalecarlians, to whom the inhabitants of the plains of Sweden quickly united themselves. At length, after various vicissitudes, Stockholm fell into the hands of Gustavus, and Christian was forced to withdraw to Denmark. The nation which he had freed offered Gustavus the crown of Sweden, but he declined to accept sovereignty. Under the title of Stadtholder, however, he conducted the government of Sweden. But the adherents of the Catholic party and the expelled king of Denmark still continued to disturb the country by their intrigues, and the Swedes, in order to obtain peace and security, again solicited Gustavus to ascend the throne; and in June, 1527, he was solemnly crowned king of Sweden, and became the founder of a new dynasty.

Gustavus Vasa reigned in Sweden upwards of thirty-three years. During this long period he displayed such virtues and talents for government, that he acquired fresh and imperishable claims upon the gratitude of his country.

GUSTAVUS ADOLPHUS, King of Sweden, was born on December 9, 1594. He was the sixth monarch of the dynasty of Vasa. His father, Charles, had been declared king of Sweden to the exclusion of Sigismund, the heir of the elder line of the house of Vasa. Charles died October 30, 1611, leaving the Swedish sceptre to his son, then in his seventeenth year. As long as Charles lived, Sigismund never ventured to renew his claims to the crown of Sweden; but upon his death he invaded Sweden, and laid claim to the crown for his son Ladislaus, then a minor; but Gustavus fought successfully against the czar of Russia, the ally of Sigismund, and also against Sigismund himself, until, by the mediation of England and Holland, a peace was concluded in 1629, upon the most advantageous terms for Adolphus. Gustavus next declared war against Austria, his principal motive being to protect the oppressed German Protestants, notwithstanding that the ground of quarrel alleged in his declaration was the enmity shown to Sweden by Austria, and the violation of her territories.

Gustavus landed in Pomerania on the 24th June, 1630, with not more than 8000 men. He made himself master of the islands of Usedom and Wollin, and pressed Bogislav, the duke of Pomerania, so warmly, that he was compelled to agree to a treaty by which the town of Stettin was put in possession of the conqueror, and the whole country placed at his disposal.

The army of Gustavus was reinforced by six Scottish regiments, under the conduct of the duke of Hamilton, and he provided himself with money by raising a contribution of 50,000 rix-dollars in Pomerania. After several other successes, he divided his

force into four parts. One division, under the duke of Lauenburg, was ordered to the relief of Magdeburg; General Bauditz was sent to make an attack upon Kolberg; Horn was left with a garrison in Stettin; and Gustavus himself encamped at Ribbenitz in the duchy of Mecklenburg. While lying there, he received a letter written by the Emperor Ferdinand, containing proposals for peace, in which he made the most advantageous offers to the Swedish king, including the possession of Pomerania. Gustavus rejected these proposals, and continued to make himself master of the towns and fortresses of Pomerania and Mecklenburg. By the end of February, 1631, in the course of only eight months, he had already taken eighty fortified places; but the towns of Rostock and Wismar yet remained in the hands of his enemies. The emperor sent against him Field-marshal Tilly, at the head of the Imperial army. The army of Gustavus pressed forward into the heart of North Germany, gaining continual victories, and on August 1, 1631, encamped near Wittenberg, where Gustavus received Count Arnheim, the ambassador of the elector of Saxony. A treaty was quickly concluded, by which the Saxon dominions were opened to the king of Sweden, and the whole military power of the electorate placed under his command; the elector to provide the army with ammunition and provision, and to conclude no peace with Austria without the consent of the king of Sweden. Gustavus then prepared to encounter Tilly, who had advanced against him to Eilmarschen. On the 7th September, 1631, they met on the plains of Leipzig. The force of the king of Sweden, to which the Saxon troops under Arnheim were joined, amounted to about 40,000 men; Tilly's army was somewhat more numerous. The victory was long doubtful; but at length Tilly's defeat was complete.

All Germany was now open to the Swedes, and Gustavus hastened forwards in an uninterrupted course of conquest. But the progress of the Swedish arms excited the jealousy and apprehension of the whole German population—even among the Protestants. Gustavus was also accused of having designs on the Imperial crown. His allies became lukewarm, and the inhabitants everywhere viewed the Swedes with dislike. Upon the defeat of Tilly at Leipzig, and the Saxon army making itself master of Bohemia almost without opposition, Ferdinand called in Wallenstein, who drove the Saxons out of Bohemia, and threatened Gustavus, who in the meantime had gained a second victory over Tilly, in which that general lost his life. Wallenstein took up a strong position in the neighbourhood of Nürnberg. In fruitless attacks upon the camp, and through hunger and disease, in the course of seventy-two days, Gustavus lost 30,000 men. At length Wallenstein moved towards Saxony, and on November 1, 1632, he offered battle to his opponent at Lützen.

Gustavus opened the battle to the sound of music, with Luther's hymn, 'Eine feste Burg ist unser Gott.' He led the attack in person, descended at the critical moment from his horse, and killed the foremost of the enemy with a lance. While heading a second attack on horseback against the enemy's cavalry, a ball struck him from behind, and he fell. Duke Bernhard of Weimar, crying out to the Swedes that the king was made a prisoner, inflamed them to such

a degree that nothing could resist their impetuosity, and after a frightful carnage the enemy was forced to retreat. The Swedes gained a victory, but with the loss of their king. A strong suspicion of the crime of assassination rests upon his cousin, the duke of Saxe-Lauenburg.

Gustavus Adolphus married, in 1621, Maria Eleonora, the sister of the duke of Mecklenburg, by whom he had one daughter, Christina, who was his successor.

GUSTAVUS III., King of Sweden, born in 1746, was the eldest son of Adolphus Frederic, duke of Holstein, who had been called to the Swedish throne in 1743. On the 12th of February, 1771, Gustavus III. succeeded to the crown on the death of his father. The country was at this time divided by two factions, the Hats and Caps, as the aristocratic adherents to the Russian or French policy respectively called themselves. Gustavus took the bold resolution of subverting both these parties with the assistance of the people. The execution of the king's plans was commenced by the insurrection of the commandant of Christiansstadt, who issued a violent proclamation against the States-General. Gustavus sent Prince Charles with a powerful force ostensibly to subdue the rebel, but in reality to unite with him. On the 19th of August, 1772, the king began to follow out his plans in person. He arrested the heads of the parties and the most powerful members of the States, and publicly announced his plans for the establishment of a new constitution. The next day the magistracy of the capital took the oaths of fidelity, and the States-General were invited to assemble. Gustavus entered the assemblage in order to submit to them the proposed new constitution. His armed force was apparently sufficient to subdue every scruple of the assembly; but as the constitution only restricted and circumscribed the privileges of the nobility, and did not infringe the liberties of the citizens, it was received by the majority with real satisfaction, and confirmed by oaths and signatures. Those who had been arrested were immediately afterwards released, and the revolution was completed.

The nobility were silenced, but they nourished a secret hatred, which at length broke out in the year 1788, when they prevailed on the States to refuse the supplies while the king was engaged in a war with Russia and Denmark. In order to free himself from the ever-active intrigues of the nobles, the king, on April 3rd, 1789, caused the leaders of the opposition in the Diet to be arrested, and a law to be passed, by which the royal prerogatives were very considerably increased. After varying fortunes in the war, Gustavus concluded a peace on the 14th August, 1790, with his foreign enemies; but the nobility, who apprehended the loss of all their privileges, resolved upon his death. Accordingly they formed a conspiracy under the direction of Counts Horn and Ribbing, and Colonel Lilienhorn; and a nobleman, named Ankerstroem, undertook to murder him. Ankerstroem chose a masked ball, given on the 16th of March, 1792, at Stockholm, as affording the fittest opportunity. The king was warned by some anonymous friend; but he went to the ball, and the assassin shot him through the body. The king suffered with much firmness, and died on the 29th of March. His murderer was discovered and executed, and

many of the conspirators were banished from the country.

GUSTAVUS IV., King of Sweden, son of the preceding monarch, was born November 1st, 1778, and ascended the throne on the 29th of March, 1792. This king displayed, while a prince, a capricious humour and an obstinacy that bordered upon madness. He entered into a negotiation for a marriage with the granddaughter of the Empress Catherine of Russia, and the whole court was assembled in order to be present at the ratification of the marriage-treaty, when he departed secretly, and married a German princess of the house of Baden. Of all the European monarchs he was the most zealous partisan of legitimacy, and he proposed, as the great object of his life, the restoration of the dethroned family of the Bourbons to the crown of France. He involved his country in indescribable difficulties, irritated all his neighbours, and even offended England, his only ally, whom he certainly could not reproach with any friendly feelings towards Napoleon. Gustavus appears to have discovered that a storm was gathering about him, and in order to avert it he endeavoured to possess himself of the funds deposited in the bank of Sweden. At first he made an attempt to get the money by a loan of eighty-two millions of Swedish rix-dollars (about twelve millions sterling); but as the bank commissioners refused to comply with this demand, he resolved to carry his plan into effect by force.

On March 29, 1809, he repaired to the bank, accompanied by a detachment of military, with the intention of taking possession of the money deposited there. By order of the Diet, a resistance was made, and the king arrested, and confined in an apartment, where he raged like a madman. On March 29 there appeared the decision of the Diet, by which Gustavus IV. and all his direct descendants were declared to have forfeited their right to the Swedish crown; and the duke of Sudermania ascended the throne under the name of Charles XIII.

Gustavus left the Swedish territories. During his exile he assumed the name of Colonel Gustavson, and renounced all external observances that might remind him of his former rank. He refused the appanage which Sweden offered him, declined having any communication with his family, and obstinately rejected all assistance from them. He subsisted on the produce of his labours as an author, together with a little pension which he drew as a colonel.

He died at St. Gall, towards the end of the year 1837.

GUSTROW. [MECKLENBURG.]

GUSTO, or GUSTO'SO (Ital. *taste*), in Music, a word (generally written *con gusto*) prefixed to such movements as are to be performed in an elegant and spirited style.

GUTENBERG, believed to be the first inventor of the art of printing with movable types, whose real name was Johannes Gensfleisch, was born in 1397 at Sulgelo, a village near Mainz. During his residence there he became implicated in an insurrection against the nobility, and was compelled to fly to Strasburg, where necessity compelled him to employ himself in mechanical occupations, and by accident he made the discovery so pregnant with future consequences. On returning to Mainz, Guten-

berg experienced the hard fate that most great inventors have to endure from the misconceptions and ingratitude of mankind. The members of the Guild of Writers, together with the priests, persecuted him; his partners Fust and Schoeffer joined with his enemies against him; through litigation he was deprived of all his property; and once more he was forced to turn his back upon the ungrateful town. In the meantime Fust and Schoeffer pursued their business as printers, and thus reaped all the profit, while the inventor was wandering in exile. After many years Gutenberg returned to Mainz, where he died, February 24, 1468. His statue in bronze was set up at Mainz some years ago.

The 'Statuta Provincialia antiqua et nova Moguntina,' quarto, are thought to have been printed by Gutenberg, as well as two or three editions of Donatus, of which fragments only remain. Some have thought the Mazarine Bible to have been a production of his press.

GUTHRIE, GEORGE JAMES, F.R.S., President of the Royal College of Surgeons, &c., was born in 1785, and placed at an early age under the celebrated Dr. Hooper. For many years he practised as a regimental surgeon in North America and the Peninsula. After the Peninsular campaigns he returned to London, and commenced lecturing on surgery, which practice he continued for nearly thirty years. In 1827 he was appointed surgeon to the Westminster Hospital, and in 1833 was elected president of the Royal College of Surgeons. He also held the office of professor of anatomy and surgery; and such was the high opinion the members of the college entertained of his abilities and surgical skill, that in 1842 and 1855 the same honours were again conferred upon him, this being the only instance on record of the same person being three times honoured with this distinguished position. Mr. Guthrie was the author of several works which rank high in the profession; among others, his 'Treatise on Gun-shot Wounds of the Extremities,' 'Clinical Lectures on Compound Fractures,' 'On Injuries of the Hand, Chest, and Abdomen,' 'Diseases and Injuries of the Arteries,' 'On the Anatomy and Diseases of the Bladder and Urethra,' 'Extraction of Cataract,' &c. He died on the 1st of May, 1856.

GUTHRIE, WILLIAM, was born at Brechin in the county of Angus, Scotland, in 1708. He was educated at the University of Aberdeen. He came to London, and became one of the most popular compilers of his day, and must have been one of the most industrious writers ever known, if he was the author of all the voluminous works to which his name is prefixed. Among them are a 'History of England,' 3 vols. folio; a 'History of Scotland,' 10 vols. 8vo; and a 'General History of the World,' 13 vols. But in the preparation of most of these works he is believed to have had little share beyond lending them his name. The 'Geographical Grammar' which bears his name is believed to have been compiled by a bookseller in the Strand, of the name of Knox. Soon after his arrival in London, Cave published the first number of the *Gentleman's Magazine*, and Guthrie, by way of reporting the speeches in Parliament, concocted from such hints as he could gather the debates in the 'Senate of Lilliput,' which

were published in that periodical. In the performance of this duty he was subsequently superseded by Johnson. To what he gained by his pen was, in course of time, added a pension from government. He died in March, 1770, and was buried in Marylebone Churchyard.

GUTHRY, HENRY, a Scottish ecclesiastic, was the son of John Guthry, clergyman of Cupar-Angus in Forfarshire, where he was born soon after the commencement of the seventeenth century. He studied at St. Andrews, and was presented to the church of Stirling. In 1638 he subscribed the Covenant, but he is said never to have had much sympathy with its promoters. In 1647 he was one of those who joined the 'Engagement' for the support of Charles I. against the Parliament, which occasioned his deposition from the ministry. He was succeeded by a celebrated namesake, apparently a member of the same family, James Guthry, who, having shown a resolute hostility to Charles II., his followers, and his ecclesiastical polity, was beheaded for high treason in 1661. The more moderate or cautious Henry was then restored to the benefice. He conformed to the re-establishment of Episcopacy, and was appointed bishop of Dunkeld in 1665. He died in 1676, leaving behind him a MS. 'History of his Own Time,' which was published in 1748.

GUTTA PERCHA. This valuable substance, the name of which is the same in all languages, and which was unknown in Europe previously to the year 1843, is the inspissated juice of a tree which grows in the Malayan forests and the islands of the Eastern Archipelago. In its origin, character, and composition, it is analogous to caoutchouc, but wants the peculiar elasticity of that substance; on the other hand it possesses special and distinct properties, which render it applicable to an extraordinary variety of important uses, and which, within the short time that has elapsed since its introduction into Europe, have given a remarkable development to its manufacture.

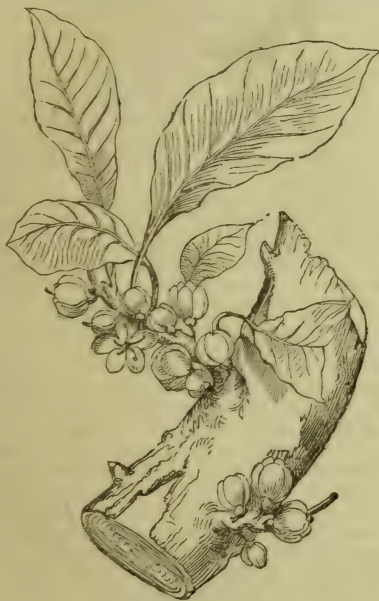
The word 'gutta,' in the Malay language, means a gum which exudes from a tree; and 'percha' is derived from 'pertscha,' the particular tree from which the gum is produced.

The merit of first appreciating its value and making it known in Europe, is claimed by two individuals who seem to have endeavoured about the same time, and quite independently of each other, to bring it into public notice, namely, Dr. William Montgomerie, who was for some years surgeon to the residency at Singapore, and Sir Jose d'Almeida, who had been for many years resident in the same settlement. The valuable qualities of the substance were no sooner publicly announced, than it came into general demand. The immediate effect of its discovery may be compared to that of the gold fields in California and Australia; and perhaps no commodity, except the precious metals, has been more eagerly sought after or more highly appreciated.

A knowledge of the article gradually spread from Singapore northward as far as Penang; southward along the east coast of Sumatra to Java; eastward to Borneo, where it was found not only at Sarawak, but also at Brunè and Pontianak on the west coast, and at Reti and Passir on the east.

This eager demand for the precious gum was pro-

ductive of a reckless destruction of the valuable trees that produced it. Instead of simply tapping the trees, as is practised in the case of caoutchouc, the monarchs of the forest were felled; a magnificent product of fifty or a hundred years' growth was cut down, the bark stripped, and the milky juice collected, and poured into a trough formed by the hollow stem of the plantain leaf; and some idea may be formed of the havoc thus made to procure the large supplies which were imported into Singapore, when it is stated that on an average not more than twenty or thirty pounds were procured from one tree. The result was that in the course of four years 270,000 trees were felled. It was therefore apprehended that the tree, although at first sufficiently plentiful, would soon become difficult to be



Gutta Percha Tree.

procured; and this would undoubtedly have been the case, had not the Gutta Percha Company, subsequently formed in England, acted with a wise precaution, and embarked a considerable capital in seeking to promote the tapping instead of the felling of the trees.

For some time after its introduction, the character of the tree remained a mystery. At length, from specimens sent home by Dr. Oxley in 1847, Sir W. J. Hooker was enabled to refer the plant to Dr. Wright's new genus *Sapotaceae*, called by him *Isonandra*; accordingly, he proposed to designate the gutta percha plant *Isonandra gutta*—the name by which it is now known. The tree is from forty to seventy feet high, and from two to six feet in diameter. The wood is peculiarly soft, fibrous, and spongy, pale-coloured, and traversed by longitudinal receptacles of reservoirs filled with the gum, forming ebony-black lines.

The sap coagulates in a few minutes after it is collected; but before the crude gum becomes quite hard, it is kneaded by hand into compact oblong masses. When quite pure, gutta percha is of a greyish-white, but as brought to market it is generally found of a reddish-brown hue, arising from chips of bark that fall into the sap in the act of making the incisions, and which cause the tinge.

The articles now made of gutta percha are numerous and varied. The toughness of the material and the facility with which it may be softened by heat, render it peculiarly apt to receive and to maintain permanently, any form that may be imparted to it. Pressure in moulds, while the gutta percha is in a warm and plastic state, is one of the most convenient modes of giving it a determinate form. Whether wet or dry, its uses are confined to cold purposes, as it is very readily affected and thrown out of shape by heat. For many purposes, naphtha and other inflammable liquids act as cements and even solvents for the gutta percha. It resembles very tough leather, and emits a peculiar odour; its surface is, however, capable of being prepared so as to receive paint, gilding, japaning, bronzing, and other ornamental modifications. The crude substance, as brought to England, is reduced to a pulp by macerating machines, purified by water, combined with many different substances according to the purpose to which it is to be applied, and pressed into sheets or other forms by rollers; and familiar mechanical processes are then sufficient to work up this prepared material to the required forms.

Gutta percha is used for making a vast variety of ornamental articles, too numerous to detail, but which might, if necessary, be grouped into such headings as domestic, artistic, surgical, chemical, manufacturing, agricultural, electrical, maritime, engineering, and ornamental. Perhaps its most important application has been the coating of underground and submarine electric telegraph wires. But apart from these uses, it is more especially to the manufacture of tubes and chemical utensils for the conveyance and conservation of acids, *et cetera*, that the article seems calculated to render the greatest services.

The imports of the raw material amounted, in 1863, to 21,655 cwts., value 224,961*l.*, or an average value of 10*l.* 10*s.* per cwt. India, Singapore, and Ceylon, sent 18,597 cwts.; Borneo, 1854 cwts., and Holland, 875 cwts. The exports were 786 cwts.; value 8165*l.* In the same year 190 cwts. of gutta percha manufactures, value 2493*l.* were imported; and 1418 cwts. of British, value 18,351*l.*; and 106 cwts., value 1274*l.*, of foreign make, were exported. In 1864 the imports had increased to 35,636 cwts.

In Dr. Muspratt's 'Dictionary of Chemistry' is given an invaluable treatise on the properties, composition, and manufacturing processes of this singularly useful article of commerce.

GUTTA SERENA is that kind of blindness which arises from derangement or disease of the nerves of the eye, whether before or after their separation from the brain. The name originated in a notion, long prevalent in the schools, that all diseases are attributable to some deleterious fluid or humour circulating in the blood, or diffused in the substance of the part affected. The epithet *serene*

was intended to intimate the comparative freedom from pain, and the absence of any unpleasant change in the appearance of the eye, which distinguish this class of ophthalmic complaints from others equally destructive of sight. Hence Milton, whose blindness was of this kind, thus addresses Light ('Paradise Lost,' iii. 22)—

'But thou
Revisit'st not these eyes, that roll in vain
To find thy piercing ray, and find no dawn;
So thick a drop serene hath quenched their orbs,
Or dim suffusion veiled.'

and, in the lines to Cyriack Skinner, he notices both the external peculiarity and the cause (by far the most frequent one) of his blindness, as well as the occasional suddenness of its attack:—

'Cyriack, *this three years day* these eyes, *though clear*
To outward view of blemish or of spot,
Bereft of light, their seeing have forgot.'

But the rejection of the humoral pathology has been extended to the nomenclature derived from it; and this fanciful though still popular term, which seems to have been devised expressly for the poets, has given place in modern systems of nosology to that of *amaurosis* (ἄμαυρος, 'blind').

The most frequent seat of the complaint is the retina; the next is probably the brain itself, or that part of the optic nerve which, lying near the cranium, is in contact or communication with the brain, and partakes of its diseases. It may likewise be symptomatic of irritation in some distant organ. The temporary failure of sight during a bilious attack is of this nature. It is sometimes merely hysterical, in which case, though the blindness may be total, it is rarely permanent; and the same remark may be made of a kind of amaurosis which occasionally results from the irritation of worms in the intestinal canal.

Confirmed amaurosis is seldom cured, but in its early stages much may be effected by careful and skilful treatment; and the means may generally be adapted with great precision to the nature of the case, by attentive consideration of its symptoms and history.

Depletion, aperient medicines, abstinence, and a darkened chamber, with mercury, must of course form a part of the treatment when the case is inflammatory; but, when the symptoms arise from exhaustion, an opposite plan of treatment is obviously proper.

GUTTIFERÆ, or CLUSIA/CEÆ, form a small natural order of exogenous plants, inhabiting the hotter parts of tropical countries in both the Old and New World. Their fruit is succulent, juicy, and in many cases resembling a large apple or orange. The Mangosteen (*Garcinia mangostana*) is probably the most delicious of any known; but it has never been seen in a fresh state in Europe, for the tree will hardly exist out of its native, humid, heated atmosphere in the Indian Archipelago. In general the fruit of these plants is acrid and astringent, and quite unfit for food. The most remarkable product of the order is Gamboge, which is secreted by the branches of *Hebradendron cambogioides*, and perhaps some other species. Others yield an astringent gum-resin, called Tacamahaca.

GUTTURAL (Lat. *guttur*, 'the throat'), in Elo-

cution and orthoëpy, a term applied to sounds, letters, or syllables, pronounced or formed in the throat. In music, it is an epithet applied to that style of intonation which the Italians call 'singing in the throat.'

GUTZLAFF, REV. DR. CHARLES, a distinguished Chinese scholar, and secretary to the Hong Kong government, was born in Pomerania in 1803. He was first sent to the East by the Netherlands Missionary Society in 1827; and after spending four years in Batavia, Singapore, and Siam, he went to China, where his critical knowledge of the language and manners of the inhabitants enabled him to enter the country on a familiar footing, and thus obtain a more intimate acquaintance with China and its inhabitants than any other European. He subsequently published his journals, which are of a most interesting character. On the death of Dr. Morrison in 1834, Mr. Gutzlaff was engaged as interpreter to the British Superintendency, which position he held during the war with the Chinese Empire in 1841-42. He afterwards received the appointment of Chinese secretary to the British plenipotentiary and superintendent of trade. This position he held to the time of his death, which took place in 1851.

Mr. Gutzlaff's researches in China have been published in various forms. In addition to his journals of different voyages along the coast of China, he published 'A Sketch of Chinese History, ancient and modern;' 'China Opened, or a Display of the Topography, History, &c., of the Chinese Empire;' 'Memoirs of the late Emperor of China, and the Court of Peking,' &c.

GUYANA, GUAYANA, or GUIANA, is the north-eastern portion of South America, extending from the banks of the river Orinoco southward to those of the river Amazon. It is bounded on the west by the Guainia or Rio Negro, the natural canal of Cassiquiare, and the middle course of the Orinoco. Its surface covers an area of more than 650,000 square miles, but more than five-sixths of it are included within the boundaries of the empire of Brazil and the republic of Venezuela, under which articles these portions are noticed. We limit the present description to those parts which comprehend the English, Dutch, and French settlements, and which cover a surface of about 130,000 square miles. The boundaries between these settlements and the other two portions are only vaguely determined; but for the most part the districts drained by the rivers which fall immediately into the Atlantic Ocean belong to the European nations, while those which are drained by the streams which fall into the Amazon and Orinoco are appurtenances of Brazil and Venezuela respectively.

Surface, Rivers, &c.—The shores of this country are skirted by a mud bank, extending about seven or eight miles out to sea, rendering the approach from the sea exceedingly monotonous and difficult. Low land extends from the coast forty to seventy miles inland, and is mostly on a level with the sea at high water. This land can with difficulty be protected from the sea, but when drained and cultivated, it yields rich crops. In fact, such is the depth and fertility of the soil, that the same land has been productive annually through more than half a cen-

tury, without manure, without rotation of crop, and without a pause.

The high land does not rise immediately from the plain to a great elevation, the hills on its southern edge attaining only a height of from 50 to 200 feet above the plain. Behind these hills the high land stretches out in level or undulating plains, rising here and there into eminences; but farther south ranges of hills appear running north-west and south-east parallel to the coast; or rather to the northern edge of the upper region; and south of them the surface is again depressed and extends in plains. A considerable portion of this inland country consists of extensive savannahs covered with grasses and plants.

The largest river is the Essequibo, which traverses nearly the middle of British Guyana. At a point 230 miles from its mouth, the river is still some hundred yards wide, and forms a great cataract, called King William's Cataract. It is, however, only navigable for large vessels up to its first falls—a distance of 60 miles from the sea. In the wide estuary of the Essequibo there are numerous islands, some of which are extensive. Among them are Hog Island, Wakenaam, Leguan, and Tiger Island.

East of the Essequibo and parallel to it, runs the Demerara, whose sources lie a little south of 5° N. lat. At 5° 25' N. lat. it forms a great cataract, and below it becomes navigable for small craft. This river runs more than 200 miles; and, as it affords an easy means of transport for goods, there are many settlements on its banks.

Farther east runs the Berbice, whose source is situated about 3° 40' N. lat. It has many rapids and cataracts, but is navigable for 165 miles.

The Courantin River forms the boundary between the Dutch and British possessions. At 200 miles from its mouth it is still 900 yards wide. Like most of the other rivers of Guyana, it has many rapids and cataracts, and its course is very tortuous. Near its mouth is an island, Parrot Island, seven miles long. Seventy miles from the sea the tide rises thirty inches.

The river Surinam, which traverses the middle of the Dutch territories, rises somewhere about 4° N. lat. It enters the low plain at about 4° 40' N. lat., and so far it is navigable for river barges. Towards its mouth it increases to a mile in width, and north of Paramaribo it is still wider. Vessels of considerable size can enter it and sail up to that town.

The Marony, which divides the Dutch and French Colonies, has many rapids and cataracts south of Arminia, in 4° 45' N. lat. From this place, to which the tide ascends, as far as its mouth, it is not less than a mile and a half wide, but full of islands. Large river vessels can ascend to Arminia.

The smaller streams are the Pomeroon, the Moruca, the Wai-ini, between the Orinoco and the Essequibo; the Mahaica, the Mahaicony, and the Albany, between the Demerara and the Berbice; and the Canje, which joins the latter immediately before it falls into the sea. All these streams are continually bringing down quantities of detritus, and the coast-line is consequently undergoing considerable changes. In one place the drainage of the estates is blocked up by drift-mud, and in another, incessant exertion is required to repel the encroachments of the sea.

Climate and Productions.—Guyana has two rainy

and two dry seasons. The long rainy season sets in about the middle of April, and lasts till August. The long dry season continues from August to November. February and March constitute the short dry season, but they are not quite so free from showers as the long dry season. The heat is not so great as might be supposed, considering the position of the country near the equator and the lowness of the coast: the trade-winds and the land and sea breezes tend to cool the air. The thermometer, even in summer, seldom rises above 90°, and it does not often descend below 75°. Though Europeans are subject to some diseases on their arrival, it is now well known that the climate of Guyana is more healthy than that of most places in the West Indies. Thunder-storms, hurricanes, and earthquakes are rare.

Few countries on the surface of the globe can be compared with Guyana for luxuriance of vegetation, which shows itself especially in the great number of indigenous plants and the large forest-trees which cover perhaps not less than one-half of its surface. Timber, furniture-wood, and dye-wood are afforded in abundance. Indian corn, rice, wheat, cacao, vanilla, tobacco, cinnamon, mandioc, yams, sweet potatoes, arrow-root, bananas, pine-apples, coconuts, sugar, coffee, ginger, pepper, cloves, nutmegs, and cotton—all are grown in Guyana. The principal attention of the landed proprietors is now concentrated in the growth of sugar and the manufacture of rum; but the timber trade has of late years assumed a very great degree of importance, owing principally to the interest excited in the natural resources of the colony by the Great Exhibitions of London in 1851 and 1862, and of Paris in 1855.

The domestic animals are the same as in England. Black cattle grow to a greater size than in Europe, but their flesh is not so tender nor of so fine a flavour. The wool of the sheep is converted into hair. Among the ferocious animals are the jaguar and cougar. Other animals are the armadillo, agouti, ant-bear, sloth, monkeys, lizards, iguana, alligators, bats, and snakes. The birds and insects are very numerous.

Inhabitants.—Guyana is inhabited by Europeans, Africans, and native Americans. The Europeans are mostly descendants of Dutch settlers, but some are descendants of Englishmen and Frenchmen. The Africans were brought over to cultivate the country as slaves, and are much more numerous than the whites. In British Guyana there are six tribes of natives, who are much more civilized than the aboriginal tribes who inhabit the adjacent countries. Some of them work for the English settlers.

Guyana is, as we observed, divided among Great Britain, Holland, and France.

I. BRITISH GUYANA comprehends the countries extending from the Courantin River westward to the Orinoco, and from the sea-coast to the sources of the rivers Essequibo and Courantin. Its area has been estimated at 76,000 square miles, which considerably exceeds that of the two other territories taken together; but the possession of much of this has been disputed by Brazil and Venezuela. The population in 1861 was 148,026, including about 30,000 Indians. The total number of immigrants of all races introduced from 1835 to 1860 was 90,000, and there are now about 27,000 under indenture on the several estates.

Previous to 1831 the country was divided into three colonies, Essequibo, Demerara, and Berbice, but in that year they were united under one government, called British Guyana. The residence of the governor is in *Georgetown*, formerly called Stabrock, on the Demerara river, a short distance from its mouth. Its wide streets are traversed by canals. The houses are of wood, and seldom above two stories high. Before them are porticoes and balconies, shaded by a projecting roof, which is made of red wood, resembling mahogany. The population is 25,000—the great majority being negroes, or persons of colour. There is an episcopal cathedral and a Smith chapel—the latter erected to commemorate the memory of a missionary who suffered in the cause of the negroes during the struggle for emancipation. There is also a very elegant town-hall, with marble-paved galleries resting on cast-iron columns; a mariners' hospital, numerous churches and schools, astronomical and botanical societies, barracks, theatres, and a market-place surrounded by elegant and well-stocked shops. Owing to the low and swampy nature of the district, the town is unhealthy, and yellow and intermittent fever, diarrhoea, dysentery, and dropsy, are local diseases.

Berbice was first settled by the Dutch in 1626, and remained mostly in the hands of Dutch companies or traders till 1803, when it was finally ceded to Great Britain. The former capital of this province was Old Amsterdam, which was replaced by New Amsterdam, higher up the river Berbice, in 1796. It extends about a mile and a half along the river shore, and each house has an allotment of garden ground around it.

Public affairs in British Guyana are administered by a governor invested with large powers, responsible to the queen in council, and aided by a peculiarly-constituted colonial assembly, based to a great extent on the system under which affairs were formerly administered by the Dutch. The three counties of Berbice, Demerara, and Essequibo, form a diocese of the Anglican church. The colony is altogether divided into seventeen parishes, of which seven belong exclusively to the Church of Scotland, and eight to that of England; while the two in which the towns are situated, have a minister of each church appointed to them. The ministers of both churches, as well as those of the Roman Catholic and Wesleyan, are supported by the state, but independent missionaries throughout the colonies are maintained by their congregations.

The revenue of the colony in 1863 was 266,000*l.*, and the expenditure 267,000*l.*—both sums being rather under those for 1862. The public debt amounts to 600,000*l.*—a great portion of which has been incurred in bringing immigrants to the colony.

The value of the imports in 1863 was 1,121,979*l.*, against 1,107,181*l.* in 1862. The value of the exports was 1,679,885*l.*, against 1,365,295*l.* in 1862. This increase is to be attributed partly to the advance in price of the staple product of the colony, but also to a considerable increase in the quantity exported.

The important colony of British Guyana has made very rapid progress during the last fifteen years, but like other sugar-producing countries, it has had to contend with great difficulties, owing to the com-

paratively low price of the product, and in this colony also with the want of drainage. To meet the necessary low rate of wages, Chinese and Coolies have been imported in large numbers to supply the labour-market. The Chinamen are liked by the planters, who have an agent regularly stationed at Canton to procure recruits. In his last published report (1865) the governor of the colony says:—'There is great room for improvement in the condition of the masses of the people. It is satisfactory, however, to be able to report that, with regard to the immigrant class, which is chiefly located on the estates, a marked improvement has of late years taken place in their dwellings, as well as in the estates hospitals. The Creole population, which is chiefly located in villages, must always be a source of the deepest anxiety. There is so much to be done, so many difficulties to be encountered, and so much obloquy to be endured, that the task of ameliorating the condition of the villagers is anything but an encouraging one. Their stubborn resistance to taxation is the main obstacle to any measure of improvement. I have no doubt that this obstacle will ultimately be overcome, and that means will be obtained to place the villages of British Guyana in a satisfactory condition. It would not be proper for me to omit to notice the fact that in all the villages, so far as my knowledge extends, there are intelligent negroes fully alive to the value of those measures of improvement which the Government is anxious to carry out. There are also some villages in which the well-disposed are much better supported than in others.'

An active commerce is carried on with Guyana by Great Britain—the exports from British Guyana alone amounting to one million and a half annually. In 1863 the sum was 1,510,500*l.*, consisting of unrefined sugar valued at 1,138,792*l.*; rum, 257,507*l.*; wood for shipbuilding, 69,808*l.*; cotton, 27,054*l.*; cocoa-nuts, 4118*l.*, and a few other articles. In the same year the imports from the United Kingdom were valued at 578,006*l.*; of which amount 512,391*l.* was for British produce and manufactures. The principal articles were cotton manufactures, 85,361*l.*; apparel and haberdashery, 50,845*l.*; casks, staves, and hoops of wood, 41,949*l.*; machinery, iron manufactures, ale and beer, coal, drugs, linen and woollen manufactures.

II. DUTCH GUYANA, or SURINAM, extends along the coast from the Courantijn River to the Marony, and between them inland to their sources. The area is 45,000 square miles, and the population in 1861 was 53,700, of whom nearly three-fourths are negroes. Slavery has recently been abolished by the Dutch government, but in lieu of compensation it was agreed that the negroes should labour for a considerable time for their former masters without wages.

The physical character, climate, and productions of the country, are very similar to those of British Guyana, but the natural advantages of the country are not so fully developed, and in some parts the land is totally uncultivated. The principal river is the Surinam, which has a course of 300 miles, but is not navigable for large ships for more than about thirty miles. Dutch laws are in force, and the country is ruled by a governor-general, appointed by the king, and a general council of native freeholders. All religions are tolerated, and the Jews—who are

very numerous in the colony—have establishments and synagogues in many places.

The principal exports are sugar, rum, cocoa, and cotton; but besides these articles, the colony also produces fine woods, cassava, gums, and drugs. The imports consist principally of machinery, cotton goods, iron, &c., and are chiefly supplied from the mother country and the United States; but the exports to Great Britain in 1863 were valued at 109,220*l.*; and the imports thence to 89,077*l.* The total value of the exports is about 500,000*l.* per annum, and the imports half that amount.

Paramaribo, the capital, is about ten miles from the sea, on the western bank of the river Surinam, and contains about 16,000 inhabitants. The streets are unpaved, but wide, and traversed by canals, and lined with orange, lemon, and tamarind trees. The houses are generally two stories high, and built of wood. The town is provided with Lutheran, Calvinistic, Roman Catholic, and English churches, and Portuguese and German Jewish synagogues, and is the centre of the trade of the colony. In an hospital for lepers, 450 patients are maintained at the expense of the colony. Near to it is the fortress of Zelandia, in which the governor resides.

III. FRENCH GUYANA, or CAYENNE, extends along the coast from the river Marony, which separates it from Dutch Guyana, to the Oyapock, which divides it from Brazil. The area is not well-defined, but, according to good authorities, is supposed to be about 18,000 square miles. The population is 23,107. Nearly the whole tract is still covered with large forest trees; and the settlements are neither so large nor so numerous as in British and Dutch Guyana, but the physical aspects, soil, climate, &c., are generally the same. The principal rivers are the Marony and the Oyapock. The colony is divided into two cantons, and its government is similar to that of other French possessions. The Roman Catholic is the dominant religion, although other forms of faith are tolerated. The trade with French Guyana is unimportant, and its chief importance to the mother-country consists in its being the principal seat of her penal settlements, which are maintained at Cayenne at the national charge; all persons sentenced to eight years' hard labour are condemned, on the expiration of their sentence, to reside for the remainder of their lives in the colony, unless specially pardoned by the emperor. The discipline amongst the prisoners is very severe, the labour heavy and continuous, and, as a natural consequence, the death-rate is very high. The number of prisoners at present in the colony is about 6500.

Cayenne is the only town of any importance, and even that is small and mean-looking, although some improvements have recently been effected in the part designated 'the New Town.' The population is about 8000. The name originates in a spice, Cayenne pepper, made of the dried seeds of a native plant, a species of capsicum.

History.—Guyana was discovered, before the end of the fifteenth century, by Vincent Pinzon. The Dutch formed the first settlement about 1590 on the Demerara River, and afterwards at other places. The English settled in 1634 in the neighbourhood of the Berbice and Surinam; but in 1667 the English settlements were given up to the Dutch. The

French occupied Cayenne in 1633. During the last war with France the English occupied the Dutch settlements; and by the treaty of Paris, 1814, they restored only those between the Courantin and the Marony to the Dutch, retaining possession of the remainder.

GUYENNE or GUIENNE, and GASCOGNE, two provinces in the south-west of France, formed together the largest of the thirty-two military governments into which that country was divided previous to the revolution of 1792.

Gasconne, which nearly coincides with the Aquitania of Julius Cæsar, and the Novempopulana of Augustus, takes its name from the Gascones or Vascones, a Spanish people, who wrested it from the Franks in the beginning of the seventh century. It included the countries west of the Garonne, and is distinguished by the names of Couserans, Comminges, Bigorre, Armagnac, Condomois, Marsan, Landes, and Labour, and now forms the departments of Landes Gers, Hautes-Pyrénées, Haute-Garonne, and parts of Basses-Pyrénées, and Ariège, under which heads the particular features of the country are noticed. AUCH was its capital. From this province the Bay of Biscay is sometimes called the Gulf of Gasconne.

Guienne lay to the north of Gasconne, and extended from the Cévennes Mountains to the Bay of Biscay, including the districts of Rouergue, Quercy, Agenois, Périgord, Bazadois, and Bordelais. BORDEAUX was its capital. It now forms the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, Aveyron, and part of Tarn-et-Garonne. The name is said to be a corruption of Aquitania, which designation was extended in the later divisions of Roman Gaul so as to include the districts northwards as far as the Loire. The entire government of Guienne and Gascony was sometimes spoken of under the name of Guienne.

The historical connection of Guienne and Gascony with the Plantagenet kings of England, is noticed under AQUITANIA.

The Gascons, though a very simple, industrious, and sober people, are generally represented as boasting exaggerators. This notion is supposed to have originated from the circumstance, that in former times the younger sons of Gascon families were compelled, in consequence of their poverty, to seek their fortunes as adventurers in other countries, where, in order to gain attentions, which their circumstances generally failed to command, they were wont to speak in hyperbolic language of the great valour and wealth of their ancestors, immediate and remote. Hence the term *gasconade* came to be equivalent to a harmless, amusing, and oftentimes highly comical vaunting.

GUY'S HOSPITAL, London, was built in the year 1724. The founder, Thomas Guy, was the son of a lighterman in Horsleydown, Southwark, and contrived, by a long career of industry and frugality, to amass a large fortune, which he devoted to works of charity and benevolence, besides making ample provision for the claims of consanguinity. He followed the occupation of a bookseller, and occupied as a place of business a house situated at the angle of Lombard Street and Cornhill, long since pulled down to make way for the improvements in front of the Mansion House. He was an alderman of the

city of London, and in this capacity took an active interest in its various charities, particularly in St. Thomas' and Christ's Hospital, both of which institutions he endowed liberally during his lifetime. He was also member of Parliament for the borough of Tamworth, and built and endowed numerous almshouses there for the benefit of his poorer relatives and friends. This charity is now under the management of the local magistracy. Many interesting anecdotes are related of Guy's domestic life, illustrative of his shrewdness of character, frugality, and practical benevolence. He was never married, but his relations appear, from his testamentary dispositions, to have been very numerous. For their immediate use he bequeathed 80,000*l.*, and gave their posterity a prior claim to the benefits of Christ's Hospital and the almshouses at Tamworth. But his largest bequest was the sum of 220,000*l.* for the endowment of the hospital which bears his name, and which he lived to see erected but not occupied—his death occurring at Christmas, 1724, a few weeks before the first patients were admitted to the wards. The hospital in Guy's time consisted only of two square blocks, which still exist. These were afterwards remodelled, and additions made to them, to accommodate 400 patients. By an act of incorporation, obtained shortly after Guy's death, the management of his estate was vested in the names of fifty gentlemen, who also became perpetual governors of the hospital. The residue of the property was profitably disposed of in the purchase of estates in Lincolnshire, Essex, and Herefordshire, which now yield an annual income of upwards of 35,000*l.* Thomas Hunt, another London merchant, residing at Petersham in Surrey, greatly improved the resources of the charity, by bequeathing, in 1829, the bulk of his property, amounting to 196,000*l.*, on condition that the governors should increase the accommodation by 100 additional beds. This has been done by the erection of a new hospital, which is now (1866) on the eve of completion, and which is intended to accommodate 300 patients. The chapel, placed in the front square of the hospital, contains a fine statue of the founder in marble, representing him in the act of pointing out to a suffering female the home he had furnished for her relief. There are also memorial windows in the chapel in acknowledgment of Hunt's bequest; and the governors have recently erected a tablet to the memory of Sir Astley Cooper, who was for thirty years surgeon to the hospital. The remains of Guy, Hunt, and Cooper, are placed in the vault underneath the chapel. The medical school of the hospital has long enjoyed a high reputation, on account of the distinguished names of its medical officers, among whom may be enumerated Sir Astley Cooper, Aston Key, Dr. Bright, and Dr. Addison. For some years past it has had the largest number of students enrolled of any of the Metropolitan medical schools. The average yearly number of patients admitted to the hospital is 5000, while the number of outpatients, including minor accidents, poor pregnant women, and others, has been annually increasing, and has latterly averaged upwards of 70,000 persons.

GUYTON, DE MORVEAU, LOUIS BERNARD, was born in 1737 at Dijon, in the University of which his father was professor of civil law.

In early life he showed a turn for mechanics, and after studying at home he went to college, which he quitted at sixteen years of age; he then became a law student, and acquired much skill in that profession. Having been admitted honorary member of the Academy of Dijon, the lectures he heard there gave him a taste for chemistry; and in 1772, having previously published some less important papers, he gave to the world a collection of scientific essays, entitled 'Digressions Académiques.' The memoirs contained in this work on phlogiston, solution, and crystallization merit particular notice, and evince the superior knowledge which he had acquired on the subjects that he had undertaken to illustrate. In 1773 he discovered the mode of destroying infection by the vapour of muriatic acid. In 1766 he commenced a course of well-attended lectures on chemistry at Dijon.

The fame of Morveau now began to extend to every part of Europe; and in 1767 he published the first volume of a course of chemistry, entitled 'Elémens de Chimie de l'Académie de Dijon.' The work was completed in four volumes, and was much admired. He afterwards supplied many articles to the 'Encyclopédie Méthodique.' He published a paper in the 'Journal de Physique' for 1782, to show the necessity of establishing a new and scientific chemical nomenclature.

On the breaking out of the French Revolution he became a decided friend to the popular cause, and was a member of the Convention and of the Council of Five Hundred. In 1799 Bonaparte appointed him one of the administrators-general of the mint, and in the year following director of the Polytechnic School; and after having been made one of the Legion of Honour he was created a baron of the French empire in 1811. At an advanced period of life he married, but left no children. After teaching about sixteen years in the Polytechnic School he gave up the appointment; and after about three years' retirement he died on 3rd January, 1816.

The publications of Morveau on chemical subjects are very numerous, and few of his contemporaries contributed more to the advancement of the science.

GUZERAT, or GUJERAT. [HINDUSTAN.]

GWALIOR, a principality in Central India, is a fragment of the great empire of the Peishwa, and has been under British protection since 1803. In 1843, the death of the sovereign caused universal anarchy, and led to the forcible interposition of the British government, and since that time some of our troops have been stationed there, in addition to about 9000 native soldiers. During the mutiny of 1857, the young Maharajah remained faithful to the English, though the troops rebelled. The population of the state is estimated at 3,250,000. The chief towns are:—

Gwalior, the capital, about sixty miles south of Agra, has a population of 50,000, grouped around a rock-fortress of remarkable strength, which rises almost perpendicularly to a height of 300 feet, and is completely isolated. The summit is crowned by a citadel, which can accommodate a garrison of 15,000 men, and is provided with large tanks of water. It is impregnable to native troops. But the revolt of the garrison in 1857 placed it in the hands of the rebels, and it was a centre of rebellion for more than

a year, when it was recovered by Sir Hugh Rose. *Jhansi* is a fortified town on the south of Gwalior, with considerable trade and a large population. All the Europeans, men, women, and children, fell by the hands of the native troops in 1857, not one being left alive to tell the story of their fate. The town was taken by storm in the following year by Sir Hugh Rose, after a desperate defence.

Oojein, or *Ujein*, an ancient capital, in a southern part of the country, contains 130,000 inhabitants, and has many mosques and temples, with extensive trade. It is one of the seven sacred cities of the Hindus.—(Milner's *Gallery of Geography*, 1864.)

GWILT, GEORGE, an eminent architect and antiquary, was born in the county of Surrey in 1775. He was the son of George Gwilt, an architect of some celebrity, who erected the Newington Sessions House, Horsemonger Lane Gaol, and many other public edifices in the locality. The professional knowledge of the son was chiefly obtained in the office of his father, whom he succeeded in business. At a very early age he displayed considerable taste for antiquities, which eventually introduced him to an extensive connection. In 1815 he became a fellow of the Society of Antiquaries, and in 1818 he was engaged upon the restoration of the steeple of Bow Church, a work which required considerable skill and knowledge of ancient architectural details. In 1822 he undertook the restoration of the tower and choir, and afterwards of the lady chapel, of St. Mary Overy's Church, in Southwark, which are considered as among the most interesting works of art in the Metropolis. He died in 1856, at the advanced age of eighty-one.

GWYNN, JOHN, R.A., architect, was born at Shrewsbury in the early part of the eighteenth century. Gwynn erected a church and some other buildings, but is remembered on account of his bridges and his writings. He built the well-known Magdalen Bridge at Oxford; and the picturesque, but not very convenient, English bridge at Shrewsbury. He also competed for the erection of Blackfriars' Bridge, London, and carried on a brisk controversy (assisted by Dr. Johnson) with Mylne, whose design was selected. As a writer Gwynn has the merit of having suggested various important public improvements, which, though neglected at the time, have since been to a remarkable extent adopted. In 1749 he published 'An Essay on Design, including Proposals for erecting a Public Academy.' This was to be an English academy of painting, sculpture, and architecture; and when, nineteen years later, the Royal Academy was founded, Gwynn's suggestions were to a considerable extent followed. Gwynn was one of the original members of the Royal Academy. His most remarkable work was a quarto volume, which appeared in 1766 under the title of 'London and Westminster Improved,' and for which Johnson wrote a dedication to the king. In this Gwynn not only proposed to replace old London Bridge by a new one, and to erect another bridge almost on the exact spot long afterwards selected for Waterloo Bridge; to widen the Strand, and other main thoroughfares; to form open central spaces, and to construct a great number of new streets, which should more directly connect the various public places and centres of business;

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but also to embank the Thames between the bridges, and to form a river-side road one hundred or one hundred and twenty feet wide, half being devoted to quays, and half to a carriage way; to improve the sewers, and to remove the burial-places to a convenient distance outside the city. In this work, strange to say, a very large proportion of the chief improvements which have only within the last few years been made in the Metropolis, and many which sanitary reformers and others are still vainly urging, were not merely indicated by him, but clearly explained in maps, as well as in descriptions. Gwynn had spent many years in elaborating his plans, he having, as he states in an introduction, first proposed a less comprehensive scheme (founded on Wren's plan for the rebuilding of London) seventeen years before. His projects seem, however, to have been regarded as visionary, and to have been long utterly neglected. Within the last few years attention has been directed to them; but Gwynn himself has hitherto not found a place in any biographical dictionary, English or foreign, and it is with some difficulty we have found the materials for this scanty notice. We cannot ascertain the exact date of his death; but as a new academician was elected in his place in October, 1786, there can be little doubt that it occurred in that year.—(*Imp. Dict. of Universal Biography*, Mackenzie, 1866.)

GY'AROS, one of the smaller Cyclades, situated nearly at an equal distance between Andros, Ceos, and Syros. It is about four miles long, and three miles in its greatest breadth, and is rocky and barren. It is now called Ghioura, and is not inhabited, except occasionally by fishermen. Under the Roman emperors it was used as a place of banishment.

GYGES. [LYDIA.]

GYMNADE'NIA, a genus of plants belonging to the natural order *Orchidaceæ* and the tribe *Ophrydineæ*. There are two British species, *G. conopsea* and *G. albidæ*. They are found in mountainous and hilly pastures, and blossom in June and July.

GYMNAPISTES (γυμνός, 'bare,' or 'naked,' and ἀπιστος, 'treacherous'), a genus of fishes of the family *Scorpenidae*, whose bodies are naked, and the anal fins furnished with three strong spiny rays.

GYMNARCHUS (Gr. γυμνός, 'bare,' and ἄρχης, 'head'), a genus of fishes of the eel kind, and of the family *Sternarchidae*.

GYMNASTICS, or more properly *gymnastic* (γυμναστική, from the word γυμνός, 'naked,' it being customary among the Greeks to strip themselves, wholly or in part, before engaging in bodily exercises). Gymnastic games may be said to be prehistoric; they are mentioned in the second and twenty-third books of the 'Iliad.' The rewards given to the conquerors in these games were called *athla*, which gave origin to the word athlete, as applied to those who contended for them. Before the time of Hippocrates gymnastics were made a part of medicine, as a means of counteracting the bad effects of increasing luxury and indolence. The various exercises were gradually reduced into a complete system: public buildings called *Gymnasia* were erected for the purpose, and superintending officers appointed by the state.

The first gymnasia were built by the Lacedæmonians (Plato, *Nóμοι*, lib. i.), and after them by

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the Athenians. Those built by the Romans were on a more magnificent scale, and from the extensive baths which were attached to them are not unfrequently called *Thermæ*.

The exercises practised in the gymnasia were—dancing, wrestling, boxing, running, leaping, quoits, and hurling the javelin or some similar instrument. Since the introduction of gunpowder, science and skill have had more to do with warfare than mere strength of muscle, and consequently gymnastics went out of repute in military life, and were soon little thought of in civil life. During the present century, however, the practice has revived, and in Prussia, Sweden, France, and England, is daily gaining more attention and improvement.

In the English army recruits have to undergo daily gymnastic training for two months instead of musketry instruction. Young officers, while at recruit, drill the same. Weak and awkward men are kept at it for six months. As soon as they have passed all the courses of gymnastic exercise, it is left optional with them to further improve themselves by voluntary practice. The object aimed at is to harden and strengthen the trained soldier, so as to enable him to cover 1000 or more yards of ground at a rapid pace, and leave him in good wind, and able to use his bayonet efficiently. A medical inspection of the recruits is made at the gymnasium once a fortnight, and of the trained soldiers once a month. The men are also measured and weighed at stated periods, in order to observe the progress made in developing muscle, height, breadth of chest, and weight. The cavalry officers and privates have to go through a course of fencing drill; and swimming is also taught at all stations where facilities for it exist.

The principle on which gymnastic exercises act is evident; their immediate effect is an increase both in the size and power of the parts exercised, in consequence of an admirable law which obtains in living bodies, that (within certain limits), in proportion to the exertion which it is required to make, a part increases not only in strength and fitness, but also in size. Instances of the application of this law may be seen daily. A person is called on to engage in some new avocation, in which muscular exertion is required, and every day he is not only improved in strength and dexterity, but the muscles brought into unusual action increase rapidly in size and vigour, so as soon to surpass those of the rest of the body which have been less employed. Nor does the beneficial influence stop here. If the exertion be not carried so far as to produce excessive fatigue, all other parts of the body sympathize with the improving condition of that which is chiefly exerted; the circulation, being excited from time to time by the exercise, acquires new vigour, and, the blood being thrown with unusual force into all parts of the system, all the functions are carried on with increased activity. Improvement in the general health is soon manifested; and the mind, if at the same time judiciously cultivated, acquires strength, and is rendered more capable of prolonged exertion. As instances of the bad effects of a deficiency of exercise, it will be sufficient merely to allude to the condition of those who, being compelled to a sedentary occupation during the greater part of the day,

neglect to occupy a part of their leisure time in some active exertion, as walking, riding, &c.

Excessive exercise, on the other hand, should be carefully avoided; for, though less frequent, instances are not uncommon where undue exertion has produced effects scarcely less injurious than those which result from inactivity. The existence of either class of evils is sufficient to prove that gymnastics should form a part of the education of youth, as much as 'literary instruction, music, and the art of design,' which with 'gymnastic' are mentioned by Aristotle ('Polit.,' lib. viii.) as the four branches of instruction recognized in his day. In order that gymnastics may produce their proper results, some general system should be established in all schools, by which one sex may be preserved from the evils of deficiency, and the other from those of excess in exertion; and the beneficial influences which gymnastics exercise on the mind as well as on the body may thus be secured to both.

Gymnastics, properly so called, are simple exercises, whose primary and direct aim is muscular development and health. They should commence with elementary and special movements, with a view to render every part of the body supple, and proceed to the exercises of leaping, suspension, standing and walking on beams, walking on stilts, climbing, swinging, vaulting, &c. The games that bring the greater number of muscles into successive or harmonious play are the best to strengthen the system during infancy and adolescence, and to maintain it in vigour and health during manhood. A few of the most appropriate are, cricket, foot-ball, rackets, tennis, golf, battledore and shuttlecock, dancing, rowing, skating, climbing, and swimming. Reading aloud and singing are also admirable agents in expanding the chest.

GYMNE'MA (Gr. *γυμνός*, 'bare,' and *νημα*, 'a thread,' in reference to the stamens), a genus of twining shrubs, of the order *Asclepiadaceæ*. There are many different species which possess a variety of uses; for instance, *G. tingens*, of the East Indies, produces indigo of a most excellent quality. From the *G. lactiferum* of Ceylon a milky juice is exuded, which, together with the boiled leaves, is used by the Cingalese for food. The leaves of the *G. sylvestre*, when chewed, have the singular property of taking away the power of tasting sugar for twenty-four hours, without otherwise injuring the general sense of taste.

GYMNETES (Gr. *nakedness*), a genus of the family *Gymnetres* or Ribbon-fishes, with thin bodies and long ventral fins.

GYMNOCANTHUS (Gr. *γυμνός*, and *ἀκανθα*, 'a spine'), a genus of fishes, of the family *Cottidæ*, or Bull-heads; the head naked, and the ventral fins very long.

GYMNO'CLADUS, a genus of plants belonging to the natural order *Leguminosæ*. There is but one species, *G. Canadensis*, the Kentucky Coffee-tree. The branches of this tree are without any appearance of buds, which, during the winter, gives it the aspect of a dead tree, and hence the Canadian name Stump-tree. The wood is hard, compact, and of a fine rose colour. In America it is used in cabinet-making and carpentry. It has the property of rapidly converting its sap-wood into heart-wood, so

that the smallest trees may be applied to useful purposes. This tree grows well in Great Britain, but does not ripen its seeds.

GYM'NOGENS (Gr. *γυμνός*, and *γεννέω*, 'to bring forth'), an order of plants comprising (according to Lindley) the natural orders *Cycadaceæ*, *Pinaceæ*, *Tazaceæ*, and *Gnetaceæ*, or Joint-firs.

In Zoology and Botany, the word *gymnos*, denoting 'bareness,' or 'nakedness,' is extensively used as a compound in the formation of numerous scientific terms. Thus *Gymnocephalus*, 'bare-headed,' in zoology, is a genus of birds belonging to the Coraciæ, or Fruit-crows, commonly called Bald-tyrants; *Gymnodactylos*, 'bare-fingered,' is a genus of Saurian reptiles belonging to the Gecko family; *Gymnodontes*, 'naked-toothed,' is a term applied to a family of malacopterygious fishes, of the order Plectognathes, whose jaws, instead of teeth, are furnished with a smooth ivory substance; *Gymnogaster*, 'bare-bellied,' is a genus of fishes of the tribe Gymnetres, or Ribbon-fishes; *Gymnomyza*, 'naked fly,' a genus of dipterous insects of the Muscidæ tribe; *Gymnophryx*, 'naked eyebrow,' a genus of birds of the Meliphagidæ family, or Honey-sucker; *Gymnopleurus*, 'bare-ribbed,' is a genus of coleopterous insects of the family Scarabeidæ; *Gymnosoma*, 'bare-bodied,' a genus of the order Aporobranchiata, which have no shells; *Gymnotus*, 'bare-backed,' is a genus of apodal fishes, with eel-shaped bodies; *Gymnure*, 'bare-tailed,' is a genus of animals of the digitigrade tribe; *Gymnandra*, 'naked male,' in botany, is a genus of glabrous shrubs, of the order Scrophulariaceæ; *Gymnanthera*, 'naked anther,' is a genus of plants of the order Asclepiadaceæ; *Gymnocarpus*, 'naked fruit,' is a genus of shrubby plants, of the order Illicebraceæ; *Gymnogramma*, 'bare characters,' is a genus of ferns, of the order Polypodiaceæ; *Gymnosperma*, 'naked seed,' is a genus of composite plants, of the sub-order Tubulifloræ; *Gymnostachys*, 'naked spike,' is a genus of leguminous plants, of the sub-order Papilionaceæ, natives of New Holland.

GYMNO'PS, a genus of birds (*Goulin*) established by Cuvier, and described by him as having a bill as strong as that of the Orioles, the nostrils round, without scales or any membranous *entourage*, and a great part of the head denuded of feathers. He refers to *Gracula calva*, Gmel., *Mino Dumontii*, Less., and *Gracula cyanotis*, Lath. (*Merops cyanotis*, Sh.), as examples.

GYMNO'SOPHISTS (Gr. *γυμνός*, 'naked,' and *σοφιστής*, 'a sophist'), a sect of Indian philosophers, frequently mentioned by the Greek writers, and so called from their habit of going almost naked. Their manners and habits were not unlike the Cynics of the Greeks, as personified by Diogenes. They were frequently consulted by the highest personages in cases of difficulty or importance; and great reliance was reposed in them. They would not, however, wait upon their inquirers, but obliged them to send their messages, or to come themselves. They lived upon the natural productions of the earth without culture, and did not form themselves into societies, as other sects did; but each one had his particular place of retirement, where he studied in solitude, and performed his devotions. They were very strict in their frequent examinations of their disciples, or scholars, in order to ascertain the improvements

they had made in the different branches of learning, or the especial virtues or good deeds they had practised since the previous examination. They believed in the immortality of the soul, and its migration into different bodies. The Gymnosophists are mentioned and particularly described by Diogenes Laërtius. According to Jerome and Clemens, their great leader was one Buddas, or Butta; but Suidas classes him among the Brachmans, from whom the modern Brahmins have doubtless originated.

GYMNOSPERMS, one of the five divisions under which the vegetable kingdom is now classified. The name is derived from the seeds being naked, that is to say, unprotected by a pericarpial covering, and fertilized by the pollen coming in direct contact with the ovule, not by the intervention of the apparatus called stigma and style. In this respect Gymnosperms are analogous to those reptiles which, in the animal kingdom, have eggs that are impregnated by the male after they have been deposited by the mother.

The number of plants in which this peculiarity exists is inconsiderable; they entirely belong to the natural orders, *Conifera* in its most extensive sense, and *Cycadaceæ*. *Equisetaceæ* perhaps have to be added, but this is a point at present involved in doubt.

In their manner of growth Gymnosperms correspond on the one hand with Exogens, the wood of *Conifera* being arranged in concentric circles, and on the other with Endogens, the wood of *Cycadaceæ* being very nearly like that of a palm-tree. In fact, the class of Gymnosperms may be considered to unite the two classes of Exogens and Endogens so perfectly that not a link remains to be supplied. They also closely border upon Acrogens, of which *Cycadaceæ* have the gyrate venation, *Conifera* the veining, and in some cases the peculiar arrangement of the male apparatus.

In addition to the differential characters of these plants, we have to add that their sexes are always separate, and that their leaves, if furnished with veins at all, have them parallel as in Endogens, or forked as in ferns, and never reticulated as in the class of Exogens.

GYMNO'TUS, a genus of fishes of the section *Apodes*. Generic characters:—Gills partially closed by a membrane, and opening before the pectorals; the vent placed very far forwards; body without any perceptible scales, and without dorsal fin; anal fin extending the greater part of the length of the body.

Gymnotus electricus (Linn.), from the resemblance it bears to an eel, and the electric power which it possesses, has been called the Electric Eel. It is about five or six feet in length; the head is rather broad and depressed; the muzzle is obtuse; the body, compared with that of the common eel, is stouter and shorter in proportion; the anterior part is nearly cylindrical, but towards and at the tail it is compressed; the pectoral fins are small and rounded; the anal fin commences at a short distance behind the line of the pectoral fins, and extends uninterruptedly to the tail; there is no caudal fin. Its colour is brownish black.

The Electric Eel is said to communicate shocks so violent that men, and even horses, are overpowered by them. This power is dependent on the will of the animal, but decreases in strength if frequently

repeated, unless at considerable intervals. The organs by which this shock is produced are minutely described by Hunter in the sixty-fifth volume of the 'Philosophical Transactions.' All the species of *Gymnotus* inhabit the rivers of South America.

The genus *Cerapus* of Cuvier contains such species of *Gymnotus* of the older authors as have the tail lengthened and tapering, and the body compressed and furnished with scales. They also inhabit South America.

GYMNU'RA, a genus belonging to the order *Insectivora*, and established by Dr. Horsfield and Mr. Vigors for the reception of an animal brought from Sumatra, and first introduced to science by Sir Stamford Raffles, who described it under the title of *Viverra Gymnura*. Cuvier (vol. i. 'Add. et Corr.') observes that it appears to approach *Cladobates* (*Tapia*, Raffl.) in its teeth, and the Shrews in its muzzle and scaly tail. The feet (plantigrade) are each furnished with five toes; the eyes are small; the whiskers long. The fur consists of a short dense woolly undercoat and of long coarse thinly set hairs.

Example, *Gymnura Raflesii*.—This animal has the body, feet, stripe above the eyes, scattered occipital hairs, and the basal half of the tail, black; the head, the neck, the scattered hairs of the back, and the other half of the tail, white. (Horsfield and Vigors.) Length of head and body (adult) 1 foot 2 inches, of the tail 10½ inches. Habits unknown; exhales a strong musky smell. Original specimens in the Museum of the Zoological Society.

GYNA'NDRIA, one of the classes in the artificial system of botany invented by Linnaeus.

GYNE'CIUM (Gr. *gynè*, 'a woman,' and *oikos*, 'a dwelling'), among the ancient Greeks a room set apart for the women, who were occupied with operations of the needle or the loom, or other domestic duties. Among the Romans it was a depôt for clothes or furniture, where females were constantly at work. In the Middle Age, the term was also applied to any private apartment in the house or mansion, where the women were in the habit of making clothes, or preparing the needle-work furniture of the household.

GYNOCH'THODES (Gr. *gynè*, 'a female,' and *ochthos*, 'a wart'), a genus of plants, of the order *Cinchonaceae*, natives of Japan.

In Botany, there are many genera of plants compounded of the word *gynè*, 'a female,' in allusion to the pistil of the flower; as *Gynopachys*, 'thick pistil,' a genus of climbing shrubs, of the same order and country as the above; *Gynophore*, 'a bearing female, or pistil,' a term applying to the receptacle of a flower having the petals, stamens, and pistil, but not the calyx; *Gynostemma*, 'a crowned female,' a genus of climbing shrubs, of the order *Memispermaceae*, natives of Java, and so named from the ovaries being crowned by the permanent stigmas.

GYPA'ETOS, Storr's generic name for the Lämmergeyer, or Bearded Griffin (*Gypaëtos barbatus*), a bird of prey which may be considered as intermediate between the eagles and the vultures. [VULTURIDÆ.]

GYPOGE'RANUS, Illiger's generic name for the Secretary Bird, which some have placed with the gallinaceous tribe, others among the wading birds, and others again among the vultures. We agree with those who regard it as one of the aberrant

forms of the *Falconidæ*, destined for terrestrial habits, and for feeding on reptiles and small quadrupeds.

Generic Character.—Bill rather slender, shorter than the head, strong, very much hooked, curved nearly from its origin, and furnished with a cere at its base, rather vaulted, compressed at the point; nostrils placed at a small distance from the base, lateral, pierced in the cere, diagonal, oblong, open. Feet very long, slender, the tibia feathered behind, but not quite to what is called (improperly) the knee, whilst the feathers come a very little below the joint before; tarsus long, more slender below than in its upper part; toes short, warty below, the anterior



Secretary Bird (*Gypoggeranus serpentarius*).

toes united at the base by a membrane; hind toe articulated upon the tarsus. Wings long, armed with obtuse spurs; the five first quills the longest and nearly equal. Locality Africa; the Philippines.

Sparman, Le Vaillant, Smith, and others, have described at length the habits and manners of this singular and most useful bird, at considerable length; and to the works of these travellers we refer our readers. Their details relate to the Cape species (*G. serpentarius* of authors, *G. capensis*, Ogilby). It inhabits arid plains, and destroys great numbers of serpents, often not without a severe conflict. Quervoert, as quoted by Le Vaillant, says:—'In descending from a mountain into a very deep bog (fondrière), I perceived, nearly perpendicularly below me, a bird which raised and lowered itself very rapidly, with very extraordinary motions. Although I well knew the secretary, and had killed many of these birds at Natal, it was impossible for me to recognize it in the vertical situation in which I found myself, and I only suspected that it was one from its bearing. Having found means, by favour of some rocks, to approach sufficiently near, noiselessly and without being discovered, I found that this bird was a secretary combating a serpent. The fight was very sharp on both sides, and the skill (la ruse) equal on the

part of each of the combatants. But the serpent, which perceived the inequality of its strength, employed that adroit cunning which is attributed to it, in order to save itself by flight and regain its hole; while the bird, divining its intention, stopped it at once, and, throwing itself before the serpent by one spring, cut off its retreat. Wherever the reptile essayed to escape, there it always found its enemy. Then, uniting skill with courage, it erected itself fiercely to intimidate the bird, and presented, with a frightful hiss, a menacing gape, inflamed eyes, and a head swollen with rage and poison.

'Sometimes this offensive resistance suspended hostilities for an instant; but the bird soon returned to the charge, and covering its body with one of its wings, as with a shield, struck its enemy with the other, with the bony protuberances of which I have already spoken, and which, like small clubs, overpowered it the more surely, inasmuch as it presented itself to the blows. In effect, I saw it reel and fall extended: then the conqueror threw himself upon it to finish his work, and with one blow of the bill split its skull.

'At this moment, having no further observations to make, I killed it. I found in its crop (for it has one, which nobody has stated), on dissecting it, eleven rather large lizards, three serpents as long as one's arm, eleven small tortoises very entire, many of which were about two inches in diameter; and, finally, a quantity of locusts (*sauterelles*) and insects, the greater part of which were sufficiently whole to deserve being collected and to be added to my specimens. The lizards, the serpents, and the tortoises, had all received the stroke of the bill upon the head.'

According to Lesson, attempts have been made to introduce the breed into the French sugar islands (Martinique, &c.), in the hope that it might diminish the race of the formidable *Trigonocephalus*, the yellow serpent of the Antilles (*Trigonocephalus lancoletus*, Opp.), the most dangerous reptile of those parts, six or seven feet in length, and rivalling the rattlesnake in the intensity of its poison.

The secretary bird is about three feet in length; it lives in pairs and builds upon high trees, sometimes in dense thickets; it is very wary, and runs with considerable swiftness. Plumage, when perfect, for the most part bluish-grey, with a reddish-brown tinge on the wings; greater quills black. Throat and breast nearly white; rest of the under surface black, reddish, and white intermingled, the plumage of the legs bright black, with a slight intermixture of brownish rays. Occipital crest, which can be raised or depressed at pleasure, consisting of feathers without barbs at the base, but spreading out as they advance, and coloured of a mixed black and grey. Eyes surrounded by a naked skin, full, and over-

shadowed with hairs in the form of an eye-brow; eyelashes long and strong.

GYPSUM, or sulphate of lime, is a mineral which is found in a compact and crystallized state, as alabaster [ALABASTER] and selenite, or in the form of a soft chalky stone, which in a very moderate heat gives out its water of crystallization, and becomes a very fine white powder extensively used under the name of Plaster of Paris. In 1863 the quantity of gypsum imported into the United Kingdom was 3015 tons, value 3826*l.*, of which quantity only two tons were exported. [CALCIUM; MANURE.]

GYR-FALCON, or JERFALCON. [FALCONIDÆ.]

GYRACANTHUS, a genus of fossil placoid fishes, from the mountain limestone and coal strata: four British species. (Agassiz.)

GYRATION, CENTRE OF. When a system of heavy bodies, or any system possessing weight, has a fixed axis of revolution, the centre of gyration is a point at any such distance from the axis, that the moment of inertia would not be altered if the whole mass were collected at that point.

GYRINIDÆ (Gr. *gyros*, 'a circle'), a family of coleopterous insects (the Water-beetles, or Whirligigs), of which *Gyrinus* is the type. They are so called from their habit of swimming in circles on the surface of the water; and the velocity with which they execute their evolutions is really surprising. The French have given them the name of *Tournequets*.

GYROCARPUS, a genus of plants containing few species, but these few are widely distributed in Asia and America. The Asiatic species grows to be a large tree, with cordate leaves, which are deciduous about the end of the rainy season; after which the flowers make their appearance in the cold weather, but are shortly followed by the new leaves. The wood of this tree is whitish-coloured and very light. It is preferred whenever procurable for making the catamarans, or rafts, on which the natives come off to ships through the heavy surf of the Madras coast.

GYRODUS, a genus of fossil ganoid fishes from the oolite and cretaceous strata chiefly: ten British species. (Agassiz.)

GYROLÆPIS (Gr. *gyros*, and *lepis*, 'a scale'), a genus of fossil fishes, whose remains occur in the bone-beds of the lias formation, and also in the new red sandstone.

GYRONCHUS (Gr. *gyros*, and *onux*, 'a nail'), a genus of fossil ganoid fishes, from the oolite of Stonefield. (Craig.)

GYROPRISTES (Gr. *gyros*, and *pristēs*, 'a saw'), a genus of fossil placoid fishes, from the new red sandstone.

GYROSTEUS (Gr. *gyros*, and *ostēon*, 'a bone'), a genus of fossil ganoid fishes found in the lias formation.

H.

H is an aspirate of the guttural series, and is a faint pronunciation of the sound which in the High German alphabet is denoted by *ch*. In the earliest alphabets, as the Greek and Hebrew, the symbol whence the modern character is derived denoted the syllable *che* or *he*. Hence the Hebrew name was *cheth* or *heth*; and the Greek probably at first *heta*, as it was afterwards *eta*. As the guttural sound disappeared in the latter language, the letter finally denoted the simple vowel *ē*. In the Latin alphabet it was retained as the symbol of the aspirate. The English name *aitch* was probably at first *ech*, with the vowel prefixed, as in *ef*, *el*, &c. The guttural sound of *ch* is often confounded with the sibilant *ch*, as heard in *church*.

The letter *h* is liable to the following changes in different dialects:—

1. *H* is interchangeable with *c* [see C, 3]. To the examples there given may be added the Latin *decem* compared with the German *zehn*.

2. *H* is interchangeable with *ch*. Thus the Greek forms *χημων*, *χημαρινος*, *χημαι*, are severally connected with the Latin *hiems*, *hibernus*, *humi*.

3. *H* with *chth*. Of the interchange between the aspirates there are examples in the Greek *χθες* compared with the Latin root *hes* in *heri* and *hesternus*.

4. *H* is interchangeable with *g*. Examples: the German *zehe* compared with the Latin *digito*; the German *fliehen*, *sehen*, compared with the English substantives *flight*, *sight*.

5. *H* with *s*. Compare the Latin *sub*, *sex*, *septem*, *sus*, with the Greek *ὑπο*, *ἕξ*, *ἑπτα*, *ὑς*.

6. *H* with *f*. Hence the Latin words *hostis*, *hostia*, says Festus, were sometimes written *fostis*, *fostia*. The French word *hors* is derived from the Latin *foris*. The Spanish language abounds in examples of this change, as in *hermoso*, from the Latin *formoso*; the Portuguese retains the form *formoso*. [F.]

7. *H* with *w*. Many Greek words which had originally the digamma (another name for the letter *w*) at the beginning, took a mere aspirate afterwards. In English the word *who* has nearly exchanged the *w* for what is sounded as an *h*; and the relative adverb *how* is no doubt derived from the relative itself.

8. When any consonant or consonants in the middle of words had nearly lost all sound, the letter *h* appears to have been employed as a representative of the vanishing sound. Hence in Latin *mihi*, for what would appear by analogy to have been once *mibi*; and in German *stehen* and *gehen*, for what must have been *standen* and *gangen*.

9. The letter *h* is often dropped altogether in pronunciation, and hence in writing also. In Latin many words are written indifferently with or without

HAARLEM.

an *h*, as *arena*, *harena*; *onustus*, *honustus*. The Italians for the most part are averse to all aspirates; but the people of Tuscany still maintain their ancient character for the strongest pronunciation of these harsh sounds.

HAARLEM, **HAERLEM**, or **HARLEM**, a city in the Dutch province of North Holland, stands on the Spaaren, which runs from the Lake of Haarlem into the Y, four miles from the shore of the North Sea, in 52° 23' N. lat., 4° 38' E. long., and had in 1862, 29,426 inhabitants. It is connected by canals with all the principal towns in Holland, and by railway with Amsterdam and Leyden, from which it is respectively 12 and 13 miles. Haarlem is famous for its resistance to the Spaniards in 1572, and for the cruel treatment of its citizens by the son of the duke of Alva after their surrender. The town is well built; the streets are clean, planted with trees, and traversed by numerous canals. It contains several Roman Catholic churches, one of which, the cathedral of St. Bavon, is the largest church in Holland, and celebrated for its great organ, which has 5000 pipes, sixty stops, and four rows of keys. It was built in the fifteenth century, and, until recently, was the largest in the world. There are also Calvinistic and Lutheran churches. The finest building in the town is the Stadhuis, or town-house, which stands on one side of the market-place. The Prinzenhof, in which the States-general of Holland formerly met, is now converted into a museum of arts, antiquities, medals, and pictures. The public walks on the site of the ancient ramparts are exceedingly agreeable. Haarlem, besides many benevolent institutions, has numerous public schools, an academy of sciences, a botanic garden, a public library, a national normal school for schoolmasters, and the Teyler institution, which comprehends an establishment for the poor, a society of natural history, valuable collections, and an observatory. The library boasts of the early productions of Laurence Coster, a native of this town, for whom the Dutch claim the invention of the art of printing. [COSTER.] The neighbourhood of the town is studded with handsome country seats, and laid out in gardens. In the southern suburb of Haarlem are the famous nursery flower-gardens, in which are raised the flowers and flower-seeds, which form such important articles of Dutch commerce. Haarlem is the centre of the trade. They consist principally of hyacinths, tulips, and other bulbs. There are extensive bleaching establishments here, which formerly supplied large quantities of linen to England, whence the article came to get the name of *Holland*, as coming from that country. Silk, carpets, ribands, lace, and soap, are among the principal manufactures.

The Lake of Haarlem, which lies S.E. of the town,

is 14 miles long, 10 broad, and 14 feet deep, between water and mud. The mud of the lake is manufactured into valuable bricks called clinkers. The lake has been drained, and it is calculated that 45,000 acres of land have thus been gained.

HAARLINGEN. [FRIESLAND.]

HABAKKUK, one of the twelve minor Hebrew prophets. We have no particulars respecting the place and time of his birth; but it appears probable that he prophesied in the beginning of the reign of Jehoiakim (B.C. 609). The prophecy of Habakkuk is written in an energetic style, and contains many beautiful passages. The third chapter is considered by Bishop Lowth as one of the finest specimens we possess of the Hebrew ode. The canonical authority of the book has never been disputed. It is quoted in the New Testament: compare Hab. ii. 4 with Rom. i. 17, Gal. iii. 11, and Heb. x. 38; and Hab. i. 5 with Acts xiii. 40, 41.

HABEAS CORPUS is a writ at the common law, used for various purposes. It derives its name, like other writs, from the formal words contained in it. When the writ of Habeas Corpus is spoken of without further explanation, it always means the important writ which will presently be described; but it is also used for certain purposes in the courts of common law at Westminster, as for removing prisoners from one court into another, and for compelling the attendance of prisoners as witnesses, &c. But the great writ of Habeas Corpus is that which in cases of alleged illegal confinement is directed to the person who detains another; and the purport of the writ is a command to such person to produce the body of the prisoner, and to state the day and the cause of his caption and detention, and further to do, submit to, and receive (*ad faciendum, subjiciendum, et recipiendum*) whatsoever the judge or court that awards the writ shall direct.

All persons, whether natives or aliens, are entitled to this writ. The statute 31 Car. II. c. 2, which is called the Habeas Corpus Act, declares the cases and mode in which this writ may be obtained; and, lest this statute should be evaded by demanding unreasonable bail or sureties for the prisoner's appearance, it is declared by the 1 Wm. and Mary, stat. ii. c. 2, that excessive bail shall not be required. The provisions of the 31 Car. II. c. 2, are extended to Ireland by the Irish act, 21 & 22 Geo. III. c. 11.

It has been customary in times of alleged danger to suspend the Habeas Corpus Act. A suspension of the Habeas Corpus Act is effected by an act of Parliament, which empowers the crown, for a limited period, to imprison suspected persons without stating any reason for the imprisonment. 'The effect of a suspension of the Habeas Corpus Act is not in itself to enable any one "to imprison suspected persons without giving any reason for so doing." But it prevents persons who are committed upon certain charges from being bailed, tried, or discharged, for the time of the suspension, except under the provisions of the suspending act, leaving, however, to the magistrate or person committing all the responsibility attending an illegal imprisonment. It is very common, therefore, to pass acts of indemnity subsequently, for the protection of those who either could not defend themselves without making improper disclosures of the information on which they acted,

or who have done acts not strictly defensible at law, though justified by the necessity of the moment. See 57 Geo. III. c. 3 and c. 55, for instances of suspending acts; and 58 Geo. II. c. 6, for one of an indemnifying act.'

The 56 Geo. III. c. 100, which was passed 'for more effectually securing the liberty of the subject,' after reciting that the existing acts only apply to cases of imprisonment on criminal charges, enacts that, if any person is imprisoned, except for crime or debt, any baron of the exchequer, as well as any judge of either bench in England or Ireland, shall, on complaint on behalf of the party confined, if reasonable cause appear to them, award in vacation time a writ of Habeas Corpus, returnable immediately before the judge awarding the same, or any other judge of the same court.

The statute 31 Car. II. c. 2, introduced no new principle into the English law. From the date of the Great Charter at least, if a man was confined in prison on a criminal charge, he could apply to the court of King's Bench for the writ of Habeas Corpus *ad subjiciendum*. This writ could not be refused. The object of the statute of Charles was to prevent the abuses which had grown up to the detriment of this important privilege.

Habeas Corpus is not a form known in the law of Scotland. The form by which a person imprisoned gets his trial brought on, or his release if he is not brought to trial, is there called 'Running Letters.'

HABENARIA, a genus of plants belonging to the natural order *Orchidæ*. There are three species natives of Great Britain. *Habenaria viridis*, the Frog Orchis, is the *Peristylus* of Lindley, and the *Himantoglossum* of Reichenbach. It grows in pastures. *H. bifolia*, the Lesser Butterfly Orchis, has white flowers. It is found in heathy places. *H. chlorantha*, the Great Butterfly Orchis, grows in moist woods and thickets.

HABERDASHERY technically comprises small ware composed of various descriptions of articles, such as of cottons, woollens, linens, muslins, silks, &c., and forms a large article of export from the United Kingdom. The quantity exported in 1863. (not including embroidery or millinery), was valued at 3,298,244*l.* The largest markets were Australia, 623,824*l.*; United States, 545,562*l.*; British North America, 497,643*l.*; India, 168,807*l.*; France, 154,145*l.*; and Egypt, 93,779*l.* The whole of the haberdashery exported was of British and Irish manufacture.

HABERE FACIAS POSSESSIONEM, a judicial writ directed to the sheriff, commanding him to put the recoverer of a chattel interest in lands into possession.

HABERE FACIAS SEISINAM, a judicial writ directed to the sheriff, commanding him to put the recoverer of a freehold interest in lands into possession. In the execution of this writ, as well as of the writ of *Habere facias Possessionem*, the sheriff may justify breaking open doors if the possession be not quietly delivered up.

HABINGTON, WILLIAM, the son of Thomas Habington, a Roman Catholic gentleman of family and fortune in Worcestershire. His mother, the daughter of Lord Morley, has been supposed to have been the writer of the famous letter which revealed

the Gunpowder Plot. [FAWKES, GUIDO.] Habington was born upon the very day now marked as the date of the plot, the 5th of November, 1605. He was educated in the Jesuit college of St. Omer, and afterwards at Paris; and endeavours were used, but in vain, to induce him to enter the society. He married Lucy, daughter of William Herbert, the first Lord Powis. He died at Hindlip on the 13th of November, 1645, when he had just completed his fortieth year. His published writings were the following:—1. 'Castara,' a collection of poems, first printed together in 1635. 2. 'The Queen of Arragon, a Tragi-Comedie,' printed in 1640. 3. 'The History of Edward IV.,' 1640, folio, said to have been partly written by his father. 4. 'Observations upon History,' 1641, 8vo.

HABSBURG, THE HOUSE OF, was the original title of the House of Austria. Rudolf, the founder of the Austrian dynasty, was born in 1218, and was the son of Albert, count of Habsburg in Aargau, and of Hedwige of Kyburg, who was descended through her mother from the once powerful House of Zähringen, and whose possessions he afterwards inherited. Having distinguished himself in the management of his own dominions, he was chosen, after the death of Conrad IV., emperor of Germany by the electoral diet of Frankfort in 1273. The dignity became in reality hereditary in his family, and was enjoyed by his descendants [GERMANY] till the death of Charles VI. in 1740. His daughter, Maria Theresa, having married Francis of Lorraine, grand-duke of Tuscany, an attempt was made to dispossess her of the imperial crown, but it failed, and the succession has been ever since transmitted in the line of Habsburg-Lorraine.

The castle of Habsburg, the manorial residence of Rudolf I., has long since ceased to belong to his posterity. While Rudolf's successors were extending their sway over both hemispheres, they lost by degrees in the wars of Switzerland all their patrimonial domains in that country. Two square towers of the castle of Habsburg still remain, standing on a steep hill on the right bank of the Aar, not far from Brugg, and opposite the baths of Schinznach. The sepulchres of the Habsburg family, which were at Königsfelden, in the neighbourhood, have been removed to St. Stephen's cathedral at Vienna.

HABZELIA, a genus of plants belonging to the natural order Anonaceæ. *H. Ethiopica* is the *Piper Æthiopicum* of the shops. It is a native of Sierra Leone. *H. aromatica* is another species, yielding a pungent aromatic fruit. It grows in the forests of Guyana, and the fruit is used by the negroes as a condiment.

HACHETTE, JEAN NICOLAS PIERRE, was born at Mezières, May 6, 1769. He began his studies at Mezières, where Monge then held a professorship. At the age of twenty-three he was the successful competitor in the *concours* for a professorship of hydrography at Collioure. Some memoirs on mathematical subjects which he addressed to Monge, then minister of marine, procured him to be called to Paris, from whence he was sent to fill a professorship at Mezières, and at the end of 1794 was appointed to the Ecole Polytechnique, at its establishment. In this post he continued till the accession of Louis XVIII., by whose feeble and fanatical

government he had, in 1816, the honour of being deprived of his professorship, at the same time when Monge was expelled from the Institute. The government above mentioned refused to sanction his admission to the Academy of Sciences; nor was it till after the Revolution of 1830 that the fellow-labourer of Monge, the instructor of Poisson, Fresnel, Arago, and of more than two thousand of the best qualified public officers in France, was permitted to sit among his former pupils at the Palais de l'Institut. M. Hachette died in January, 1834, at the time when the cholera was raging in Paris, though not of that disorder.

The greater part of the life of M. Hachette was devoted to the development of the descriptive geometry of Monge, and its application to the arts of life, particularly in the description and construction of machinery. Monge left the details of the descriptive geometry for the most part to Hachette, who made the first special applications, and particularly to the construction of machinery. His works on descriptive geometry (that of Monge being comparatively elementary) and on machinery are in high repute.

HACKERT, PHILIPP, a celebrated landscape painter, was born at Prenzlau, in Prussia, in 1737. His father was a portrait painter and a native of Berlin. Hackert's first works of importance were the six large pictures of the Russian naval victory of Tschesme, and the burning of the Turkish fleet by Count Orlov in 1770, painted for the Empress Catherine II. of Russia, and for which he was paid 2950 zechini, about 16,000 florins, or 1350*l.* sterling. Hackert was highly patronized in Rome both by Italians and foreigners. Pius VI. was delighted with his works. In 1786 the king of Naples appointed Hackert his principal painter. His salary was 100 ducats per month, with his apartments free, both in Naples and at Caserta. Hackert lived, after his departure from Naples in 1799, a short time in Leghorn, whence he removed to Florence, where he resided till his death in April, 1807.

HACKET, JOHN, was born in the year 1592, and educated at Westminster School, whence he was elected to Trinity College, Cambridge, at the age of sixteen. In 1618 he took orders, and became chaplain to the bishop of Lincoln. During the civil war he espoused the cause of Charles, and his house was a kind of rallying point for his party. His zeal, however, led him into difficulties, and he suffered a short imprisonment; but after the Restoration he accepted the bishopric of Lichfield and Coventry, where he died in 1670.

To Bishop Hacket we are chiefly indebted for the restoration of Lichfield Cathedral.

HACKNEY. [MIDDLESEX.]

HACKNEY-COACH. The derivation of the word hackney, as applied to a class of public conveyances, is uncertain. It was applied to horses let for hire, and then, by a very natural transition, extended to coaches employed in a similar way.

Hackney-coaches appear to have originated in London. It was in 1625 that they began to ply in London streets, or rather at the inns, to be called for as they were wanted, and they were at this time only twenty in number. In 1652 the number of hackney-coaches daily plying in the streets was limited by the Government to 200; and an increase was at

different times allowed till 1771, when the number of coaches was further increased to 1000. They were long assailed as public nuisances.

The first hackney-coach *stand* was established in 1634, by one Captain Baily, near the Maypole in the Strand. The monopoly long enjoyed by the London hackney-coachmen produced great indifference to the increasing wants of the community; even down to the year 1823, while that monopoly was undisturbed, hackney-coaches appear to have sunk lower and lower in the scale of efficiency. While this was the state of things in London, a lighter kind of vehicle, called *cabriolets de place*, had been brought into extensive use in Paris. In 1823, licences were obtained for eight cabriolets (or as more commonly called for brevity, cabs), to be started in London at fares one-third lower than those of hackney-coaches. With the rapid extension of this lighter class of vehicles, numerous varieties of construction have been introduced, in which comfortable and safe accommodation, with complete shelter from the weather and separation from the driver, is provided for two, three, or four persons. The name *cab* is still commonly applied to all hackney-carriages drawn by one horse, whether on two or four wheels. During the first few years of the employment of such carriages their number was restricted to 65, but in 1832 all such restrictions were removed.

The hackney-carriages of the metropolis are now regulated as to vehicles, drivers, and fares by the Act 16 & 17 Vict. c. 33 (1853). Every owner of a stage-carriage must take out a licence, which licence the police commissioners are empowered to suspend at any time if the regulations are not strictly observed. The fares for hackney-coaches are fixed at 6*d.* for every mile, or fraction of a mile, or 2*s.* per hour. Each cab is to be provided with a table of fares, and a numbered plate. The driver must not refuse to carry a fare, if the distance be within six miles, or the time within an hour; beyond these limits he may exercise an option. When hired by time, the driver is not bound to go more than four miles an hour, unless paid 6*d.* per mile extra. A reasonable quantity of luggage is to be taken free of charge. If more than two persons ride in a cab, 6*d.* for each is charged (over any distance) beyond the regular fare. All these provisions are enforced by fine or imprisonment.

The licence for every hackney-carriage is now 2*l.* per annum, and the duty 6*s.* or 7*s.* per week, according as the vehicle is worked six or seven days. Drivers are entitled to charge 1*s.* per mile instead of 6*d.* for any portion of their route beyond four miles from Charing Cross, provided the carriage is discharged beyond that limit.

Hackney-carriages, as regulated by law, comprise only those which work within the police limits of the metropolis. Beyond those limits the owners have to pay post-horse duty, and possibly some local tax imposed by the municipal authorities, but none of the duties mentioned in this article. The sum contributed to the national revenue by the London cabs is considerable. The duty of a shilling a day brings in about 80,000*l.* or 85,000*l.* per annum, while the licences raise this to about 4000*l.* more. Of this sum about 13,000*l.* is annually handed over to the Commissioners of Police to defray the expenses of supervision,

watermen, coach-stands, &c. It is computed that seven horses are on an average kept for three cabs. Some of the cab masters own fifty vehicles each; most of them own a few only; and in certain cases the cabman is the owner of the vehicle which he drives. The patent or 'Hansom' cabs, peculiar for their construction and high speed, are generally well-horsed; and there is observable a gradual improvement in the general condition of the horses employed in the London cabs.

HADDINGTON. [HADDINGTONSHIRE.]

HADDINGTONSHIRE is one of the three counties of Scotland included under the general name of the Lothians, and is very commonly called East Lothian. It is bounded S.W. by Edinburghshire, S.E. by the Lammermuir Hills, and N. and E. by the Forth and the German Ocean. It is comprised between 55° 46' and 56° 5' N. lat., and 2° 20' and 3° 2' W. long. The extreme length of the county from E. to W. is about 27 miles, and its extreme width from N. to S. is somewhat less than 16 miles. The area is 179,142 acres, or about 280 square miles. The population, in 1861, was 37,634.

Soil and Surface.—The surface of the county is extremely diversified, though not mountainous. The principal hills are those of the Lammermuir. The general inclination is from the foot of the Lammermuir range towards the N.E., but the descent is far from uniform. From the shore of the Frith of Forth the county consists of a series of parallel ridges running from W. to E., and successively increasing in altitude until they reach the Lammermuir Hills. The soil is very varied in quality in different parts; about four-fifths are under tillage, and the remainder consists of woods, plantations, pastures, and wastes. The climate varies extremely for so small a county, and the period of harvest is a month later in some spots than in others.

The geology of the county presents many points of considerable interest. The tract of country lying between Trapraane Law and North Berwick on one side, and Gallane Point and Whitberry Point on the other, is composed chiefly of porphyries and trap. The Lammermuir Hills, on the south-east of the county, consist, for the most part, of the Silurian rocks of the south of Scotland. Near Dunbar, and stretching to the south-west in the direction of the low slopes of the Lammermuir range, the old red sandstone formation is well developed. The rest of the county consists of rocks belonging to the coal measures, in which coal, ironstone, freestone, and limestone, occur. Patches of stratified rocks crop out on the coast in the neighbourhood of North Berwick. These have generally been set down as the old red sandstone. But the writer of this notice recently (September, 1865) found in them traces of plants characteristic of the coal measures.

The source of the Tyne is in Mid-Lothian, a few miles west of Haddingtonshire; and its mouth is about three miles westward of Dunbar. The river abounds with large trout, eels, and small salmon. The other rivers, or 'waters,' as they are provincially termed, are—the Coalstone, Biel, Whitewater, and Fastna, to the south of the Tyne, and the Peffer to the north, by means of which, and their tributaries, nearly the whole county is well watered. The roads are good, and the North British Railway traverses the county.

Manufactures and Produce.—There are several extensive distilleries in the county, pottery works at Preston-pans and Tranent, and fisheries at Dunbar. It has also manufactures of salt. Coal is worked in the west, and limestone abounds everywhere. The farms are generally large. From Haddingtonshire the improved system of agriculture has been diffused over Scotland, and this county continues to hold a high rank in respect of agriculture and produce. The smaller farms are on the most productive soils. Wheat is the principal grain cultivated, though large crops of beans and oats are likewise raised. The turnip crops are very large. Barley is also extensively cultivated. Since the increase of pasture-land the breeding of sheep and cattle has been extended, but breeding in the lowland and midland districts is carried on upon a very limited scale, the more usual practice being to purchase, chiefly from the Highlands, and fatten for the Edinburgh market. The manure of the farm-yard is that most generally resorted to throughout the county, but seaweed is employed along the coast, and lime in the upper districts. Guano and pulverized bones are also used. Great attention is paid to the drainage of the soil, and the best agricultural implements are used. The first steam-plough used in Scotland was introduced in this county in 1862.

Divisions and Towns.—The county is divided into twenty-four *quoad civilia* parishes, two presbyteries, and three royal burghs. Haddington is the county town. The registered electors in the whole county in 1862 numbered 688. It returns two members: one for the county, and one for the Haddington parliamentary district. The principal towns are the following:—

North Berwick, a royal burgh, is situated on the coast, at the mouth of the Frith of Forth. The town is 22 miles N.E. from Edinburgh. It is contributory to the Haddington parliamentary district. Population of the parish in 1861, 2071; of the borough, 1164. It has a harbour, an active trade in corn, and is much frequented as a bathing-place. The town is the terminus of a branch of the North British Railway. Near it are the remains of Tantallan Castle, one of the prominent scenes in 'Marmion,' and the Bass Rock, which formerly contained a fortress in which many of the leading Covenanters were confined.

Dunbar, a royal burgh, situated 28 miles E. by N. from Edinburgh. The harbour, though difficult of access, is safe and commodious, and will admit vessels of 300 tons burthen. Here once stood the castle to which Queen Mary fled in 1565, after the assassination of Rizzio. The town is now a station on the North British Railway. The population of the parish in 1861, was 4944; of the town, 3796; and of the parliamentary borough, 3516. There is a Gothic parish church, a town-hall, assembly-rooms, public libraries, shipbuilding docks, sail-cloth and cordage factories, iron foundries, breweries, and distilleries. The principal imports are coal and foreign grain; the exports consist of corn, whisky, and fish: there are extensive herring fisheries. The town is of some historical importance, owing to the successful defence of its castle against the English by 'Black Agnes,' countess of March, and to Cromwell's decisive defeat of the Scotch army in the neighbourhood.

Haddington is the county town. It is 18 miles

from Edinburgh, on a branch of the North British Railway. The parish comprises 12,162 acres, which are in the highest state of cultivation; population in 1861, 5548; of the borough, 3897. The town has parish and collegiate churches, a town-house, county buildings, corn exchange, an agricultural and a horticultural society, several public libraries, and a trade in wool. It is, perhaps, the largest market in Scotland for corn and other agricultural produce. Haddington is a very ancient royal burgh, and holds its last charter dated 1624. The town disputes with Gifford the honour of being the birthplace of the celebrated reformer, John Knox. The old abbey, a fine Gothic structure, in partial ruin, is a very interesting object. Haddington, in conjunction with Dunbar, Jedburgh, Lauder, and North Berwick, returns one member to Parliament.

Antiquities.—Circular mounds or encampments are occasionally met with in conspicuous situations. Very recently the proprietor of Seacliff, near North Berwick, discovered on a low skerry, west of Seacliff House, urns of the Roman and Celtic periods, a bone comb, a bone needle, a flint implement, and many bones of oxen, sheep, goats (?), dogs, foxes (?), birds, fishes, &c. With these, one or two fragments of human bones occurred. Some of the bones of the oxen are evidently those of the marsh cow (*Bos longifrons*). The discovery is full of interest to antiquaries. There are also numerous old castles, some of which are in a tolerable state of preservation. Of these it will be sufficient to mention those of Dunbar and Hailes, Tantallan, once the residence of the Douglasses, which stands close to the sea, Dirlton, Luffness, &c.

HADDOCK. [MORRHUA.]

HADES (Gr. *ᾍδης*, 'the grave'), in ancient theology and classical mythology, the nether world, or place of departed spirits, of which various opinions have been formed, and most horrible pictures drawn, according to the imagination or fanaticism of the writers. In Scripture history it is translated *hell*, which, in modern times, is considered as too harsh-sounding for ears polite. In Luke xvi. 23, we have, *Καὶ ἐν τῇ Ἀβύσσῳ τοῦ ἐφθάρμηνος* ('and in hell he lifted up his eyes'). As Calmet observes, 'Jews, Mussulmans, and Christians have all depicted the horrors and the punishment of hell as their several fancies have conceived, and according to various images derived from bodily tortures and pangs.' The term, in all probability, was derived by the Greeks from the ancient Egyptians, who considered Hades as a place of separate abode for the soul preparatory to judgment; whence, in all probability, the Romish doctrine of purgatory, as derived from the Romans, originally sprang.

HADLEY, JOHN, the reputed inventor of the sextant which bears his name, became a fellow of the Royal Society in 1717, and died February 15, 1744. He was author of several useful papers, which appear in the Transactions of the Society, from vol. 32 to vol. 39. He was also upon intimate terms with Sir Isaac Newton, from whom it is supposed he borrowed, without acknowledgment, the idea of the sextant. It is now generally believed that Newton and Godfrey were the original and independent inventors of that instrument. Hadley gave an account of the instrument in the 'Philosophical

Transactions' for 1731; but Newton, previous to his death in 1727, had given a description of the instrument to Dr. Halley, by whom it was, for some unknown reason, suppressed, though it was communicated to the Royal Society in the year 1742, after Halley's death, by his executor, Mr. Jones.

HADRAMAUT. [ARABIA.]

HADRIANUS, ÆLIUS, son of Ælius Hadrianus Afer (a cousin of Trajan, and a native of Hatria Picena, but of Spanish descent), and of Domitia Paulina of Cadiz, was born at Rome, in January, A.D. 76. He was left an orphan at ten years of age, under the guardianship of Trajan, and of Tatianus, a Roman knight. He made great progress in literature, especially in the study of Greek. In the reign of Domitian he served as commander of an auxiliary legion in Mœsia. Trajan gave him his niece Sabina in marriage, and he accompanied the emperor in his Dacian and Eastern campaigns. When Trajan died at Selinus, in Cilicia, in August, 117, Hadrian, whom he had left in charge of the army in Syria, was proclaimed emperor by the soldiers at Antioch, and he wrote to the senate for their confirmation. His election being confirmed by the senate, Hadrian, after making peace with the Parthians and the Armenians, set off for Rome. He refused to appropriate to himself the triumph which had been destined for Trajan, and he caused the image of the deceased emperor to be carried in the triumph. He remitted all the arrears due to the public treasury by individuals in Rome and the rest of Italy, and all that was due from the provinces for sixteen years past; and he burnt in the Forum of Trajan the schedules of the debts, which are said to have amounted to several millions sterling. Medals were struck on this occasion with the figure of Hadrian holding a torch and setting fire to the heap. In 119 he repaired to Mœsia, and drove back across the Danube the Sarmatians and Roxolani, who had invaded the Roman territory. The year after, Hadrian began his travels through the various parts of the empire, which occupied, with few interruptions, the remainder of his reign. We have memorials of his travels in numerous medals, struck in the various provinces on the occasion of his visit. An Italian medallist, Mezzabarba Birago, has put these medals in order and illustrated them. Hadrian first visited Campania, whence he proceeded to Gaul, and the provinces called the Germanies. He affected no pomp or state in his travels. He lived like a soldier among the soldiers. But his liberality for all useful purposes was unbounded.

In 119 he crossed over to Britain, where he reformed many abuses. While in Britain, he constructed a rampart of earth, extending from the Solway Frith to the German Ocean near the mouth of the Tyne, a little to the south of the more substantial wall afterwards raised by Septimius Severus. On his return to Gaul he passed into Spain, and spent some time at Tarraco (Tarragona), where he held a general assembly of the deputies of the various provinces of Spain. Hadrian returned to Rome in 122; but the next year he was at Athens, a city to which he was much attached. He ordered the embankment of the Cephissus, which had damaged the town of Eleusis, and the construction and reparation of various edifices. From thence he went to Syria, where peace was confirmed between the Romans and the Parthians.

In the year following he visited various parts of Asia Minor, and after building temples and other edifices at Nicomedia, Cyzicum, Nicaea, and other towns, he sailed to the islands of the Ægean Sea, and spent the winter at Athens, where he was initiated in the Eleusinian mysteries, and presided at the public games. He next went to Sicily, and ascended the summit of Ætna to see the sun rise. He returned to Rome in 126, and we know nothing of his movements for the two following years. In 129 he set off for Africa, where he distinguished himself, as he had done on his previous travels, by his munificence. Plautina, Trajan's widow, having died meantime, Hadrian returned to Rome, and celebrated her funeral with great ceremony. In the following year (130) he raised a magnificent temple in honour of Venus and Rome, some remains of which are still seen near the arch of Titus. In that year Hadrian set off again for the East. He visited Cappadocia, Syria, Palestine, and Egypt, in which last country he remained two years.

There is a letter of Hadrian, written from Alexandria, to Servianus, his brother-in-law, in which he describes the state of the population of Egypt and speaks of the various sects, Jews, Christians, Samaritans, who were very numerous in that country. He says that they all adored but one god, their own interest. He restored the palace and museum of Alexandria. About this time his favourite Antinous died; some say he drowned himself in the Nile, and Hadrian disgraced himself by the apotheosis and other absurd honours which he paid to his memory. He next went to Cyrenaica. In 133 Hadrian repaired to Syria, from whence he set off for Thrace and Macedonia, and lastly stopped at Athens. The insurrection of the Jews of Palestine under Barcochebas raged about this time, and the Romans had to carry on against the Jews a war for three years. [BARCOCHEBAS.] Hadrian raised a new city on the ruins of Jerusalem, which he called Ælia Capitolina, and he peopled it with a Roman colony. Jews and Christians were forbidden to enter the new city. Hadrian meantime made another long residence at Athens, and he greatly embellished that city, a district of which was called by the name of Hadrianopolis. He also completed the temple of Jupiter Olympius. He returned to Rome in 135. Soon after, falling ill, he thought of choosing a successor, and he fixed his choice upon Ceionius Commodus Verus, whom he adopted and appointed Cæsar by the name of Ælius Verus. In the following year Hadrian retired to the neighbourhood of Tibur, where he built a magnificent villa, many remains of which still exist. Protracted illness seems to have soured his naturally suspicious temper, and he condemned several individuals to death, among others his brother-in-law Servianus. Ælius Verus having died in the second year after his appointment as Cæsar, Hadrian fixed his choice upon Titus Aurelius Antoninus, on condition that he should adopt Lucius Verus, son of Ælius Verus. Antoninus accepted the proposal, and the double adoption was solemnized in February, 137. Sabina, Hadrian's wife, died about this time, and was numbered among the gods. Hadrian still finding his illness increasing, at last removed to Baia. He died in July, 138, in his sixty-third year, and the twenty-first of his

reign. (Spartianus, 'Life of Hadrian,' Dion; Aurelius Victor; Eusebius.) Hadrian was a man of great abilities and large acquirements, an encourager of sculpture and architecture, a good administrator, and very attentive to business. But he was not free from vices, if we may trust the evidence of the historians. It is said that he was the first emperor who allowed his beard to grow, in order to conceal some blemish on his face. Under Hadrian the distinguished jurist Salvius Julianus compiled the 'Edictum Perpetuum.'

The busts, statues, and medals of Hadrian are very numerous, and all bear a striking resemblance to each other in the character of the countenance. There is a full-length statue of him and two busts in the Townley Gallery, British Museum.



Coins of Hadrianus. British Museum.
Actual Size. Copper.



Reverse.

HÆMATITE (sometimes written *Hematite*), the name of one of the iron ores. Two species are distinguished. The one, *Red Hæmatite*, which yields peroxide of iron 94.0, silica 2.0, lime 1.0, and water 3.0; the other, *Brown Hæmatite*, affords peroxide of iron 84.0, water 11.0, oxide of manganese 2.0, and silica 2.0. It is thus a hydrous peroxide of iron; the proportion of peroxide of iron and water being as 85.30 to 14.70.

HÆMATOCOCCUS, a genus of plants belonging to the natural order of *Algæ*. Several species of this genus have been described. One of the first observed was the *H. sanguineus*, which, like the Red-snow Plant (*Protococcus nivalis*), has its cells coloured red; hence the generic name. Several of the species, however, are of a green colour. They are found upon most rocks, on the walls of caverns, and in damp places. Mr. Hassall has described several new species of this genus; they belong, however, to a class of plants in which it is most difficult to discover permanent specific characters.

HÆMATOPS, a name given by Mr. Gould to a genus of birds inhabiting Van Diemen's Land and New South Wales.

Mr. Gould recorded two species, *Hæmatops valdirostris*, $6\frac{3}{4}$ inches in length (Van Diemen's Land), and *H. gularis*, 6 inches long (New South Wales).

HÆMATOXYLON CAMPECHIANUM (*Logwood*), a tree native of Campeachy, but cultivated also in Jamaica. The finest wood is the produce of the former place. The bark and alburnum being removed, there is within a dark red coarse-fibred duramen, having a violet-like odour, and a taste at first sweetish, afterwards astringent. It dyes the saliva violet-colour, and produces a similar change on many of the other secretions.

Logwood acts as a mild astringent in hæmorrhages or increased secretions; and in some forms of diarrhœa it often effects a cure where more powerful astringents fail. It may be exhibited in the form of infusion or of extract: the former is preferable. Logwood is also used extensively in the arts, especially for dyeing.

The imports of logwood into the United Kingdom in 1863 amounted to 38,404 tons, valued at 213,181*l*. The principal supplies came from the West Indies, United States, Honduras, Hayti, and St. Domingo.

HÆMODORA/CEÆ. Under this name Dr. Robert Brown proposed, in the year 1810, to separate several genera from the natural order *Iridacæ*. The order may be considered a connecting link between *Iridacæ* and *Liliacæ*. The rhizoma species, *Dilatris heritieri*, yields a dyeing matter.

HÆMOPITYSIS (from *αἷμα*, 'blood,' and *πίσις*, 'to spit'), a spitting or coughing of blood.

HÆMORRHAGE (from *αἷμα*, 'blood,' and *ρῥυσις*, 'to break'). The most common cause of hæmorrhage is external violence, by which the vessels of a part are divided, and the blood escapes from their cavities. When an artery is wounded, a bright scarlet stream of blood is emitted in a current, continuous, but increased in force at intervals corresponding with the pulsations of the heart. If a vein of some size be divided, a stream of dark crimson blood is projected in a perfectly continuous and equable current. In wounds in which no vessel of more than a line in diameter has been divided, the blood flows in a constant more or less rapid oozing.

When a large artery, as one of the main trunks of the limbs or head, is divided, the blood rushes forth with such impetuosity, that life is often destroyed almost instantaneously.

When an arterial branch of the second magnitude, as one of the primary divisions of the main trunks in the leg or fore-arm, is wounded, the flow of blood is at first profuse, and a large quantity is soon lost; but after a time the patient faints from extreme exhaustion, and then, the heart ceasing to act, the blood no longer flows, but begins to coagulate both within and around the vessel, whose extremities contract, and further loss may thus be prevented. More frequently, however, as soon as the patient recovers from his exhaustion, and the heart regains some of its power, the slight obstacles formed during the fainting are forced away, and the hæmorrhage recommences, and continues till the patient is again exhausted. Thus, by a suc-

cession of hæmorrhages and of temporary stanchings, he may at last be destroyed by extreme debility. From arteries of smaller size, as those about the fingers, &c., the blood flows at first in a rapid little stream; but after a few minutes, if they are exposed to the cold air, they retract, their orifices contract and close, and the bleeding altogether ceases, without much danger of returning.

Hæmorrhage from wounded veins is of less importance. It is much more slow, for the blood is prevented by the valves from flowing from that part of the vein which is between the heart and the orifice, and in the part which is beyond the orifice it has only the force of that in the smaller arteries. Hence it is seldom immediately fatal; but when the patient becomes faint the edges of the vessel fall together, instead of remaining open, as those of arteries. Thus a coagulum forms within and round them, and, except from the largest trunks, prevents any further flow.

But bleeding to a great extent may take place without visible rupture of any vessel. This form of hæmorrhage, which may take place in various parts of the body, is that popularly supposed to arise from the 'bursting of a blood-vessel;' but in the large majority of cases, where blood is poured forth in the interior of the body, the most careful examination can discover no aperture through which it had flowed. It is therefore called hæmorrhage by exhalation, from the idea that the vessels, which in health are traversed only by the fluids of the exhalations or secretions, now permit the passage of the blood.

The circumstances under which these hæmorrhages take place are various. In some cases they arise from distension of the vessels in consequence of some local excitement, either with or without increased activity of the circulation generally; and in these the flow of blood is preceded by a sensation of fulness and throbbing in the part, which, if visible, appears red and swollen. Such are those which take place in bronchitis, producing some rare cases of hæmoptysis; in dysentery and acute inflammation of the intestines; from the membrane of the nose, producing the epistaxis so common in young persons in robust health; in the brain, producing some forms of apoplexy, especially those connected with hypertrophy of the heart; and occasionally in the acute inflammations of nearly all the tissues. In other cases the main cause of the hæmorrhage is the existence of some obstacle to the free passage of the blood through the vessels. Such are those very frequent cases in which hæmoptysis, or spitting of blood, takes place in consumption, where the blood is obstructed in its passage through the pulmonary arteries by the masses of tuberculous matter deposited around them; those of hæmatemesis, or vomiting of blood, which arise from obstruction of the splenic or portal vein, by coagula, or by disease of the liver or other adjacent organs, and the consequent congestion of the vessels of the stomach; many of those which occur from the stomach, uterus, and other organs, in the early stages of various structural diseases; those which depend on disease of the heart, producing obstruction in the large vessels, and which may take place in the brain, lungs, and various other organs; and those arising from obstacles in the veins, as in hanging, or even from the influence of gravitation.

But a simply mechanical distension of the vessels, whether from an increased afflux of blood into them, or a retarded removal of it from them, cannot explain all the phenomena of these spontaneous hæmorrhages. In some persons there exists a peculiar tendency to bleeding in the vessels, and this is called the hæmorrhagic diathesis. In other cases the blood appears to be in fault, as in scurvy, purpura, and the low forms of typhus.

Of the means of arresting Hæmorrhages.—When an artery is wounded, unless death rapidly follow, a natural process takes place by which further bleeding may be prevented. If completely divided, both extremities retract into the sheath of cellular tissue in which they lie, so that a considerable interval is produced between them, bounded by loose and irregular walls, into which the blood as it flows infiltrates, and, coagulating, tends to fill it up and obstruct the vessel. The open mouths of the artery also contract, and gradually but at last completely close, either at or just above their extremities. As the stream is thus checked by the narrowing and closure of its canal, at the same time that by the faintness induced by the previous loss the action of the heart is weakened and the whole circulation retarded, it begins to coagulate within the vessel itself, till its tube is nearly filled by a clot adhering loosely to its walls. Further changes then ensue; the divided vessel and the parts around become inflamed; coagulating lymph is effused from the edges of the wound into the artery itself and over its extremities, forming a firmer plug than the blood alone had; in process of time this lymph becomes organized, vessels enter it from the parts around, and it becomes firmly and permanently united to them and the vessel, till at length its tube is rendered impervious from the point of division up to the first branch given off from it, and is at last converted into a solid cord, closely connected with the substance of the cicatrix around it.

But it is only in the very small arteries that the hæmorrhage can be confidently expected to terminate thus naturally, and hence various artificial means of checking bleeding from the larger ones have been invented. The simplest of these is pressure; if the finger be placed with moderate firmness over the mouth of a small bleeding vessel for a minute or two, on removing it the orifice will be found closed and no more blood will flow. Bandages and the tourniquet may be applied for the same purpose. But, if these means be insufficient, the artery must be tied; if it be completely divided, ligatures must be placed on both extremities; and, if only partially cut, then on both sides of the opening, for, from the numerous communications of the arteries, when the main current is checked, another in a retrograde direction is always established into the part beyond the ligature. Sometimes astringent applications, as alum or sulphate of copper, will arrest slight bleeding. Spongy substances, as lint, agaric, &c., act mechanically in arresting hæmorrhage.

Such are the principal modes of treatment applicable in cases of external or surgical hæmorrhage, in which vessels are divided by external injury, and are within the reach of the eye or fingers. In internal hæmorrhages, however, it is obvious that mechanical means can rarely be employed. From

the varied nature of the cases from which they arise, it is evident that different means will be required, according to the several conditions of the system. If astringent remedies be deemed advisable, and in many cases they are highly useful, the acetate of lead will generally be preferable, and next to it the different vegetable compounds of gallic acid.

HÆMORRHOIDS (from *αἷμα*, 'blood,' and *ρῆμα*, 'to flow'), varicose tumours of the veins of the rectum. [VEINS, DISEASES OF.]

HÆMULON, a genus of fishes of the section *Acanthopterygii* and family *Sciænidae*. Generic characters—a single dorsal fin; seven branchiostegous rays; lower jaw compressed, a small oval opening and two small pores under its symphysis; the vertical fins partially covered with scales.

These fishes generally approach to an elongate oval form; the body is moderately compressed; the tail is forked; the dorsal fin, which occupies the greater portion of the distance between the back of the head and the tail, although continuous, has a considerable indentation at that part where the spinous rays join the flexible. The portion of the under jaw which is covered by the upper when the mouth is closed is invariably of a bright red colour. The species of *Hæmulon* chiefly inhabit the Caribbean Sea, and are eaten by the inhabitants of the West Indian islands. They are of moderate size, varying from six inches to one foot in length, and generally adorned with longitudinal or oblique dark markings on a pale ground colour.

HÆMUS. [BALKAN.]

HAFIZ, MOHAMMED SHEMS EDDIN, a celebrated Persian poet, was born at Shiras, at the beginning of the fourteenth century of the Christian era. He appears to have remained in his native town the greater part of his life. The date of his death is uncertain; it is placed by Daulet Shâh in 1389. A splendid monument was erected over his grave, which is described by Kaempfer; and Franklin gives us an account of another monument erected to his memory in more modern times.

The poems of Hâfiz, like those of Anacreon, celebrate the pleasures of love and wine. They have always been greatly admired in Persia, though many Mohammedans have condemned them for their irreligious and licentious tendency. The admirers of Hâfiz, on the other hand, contend that his poems are not to be understood in a literal, but in a figurative or allegorical sense; and that they express in emblematical language the love of the creature to the Creator. The sect of the Sûfis, who interpret the poems of Hâfiz in this manner, possess many similar poems.

The poems of Hâfiz were arranged, after his death, by Saïd Kâsem Anvârî, and were entitled the 'Divân.' The 'Divân' contains, according to the best MSS., 571 odes, called ghazels. They were published in the original Persian, at Calcutta, 1 vol. folio, 1791; this edition contains only 557 ghazels, and seven cassidehs, or elegies. The whole 'Divân' was translated into German by Von Hammer, Tübingen, 1812; and several of the odes have been translated into English by Richardson, 'Specimen of Persian Poetry, or the Odes of Hâfiz, with an English translation and paraphrase, chiefly from the Specimen Poeseos Asiaticæ of Baron Rewuski,' London, 1774; Nott,

'Select Odes of Hâfiz translated into English verse,' 4to. London, 1787; Hindley, 'Persian Lyrics, or scattered poems from the Diwah-i-Hâfiz,' 4to. London, 1800.

HAGGAI, one of the twelve minor Hebrew prophets. We know nothing concerning the place or time of his birth. The date of his prophecy is fixed by himself (i. 1) in the second year of the reign of Darius, son of Hystaspes (B.C. 519). The canonical authority of the book has never been denied. It is quoted by the author of the Epistle to the Hebrews, xii. 26. Compare Haggai ii. 7, 8, 22.

HAGUE, THE (in Dutch, 's *Gravenhage*; in French, *La-Haye*), a large and beautiful city, the capital of the Dutch province of South Holland, stands in 52° 4' 50" N. lat., 4° 18' 32" E. long., at a distance of two miles from the North Sea, 37 S.W. from Amsterdam, and 13 N.W. from Rotterdam by the railroad which connects those cities. It is not fortified, but is surrounded with a moat crossed by drawbridges. It is ranked as one of the finest cities in Europe on account of its stately buildings, its broad and regular streets traversed by canals, and its pleasant, dry, and healthy situation. Many of the streets are planted with rows of trees and paved with coloured bricks. The finest parts of the town are the Voorhout, which is lined with trees, and contains several splendid hotels, and the Vyverberg, a sort of square, with a fine avenue of trees on one side, and on the other a spacious basin of water, backed by magnificent buildings. Among the public buildings are—the royal palace, a building of little pretension; the former residence of the stadtholder, in which the States-general now hold their sittings; the palace of the prince of Orange; the Buitenhof, which contains a gallery of pictures; the town-hall; the brass-cannon foundry; the theatres; and the state-prison. The Binnenhof, on one side of the Vyverberg, contains a magnificent Gothic hall, the only remaining portion of the original residence of the counts of Holland. The Maurits-huis contains the finest collection of paintings by Dutch masters in the world, a vast collection of Chinese and Japanese products and curiosities, besides numerous historical relics. The Royal Library in the Voorhout contains 100,000 volumes, and a collection of 34,000 medals. De Witt's house in the Kneuterdyk, and the Gevangpoort (prison-gate), from which Cornelius and John De Witt were dragged by the populace and torn to pieces in 1752, are historically interesting. There are fourteen churches—the most notable being that of St. James, with its lofty hexagonal tower, and peal of thirty-eight bells—two Jews' synagogues, several Protestant chapels, numerous charitable and scientific institutions, and fine private collections of pictures. There are a royal country seat and numerous elegant villas in the environs.

The Hague owes its origin to a hunting-seat built by the counts of Holland in 1250, and the Dutch name, 's Gravenhage, is said to be taken from the circumstance that houses came to be erected along the inclosure surrounding the Counts' Park ('s Gravenhage, 'counts' hedge'). In the sixteenth century the Hague became the residence of the States-general, the stadtholder, and the foreign ambassadors. The Hague ranked only as a village till Louis Bonaparte,

during his reign, conferred on it the privileges of a city. The population in 1862 was 82,620.

Canon casting, printing, and various manufactures are carried on, but the Hague is not important as a commercial or manufacturing city—depending for its prosperity almost entirely on the court and nobility. William III. of England, and Huyghens the mathematician, were born at the Hague. In the immediate neighbourhood of the Hague are Ryswick, celebrated for the treaty of peace signed there in 1697, and Schevingen, a famous bathing place on the sea-coast, two miles from the town, with which it is connected by a broad causeway, planted with rows of trees.

HAGUE, LA, CAPE. [MANCHE.]

HAGUENEAU. [RHIN, BAS.]

HAHNEMANN, SAMUEL, founder of the system of medicine called Homœopathy, was born at Meissen, in Upper Saxony, on the 10th April, 1755. His father, Gottfried Hahnemann, who was an artist of considerable merit, was employed in the painting of china in the celebrated porcelain manufactory of Meissen. He was placed at an elementary school, the director of which, Dr. Müller, remarking talents that only required cultivation to raise the boy to eminence, persuaded his father to place him at the High School of Meissen, into which they obtained him a free admission. Hahnemann gladly availed himself of these increased facilities; he made himself master of Latin, Greek, and Hebrew, and evinced a decided bias for the study of the physical sciences, natural history, and medicine. Botany was also a favourite pursuit, and his hours of leisure were devoted to the collection of plants and their systematic arrangement.

Having chosen medicine for his profession, at the commencement of 1775 he left the High School of Meissen, and he entered the University of Leipzig.

He supported himself during his residence at Leipzig by giving lessons in German to foreign students, and by the translation of English and French medical authors. Having passed two years in the study of the theory of medicine, and saved a small sum of money, he departed for Vienna, there being no clinical lecturer in the University of Leipzig, and entered himself at the Hospital of Charitable Brothers, with a view to the completion of his studies, and to acquiring a practical knowledge of his profession.

His moderate pecuniary resources were almost exhausted, when his talents and marked attention to his duties gained for him a firm friend in Dr. Quarin, physician to the emperor of Austria, and chief physician to the hospital, through whose recommendation, although he had not yet graduated, Hahnemann obtained the situation of family medical attendant and librarian to Baron von Brückenthal, governor of Siebenbürgen, then residing at Hermannstadt. He remained here for two years, and being allowed to attend private practice he saved a small sum of money; with this he removed to Erlangen, where, on the 10th of August, 1779, he took his degree of M.D. In 1781 he was appointed district physician at Gomers, near Magdeburg, where he married.

In the year 1784 he removed to Dresden, where he gained a high reputation in the hospitals as a judicious and skilful practitioner; but, struck with the absence of a guiding principle in therapeutics, and

the great uncertainty of the healing art, he gradually withdrew himself as much as possible from practice, and endeavoured to support his family by his old resource of translations of English and French medical authors, pursuing at the same time his favourite study of chemistry.

In the year 1790, while engaged upon the translation of the 'Materia Medica' of Cullen, he was struck with the different explanations given of the mode of operation of Peruvian bark in intermittent fever: and, dissatisfied with them, he determined to try its effects upon himself. Finding that powerful doses of this substance produced symptoms strikingly analogous to those of that form of intermittent fever, for which it was an acknowledged specific, he determined to try further experiments with other medicinal substances upon himself and upon some medical friends. He obtained similar results; that is, he produced by these agents factitious or medicinal disorders resembling the diseases of which they were esteemed curative; and thus the first dawn of the law of *Similia similibus* gleamed upon him.

In 1801 he published a short treatise on the efficacy of belladonna in the prevention and cure of scarlet fever, and affirmed that its curative properties were based upon the homœopathic law. In 1810 he brought out his great work, 'The Organon of the Healing Art,' in which he developed his new system of treating disease, and for the first time gave it the name of 'Homœopathy,' by which it has since been distinguished.

In the year 1812 he returned to Leipzig, where he was appointed Magister Legens. At Leipzig he had an extensive practice, and was assisted by a great number of friends and pupils in the proving of his medicines. The apothecaries of that city, however, rose against him, and appealing to an old law long dormant, that forbade a physician to dispense his own prescriptions, they eventually, after some litigation, succeeded in 1820 in obtaining a decision in their favour. Hahnemann, unwilling to risk his own reputation and that of his system upon medicines prepared and dispensed by individuals avowedly hostile to his medical tenets, had determined to retire from practice, when the duke of Anhalt Cöthen offered him an asylum in his dominions, with the enjoyment of those privileges of which he had been deprived at Leipzig.

Having been a widower for some years, he married in 1835 a French lady, who had visited Cöthen for the benefit of his advice, and with her removed to Paris. He remained there in the exercise of his profession, and surrounded by numerous followers of his system, of all nations, till the time of his decease, which took place on the 2nd July, 1843, in the eighty-ninth year of his age. On the centenary of his birth, in 1855, a statue was erected to his honour in Leipzig, at the expense of his disciples in England, France, Germany, and other countries, with the concurrence of the local authorities, who supplied the site in one of the best places in the town.

HAIL. [SNOW.]

HAILES, LORD. [DALRYMPLE, SIR DAVID.]

HAINAN, an island in the Chinese Sea, opposite the southern extremity of the province of Quan-tung, or Canton, from which it is divided by the Channel of the Junks, a strait only fifteen or sixteen miles

wide. It lies between $18^{\circ} 10'$ and $20^{\circ} 24'$ N. lat., and $108^{\circ} 25'$ and 111° E. long., and incloses the Gulf of Tonquin on the east. Its length from south-west to north-east may be about 200 miles, and its average breadth perhaps not less than 100 miles; its surface is estimated to cover an area of 12,000 square miles.

The interior of the island is occupied by an extensive mountain-mass, some parts of which rise above the snow-line), called Ta Utshi Shan, or the Great Utshi range: from this there issue a great number of offsets, which are separated from the south-eastern and north-western shore by a level tract of considerable width. The extensive forests which cover the sides of the mountains form the principal wealth of the island. The climate is not very hot, being exposed to the wind which blows over a large expanse of sea. Fogs and heavy dews are frequent, and maintain a vigorous vegetation.

The population probably comprises 1,000,000 Chinese, exclusive of aboriginal wild tribes in the interior, who are so far independent that, in 1831, they repulsed a strong Chinese force brought against them by the governor of Quan-tung in person.

In the south are several good harbours. Exports—rice, sugar, wax, pearls, coral, salt, gold, silver, and timber. There are large rivers, but the soil is not fertile, timber being the principal product. The island is divided into thirteen districts. *Kiong-tchou*, the capital, is a populous city, on the northern coast, containing, it is estimated, 100,000 inhabitants. It is inclosed by strong walls, has two colleges, a public library, and a trade with Macao, Assam, Siam, and Singapore. Its port, *Kiung-chow*, is one of those opened by the treaty of Tientsin. Near the island whaling is pursued with great success by Chinese fishermen.

HAINAULT (*Hene-gouwen*), a province of Belgium, bounded N. by East Flanders and South Brabant, E. by Namur, S. by France, and W. by West Flanders, lies between $49^{\circ} 58'$ and $50^{\circ} 48'$ N. lat., $3^{\circ} 17'$ and $4^{\circ} 33'$ E. long.; its greatest length is 63 miles, and its breadth 32 miles. The area is 1441 square miles, and the population in 1861 was 825,216. This province is extremely rich in coal, and contains the three principal mines of the kingdom.

The surface is for the most part level, but there are some hills towards the south and east. The soil, except in the arrondissement of Charleroi, in the south-east of the province, is very fertile. The chief crops are wheat, rye, oats, barley, beans, rape, flax, hops, and potatoes; tobacco and chicory are also grown. Much of the land near the rivers is laid out in meadow; in other parts trefoil, lucerne, and sainfoin are cultivated. Horned cattle, horses, and sheep of excellent breed are numerous; poultry, game, and bees abound. The *Schelde* enters the province from France a little below its confluence with the Scarpe, and flows N.W. to Tournay; then changing its course to north, it forms the boundary-line between Hainault and West Flanders, and quits the province at its north-western angle. The *Sambre* enters the province also from France, to the E. of Maubeuge, and flows N.E. past Charleroi to join the Meuse at Namur. The *Dender* rises within the province, flows eastwards to Ath, whence it turns almost due north, quitting Hainault at Grammont, and, having

crossed a great part of East Flanders, enters the Schelde at Termonde. The *Haine*, from which the name of the province is taken, is formed by three brooks, which rise a little to the west of Charleroi; it flows W. past Mons, below which it is navigable by means of sluices, and joins the Schelde at Condé in France. The *Trouille* rises on the southern frontier, and flowing W. enters France, but leaves it again almost immediately, and falls into the Haine near Jemappes.

The province is traversed by several good roads and numerous canals, by which communication was much facilitated, even before the making of railways; but like every other part of Belgium, it is now well supplied with this rapid means of transit.

The commerce of the province is composed of its varied industrial pursuits—glass, porcelain, pottery, salt, spirits distilled from grain, beer, machinery, woollen stuffs, linen, lace, Brussels carpets (the great manufacture of which is in Tournay), &c. The most considerable articles of export are coal, iron, and lime, which are transported by canals and railroads to France and the neighbouring countries. Slates, marble, and building stone are quarried.

The province is divided into three arrondissements, Mons, Tournay, and Charleroi. The principal towns are the following:—*ATH*. *Beaumont*, on the road from Mons to Chimay, stands on a hill commanding an extensive view over a very diversified country, the surface of which is broken by steep hills, and limestone and schistose rocks. It was formerly fortified, but its defences were demolished by the English in 1691; population, 2091. *Binch*, W. of Charleroi, on the right bank of the Haine, is a well-built walled town, with 5235 inhabitants. In a fine square, ornamented with a fountain, stand a church, a college, and an hospital. The principal articles of manufacture are cutlery and hardwares, lace, paper, marble, and coal. *Braine-le-Comte*, at the junction of the Brussels-Valenciennes railroads, has cotton-mills, breweries, dyehouses, tannards, oil-mills, and 6221 inhabitants. *Charleroi*, a strong fortress on the Sambre, 23 miles E. from Mons, stands on the Brussels-Namur Railway, and has 12,782 inhabitants. It is also a manufacturing town; glass, salt, sugar, leather, nails, woollen yarn, &c., are among its products. The town stands in a most extensive coal-field, which gives employment to upwards of 10,000 men, and yields annually 3,000,000 tons of coal. The number of smelting furnaces, iron foundries, and nail factories in the surrounding district is very great. *Châtelet* is a small town, 4 miles E. from Charleroi, with 4000 inhabitants, who manufacture cotton, woollens, pottery, salt, beer, and leather. *Chievres*, a small town with 3107 inhabitants, near Ath, has important linen manufactures, potteries, breweries, and oil-mills. *Chimay* stands 24 miles S. from Charleroi, near the French frontier; it contains a college, and 3041 inhabitants, many of whom are engaged in the numerous iron-works and coal-mines of the vicinity. There is a castle and park at Chimay, and several breweries. *Enghien*, 12 miles N.E. from Ath, contains 3742 inhabitants. The town is built on the side of a hill; it is regularly laid out, and well built; it contains a college and an hospital. The château of the duc d'Arenberg, which was surrounded by a beautiful

park, was destroyed at the first French revolution. The park still remains; it contains a temple, to which seven noble avenues of beech and chestnut converge. *Fontaine l'Evêque*, 6 miles E. from Charleroi, contains 3018 inhabitants. It has several smelting furnaces, iron foundries, and nail factories. *Gosselies* stands 5 miles N. from Charleroi. The population, including commune, is 4686, engaged in manufactures of woollen cloth, hats, nails, and cutlery. Near Gosselies is *Gilly*, which has a population of 5618. *Lessines*, a town with 4971 inhabitants, north of Ath, is almost surrounded by the Dender. This is a place of much trade. The neighbouring quarries furnish large quantities of paving and building stone. There are salt refineries, distilleries, and chicory factories. The other chief branches of traffic are coal, wood, and oil. *Leuze*, 10 miles E. from Tournay, stands near the source of the Dender, and has 5880 inhabitants, many of whom are employed in manufactures. *Mons. Péruwelz*, 12 miles E. by S. from Tournay, on a feeder of the Schelde, is a town of 7879 inhabitants, who are principally occupied in breweries, lime-burning works, and some linen factories. *Rœulx*, a small town containing 2701 inhabitants, is situated 8 miles N.E. from Mons. The castle of Rœulx, surrounded by gardens and grounds in the English style, is much admired. *St.-Ghislain*, 7 miles W. from Mons, in the middle of a great coal district, stands on the Haine, and has 1956 inhabitants, who are engaged in bleaching linen, tanning, salt-refining, soap-boiling, and brewing. *Soignies*, a well-built town on the Senne, is 9 miles N. from Mons, on the Brussels-Valenciennes Railroad, and contains 6776 inhabitants. Many of the houses are large and handsome. The town is surrounded by old ramparts. The church of St. Vincent is said to be the oldest building in the province. There is a college in the town, an orphan asylum, a convent of the Sisters of Mercy, and several other religious and charitable establishments. Beer, spirits, and leather are manufactured; and the large limestone quarries here are a source of considerable profit. *Thuin*, on the Sambre, 7 miles S. from Charleroi, stands partly on a steep rock, and contains 3989 inhabitants, many of whom are engaged in the iron mines and great iron works in the vicinity. There are also manufactures of woollens and linens. *TOURNAY. Courcelles*, 5 miles N.W. from Charleroi, contains 3226 inhabitants, who manufacture nails and table-linen. *Dour*, 8 miles S.W. from Mons, has a custom-house, and a population of 5833 inhabitants, many of whom find employment in the productive coal-mines of the district. *Fontenoy*, an inconsiderable village, 4 miles S.E. of Tournay, is historically famous for the great battle fought there, May 11, 1745, between the French under Marshal Saxe, and the allied English, Austrians, and Dutch, commanded by the duke of Cumberland, who was defeated with the loss of 15,000 men. *Hornu*, a village of 3050 inhabitants, 5 miles W. from Mons, is the seat of considerable coal-mines. The village is built on a regular plan, and inhabited almost entirely by the miners and iron-forgers of the neighbourhood. Steam engines are manufactured here. *Jemappes*, the first station S. of Mons, on the Brussels-Valenciennes Railway, has a population of 4670. It is celebrated for the

victory gained on the 6th of November, 1792, over the Austrians, by the French under Dumouriez and the duc de Chartres (the late king, Louis Philippe), and which led to the conquest of Belgium. *Jumetz*, 3 miles N. from Charleroi, contains 6528 inhabitants, who are engaged in the coal-mines and in manufacturing glass, beer, and spirits.

HAINAULT, FRENCH, a district in the north-east of France, which formed with the Belgian province of Hainault the territory occupied by the ancient Nervii, whose capital was Bagacum, now Bavay. It was ceded by Spain to France by the treaties of the Pyrenees (November 7, 1659) and Nimeguen (September 17, 1678). Valenciennes, Maubeuge, Condé, Bouchain, Avesnes, Le-Quesnoy, and Landrecies were the principal towns of this district, which is now included in the department of NORD.

HAINES, river. [ZANGUEBAR.]

HAIR. The hairy coverings of mammalia are composed of long delicate processes of a horny substance, which grow from bulbs situated in or beneath the skin. Each hair is contained at its lower part in a delicate sheath, or follicle, which passes obliquely from the surface of the skin on which it opens to a greater or less depth, and at its base dilates into a pouch containing the bulb of the hair. The bulb of the hair consists of a small cone-shaped body, the pulp, soft and delicate, and apparently made up of bloodvessels and nerves, and covered by a reflection of the smooth lining of the sheath of the hair, which is continued from the cuticle covering the surrounding skin. On the whole surface of this bulb the substance of the hair is secreted, and as each layer which is deposited pushes that previously formed onwards, the whole gradually advances along the

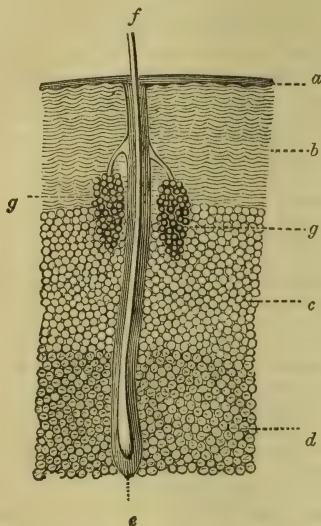
Fig. 1.



sheath till it projects beyond the skin, and thence continues to grow free. Into each hair-follicle, as Gurlt has shown, there open the ducts of one or two little glands, by which the oily matter is secreted to lubricate the hair and keep it supple and firm, and where these are deficient the same purpose seems to be performed by the follicle itself. Fig. 1 represents an oblique section of the pulp and lower part of the

whisker of a lion, in the Hunterian Museum, in which *a* is the body of the hair, *b* the conical pulp, and *c* a bloodvessel passing into and ramifying in it. Fig. 2 is a section of the skin, containing a hair

Fig. 2.



from the human scalp: here *a* is the thin cuticle, *b* the cutis, *c* the subjacent fat, *d* the cellular tissue, in which the base of the hair follicle, *e*, is seen; *f* is the hair itself, enlarged at its base, and *g g* are the two sebaceous glands opening into the sheath.

In man the hairs are not, as has been generally supposed, perfectly cylindrical. Weber has shown that they are all more or less flattened, so that a transverse section presents an elliptical form, or sometimes, from one side being grooved, has the shape of a bean. The hair of the whiskers, beard, and moustaches, and in general all short curly hair, is most flattened. In most instances flatness and curliness are directly proportionate, and both attain their maximum in the crisp woolly hairs of the negro, which are sometimes as much as two-thirds broader in one direction than in the other. The hair of the negro, however, though called woolly, differs considerably from the wool, properly so named, of sheep and other animals: the latter is not spirally curled, but wavy, all its curves being nearly in the same place; it is much more delicate, and perfectly round, and hence, from its being equally fitted to curl in any direction, is peculiarly adapted for spinning, while the flattened hairs of men have always a tendency to turn their broadest surfaces towards the middle of the curl.

Except at their base, into which the conical pulp enters to a variable distance, the hairs are perfectly solid, and in most animals their substance is similar throughout. The average diameters of hairs from the human head are respectively about 1-300th and 1-500th of an inch, and hairs often attain a length of six or seven feet in women. Instances are recorded also of the hair of the beard growing to a length of nine feet.

Hairs are very elastic; they admit of being stretched nearly one-third of their length, and regain their original length almost completely: in proportion to their size they are very tough and firm. In masses they are impenetrable, except to very great violence, and hence one of their uses in the thick coverings of animals; they are also adopted in armour, as for the coverings of helmets. Hairs are bad conductors of both heat and electricity, and their oiliness prevents the influence of moisture on the animal body.

In chemical properties hair resembles horn, nails, &c. It is soluble in water at a very high temperature, as in a Papin's digester, leaving a large quantity of oil mixed with sulphuret of iron, and some sulphuretted hydrogen. It is this oil, with the sulphuret of iron, which gives the colour to the hair, and by whose absorption grayness is produced. The iron is most abundant in the darkest hair, and the sulphur is the ingredient on which the action of the various black dyes for red or gray hair depends.

HAIR DYEING. This practice is very ancient, and has been resorted to by savages as well as by the more civilized nations. It is generally done to darken the hair, or to hide the approach of gray hairs. Vegetable dyes were formerly used, but those now sold for the purpose are chemical solutions, either oxides of silver, mercury, lead, or bismuth, and notwithstanding their general use are very injurious.

HAIR MANUFACTURES. There is a considerable amount of industry bestowed upon human hair and the hair of certain animals, in the production of manufactured articles. These consist of fabrics woven or felted of various kinds of hair, brushes, and ornamental hair-work. The latter are chiefly wigs, false curls, numerous contrivances for supplying a deficiency of hair, or giving an appearance of greater abundance to the natural supply, chains, guards, and hair-jewellery. For these purposes 15,821 lbs. of human hair, valued at 6330*l.*, were imported into Great Britain in 1864, chiefly from the continent of Europe. There are hair-merchants in France, who collect it from the various departments, and also from Holland and Germany. In the spring of the year quite a harvest of hair is raised, chiefly in the country districts, at an average price of about five francs per lb., but choice tresses fetch more. The light colours are obtained from Germany, and the dark from France.

Hair-brushes are of many kinds, the coarsest being made of pigs' bristles, of which 2,346,135 lbs. were imported in 1864, nearly all from Russia; the average price being 2*s.* 6*d.* per lb. They are chiefly used in the manufacture of hair and clothes brushes, tooth and nail brushes, brooms, and coarse brushes. The finer sorts are made of the hair of the camel, goat, badger, dog, &c. These require great care in sorting into the different lengths. The value of artists' and painters' brushes consists in their fine points.

Horse-hair forms an important article of commerce; in 1864 as much as 15,854 cwts., of the value of 78,813*l.*, were imported from South America, Russia, and Germany. The shorter kinds are used for stuffing sofas, chairs, &c.; and horse-hair cloth is woven of hair taken from the tail. If the hair be white, as in Russian horses, it admits of being dyed green, crimson, &c., by carefully conducted processes; but black or gray horse-hairs only admit of a black dye, which is done by logwood and coppers. The

process of weaving is a tedious one, for each hair usually constitutes only one throw or thread of weft. It can only be used for the weft, except for sieve-cloth; the warp being either worsted, cotton, or linen yarn. Hair-cloth is used for covering seats of chairs, couches, also for crinoline trimming, and as a material for making bonnets. Horse-hair is also made into ropes, sacks, and bags. Cow-hair is worked into a rough yarn and woven into carpets in Germany, made into socks in Norway, and used for stuffing furniture and mixing with mortar in Britain. In 1864 the quantity of cow-hair, including that of the ox, bull, and elk, imported was 43,281 cwts., value 205,218*l.*, or about 4*l.* 15*s.* per cwt.; of this quantity 18,610 cwts. came from France, 13,397 from Hamburg, and the remainder from Holland, Russia, and Belgium.

In the coarser manufactures various substances are used as substitutes for hair, such as aloe fibre, dyed hemp and flax, and China grass. One peculiar application of hair may be briefly noticed. The Russians work up the hair of rabbits and hares into a kind of felt, press or fashion it into bowls, dishes, plates, and other articles, and varnish it thickly. The materials thus made have the appearance of *papier maché* or varnished leather, and are strong, light, and durable.

For the uses of goats' hair and camels' hair in weaving, see WOOL. The importations of hair manufactures not being goats' wool, into the United Kingdom in 1863 were valued at 21,666*l.*; France supplying 16,183*l.*, Belgium 3119*l.*, Holland 1750*l.*, and other countries 614*l.* In the same year manufactures of hair of the value of 1240*l.* being foreign manufacture, and British manufacture to the value of 18,345*l.* were exported from this country.

HAIR POWDER, is made from starch, and scented with a dry perfume. In the seventeenth century, the fashion of powdering the hair was almost universal amongst both sexes of the higher ranks of society. The hair was well greased with pomade to make the powder stick. In 1795, a tax was first put on the use of hair powder, which for a short time yielded about 20,000*l.* per annum, but it had the effect of altering the fashion by a return to natural and unpowdered hair. Some of the nobility and gentry of the present day oblige their footmen and coachmen to wear it as part of their livery, for which they have to pay, in England and Scotland, a tax of 1*l.* 3*s.* 6*d.* each.

HAIRS. In plants these are long expansions of the cuticle, chiefly intended to answer the double purpose of collecting moisture from the atmosphere, and of protecting the surface of a plant from the too powerful influence of the sun's rays. They also assist in the conveyance of certain kinds of seeds through the air, and in other cases, as in that of cotton, they are specially adapted for the use of man. That the two first purposes are those for which hairs growing on the surface of plants are intended, seems sufficiently indicated by the following facts. Hairs are seldom found on water plants, which have no occasion for absorbing organs; and when water plants are accidentally obliged to grow in dry places, they acquire them; while, on the other hand, species naturally found in hot dry places, or in arid climates, are as usually provided with them, unless in those

cases where the cuticle becomes excessively thickened. If a hairy-leaved plant is observed in dry weather, it will be found that all its hairs are weak and flaccid; but no sooner does a shower of rain fall, or the atmosphere become humid, than the hairs acquire a rigid consistence.

In all cases hairs are composed of lengthened cells of cellular tissue, extending from one or more of the cells of the cuticle. Most commonly they are quite simple, and are merely formed of several cells of equally diminishing size, placed end to end, or of a single cell.

In consequence of the hairs of plants being an extension of cellular tissue, which is naturally thin-sided, all hairs are much weaker than the tough thick-sided tubes of which woody tissue is composed. This accounts for the well-known fact that all goods manufactured from cotton are far less tough and durable than those which, like linen, are prepared from the tissue of bark or wood. When the two forms of matter are submitted to microscopical examination, the thin sides and transverse partitions of the former will usually distinguish it from the thick-sided tubes of the latter, in which no partitions are discoverable.

HAJAR. [ARABIA.]

HAKE. [MERLUCCIUS.]

HAKLUYT, RICHARD, born in 1553, studied at Christ Church, Oxford, and applied himself particularly to geography, or cosmography, as it was then called, and was made a lecturer on that subject at Oxford. About 1584 he went to Paris with Sir Edward Stafford, ambassador of Queen Elizabeth, where he remained five years. On his return to England, he was made by Sir Walter Raleigh a member of the company of gentlemen adventurers and merchants of London, for the inhabiting and planting 'of our people in Virginia,' as appears from his 'Collection of Travels,' edition of 1589, p. 815, which he published in one volume, folio, and which he afterwards enlarged and published in three volumes, folio, 1599-1600, under the title, 'The Principal Navigations and Discoveries of the English Nation, by Sea or over Land, to the remote and farthest distant quarters of the earth, at any time within the compass of these 1500 years.' Hakluyt published also or edited translations of several foreign narratives of travellers, of which a selection has been since made: 'A Selection of curious, rare, and early voyages and histories of interesting discoveries, chiefly published by Hakluyt, or at his suggestion, but not included in his celebrated compilation,' 4to., London, 1812. Hakluyt died in 1616, and was buried in Westminster Abbey.

HAKODADI, a seaport town of Japan, on a peninsula on the south shore of Yesso, in Sangar Strait. Population in 1863, 45,000. It was opened to commerce in 1858. Trade is carried on chiefly by Russian, American, and British vessels. The exports consist of wood (hardwood, pine, fir, and hinoki), combou (seaweed), gensen, awabee, dried fish, cuttle-fish, oil, and silk; imports—linen, woolen, and cotton stuffs, velvet, and sugar.

Hakodadi is 650 miles from Jeddo. It has a fine harbour, and is likely to become a place of considerable commercial importance. From a report of the British consul in Hakodadi, in 1865, it appears that there is

gradual increase of British shipping at the port, but that in consequence of the absence of precautionary measures on the part of the Japanese Government to insure the safety of vessels going to and from the port, there had been several shipwrecks. The town has been compared in position and aspect to Gibraltar and Hong Kong. The winters are extremely cold: the thermometer has been observed to register 18° below zero, and the snow lies on the ground till the close of April.

HAL, or HALLE. [BRABANT, SOUTH.]

HALBERSTADT. [MAGDEBURG.]

HALBERT or HALBERD, a battle axe, consisting of a strong wooden handle about six feet long surmounted by a sort of bill-hook, formerly used for cutting and thrusting, and also for tearing down works against which an attack was made. It was first used in England in the fifteenth century, and was borne up to the end of the eighteenth century by all sergeants of foot, artillery, and marines, and by whole companies in some regiments, called Halberdiers.

HALCYONIDE. [KINGFISHERS.]

HALDE, DU, born at Paris in 1674, entered the society of the Jesuits, and was intrusted by his superiors with the care of collecting and arranging the letters written by the missionaries of the society from various parts of the world. This employment furnished him with materials for the collection styled 'Lettres Edifiantes et Curieuses.' He also compiled, from the reports of the Jesuit missionaries and their translations of Chinese works, a full and well-digested description of that empire, which was the first published in Europe: 'Description Historique, Géographique, et Physique de l'Empire de la Chine et de la Tartarie Chinoise,' 4 vols. folio, with an atlas, Paris, 1735, reprinted soon after at the Hague, in 4 vols. 4to., and translated into English by R. Brookes, 4 vols. 8vo., London, 1736.

Du Halde was at one time secretary to Father le Tellier, confessor of Louis XIV. He died at Paris in 1743.

HALE, SIR MATTHEW, was born November 1, 1609, at Alderley, in the county of Gloucester. Both his parents having died while he was an infant, Matthew Hale was educated, under the direction of a near relation on his mother's side, by a clergyman professing puritanical principles. At the age of seventeen he was removed to Magdalen Hall, Oxford, where he plunged into great dissipation. Accidental circumstances introduced him to Serjeant Glanvil, who, perceiving his good qualities, persuaded him to apply to the study of the law. He was admitted a student of Lincoln's Inn on the 8th of November, 1629, and immediately commenced a course of arduous study. One of his companions in a debauch having been taken dangerously ill, Hale was so struck with remorse that he gave up his intemperate habits. He was called to the bar some time previous to the commencement of the civil war. He resolved not to take any part in the political dissensions and contests which then agitated the country, and he steadily kept his resolution. His neutrality was favourable to his interest as an advocate; he was engaged as counsel for the court party in many of the most important state trials, and yet he was constituted counsel to the commissioners deputed by parliament to treat with the royal commissioners as to the

reduction of Oxford. After the execution of Charles I. Hale took the engagement to be true and faithful to the Commonwealth, and accepted the appointment of one of the commissioners for reforming the law. In 1653 he was made one of the judges of the Common Bench. After having discharged the duties of his office with consummate skill and strict impartiality, he suddenly affected to feel scruples of conscience at acting as judge in criminal cases, and refused to preside in the crown courts, though he still continued to administer the law in civil cases. On the death of Cromwell, Hale refused to act under a commission from the Protector Richard. He was a member of the parliament which recalled Charles II., and was made chief baron of the exchequer in 1660, and knighted. In 1671 he was raised to the chief-justiceship of the King's Bench, where he presided with honour to himself and advantage to the public till 1675, when, from the state of his health, he resigned his office. He died from dropsy on Christmas Day, 1676.

As a lawyer Hale's reputation is high, and his integrity is unimpeached. The only spot upon his memory as a judge is the fact of his having condemned two women for witchcraft, at the assizes at Bury St. Edmund's, in the year 1665. Hale in the course of the trial avowed himself a believer in witchcraft, and the jury found the prisoners guilty, notwithstanding many impartial bystanders declared that they disbelieved the charge. The prisoners were executed.

Sir Matthew Hale was a voluminous writer, though none of his productions were printed during his life. His 'Pleas of the Crown,' 'History of the Common Law,' and some other treatises connected with the law, have been published since his death, and also several others upon scientific and religious subjects. His valuable manuscripts he bequeathed to the Society of Lincoln's Inn, and he directed that they should not be lent out or printed.

A catalogue of the manuscripts was contained in his will, and a full account and catalogue of all his works is printed in Dr. Williams' 'Life of Hale.' His life has also been written by Burnet and Roscoe, and many anecdotes relating to him are detailed by that amusing gossip Roger North, in his 'Life of Lord-Keeper Guildford.' Notices of his life will also be found in the fourth volume of the 'Biog. Brit.'

Sir Matthew Hale was twice married: first to Ann, daughter of Sir Henry Moore, by whom he had ten children; and secondly, late in life, to one of his own domestic servants.

HALEB (commonly but erroneously called ALEPPO), the capital of an eyalet of Asiatic Turkey of the same name, is situated in the north part of Syria, in 36° 11' 32" N. lat. (according to Niebuhr), 37° 9' E. long. The population is estimated at 100,000; but previous to the earthquake of 1822 it was upwards of 200,000, comprising Turks, Armenians, Greeks, Jews, Maronites, Syrians, and Europeans, the Greeks being the most numerous and the richest. The city rose to importance on the destruction of Palmyra, and became the great emporium of trade between Europe and the East. With the suburbs, it is about seven miles in circumference. The houses are of freestone, and uniformly flat-roofed. The celebrated gardens are south-east of

the city. Aleppo has a castle, a Mahommedan college, Christian schools and churches, a Roman aqueduct, which supplies it with water, large inns, warehouses, and bazaars. The town is built on four hills, called Djeleb beni el-Kaka; and is surrounded by a stone wall, and has seven gates. The condition of the city was greatly changed by the earthquake which happened in August, 1822, and which destroyed almost two-thirds of the buildings, and upwards of 20,000 inhabitants. The small river Koik runs along the west side of the town.

Before the earthquake of 1822 Haleb was supposed to possess 12,000 artisans, and was celebrated for its gold and silver lace, its manufactures of silk and cotton goods, shawls, &c. Most of these are still carried on, and there are also soap-factories, dye-works, and rope-walks. Trade is conducted by more than 100 mercantile houses. Large caravans arrive from Bagdad, Bosra, Diarbekir, Mosul, Kurdistan, and Armenia. Imports—galls, silk, wool, goats' hair, and India piece goods; cotton yarns and fabrics, cochineal, sugar, indigo, silks, woollens, and colonial goods; glass, coral, paper, velvets, steel, &c.: exports—cotton, wool, and sesame. The goods are conveyed to and from the ports of Iskanderun and Latakia by caravans of mules—all destined for the European markets, being shipped from the latter place. Consuls from all the commercial states of Europe reside at Haleb.

The ancient name of the town was Chaleb, or Chalbyon, which was changed by Seleucus Nicator into Berœa. It continued to be called by that name until its conquest by the Arabs under Abu Obeidah in 638, when its original name of Chaleb or Haleb was restored. It afterwards became the capital of an independent monarchy under the sultans of the race of Hamadan. In the latter part of the tenth century Haleb was again united to the Greek empire by the conquests of Zimisceus, emperor of Constantinople. During the crusades Haleb was subject to the Seljuke princes. In 1260 it was plundered by the Moguls, and again in 1401 by Timur. It was afterwards annexed to the dominions of the Mameluk sultans of Egypt, but was conquered by Selim I., the Turkish sultan, and has since that time been subject to the sultans of Constantinople.

The inhabitants of the eyalet only cultivate the land in the mountainous districts, which produce wheat and other sorts of corn, melons, olives, cotton, tobacco, figs, &c.: the level parts of the country are abandoned to the Kurds and Arabs. The heat of the climate is seldom oppressive, in consequence of the west winds which blow from the Mediterranean. The country is reckoned healthy. The eyalet of Haleb is watered by the Euphrates, the Orontes, and the Koik. The Koik rises near Amtab in the north, and passing by Haleb loses itself in a morass about sixteen miles south of the city.

HALES, STEPHEN, D.D., was born at Beckesbourn, in Kent, September 7, 1677, entered of Benet College, Cambridge, in 1696, was elected fellow in 1702, and, having taken holy orders, was presented about 1710 to the perpetual curacy of Teddington, near Twickenham, where, though he obtained other church preferment, he resided to the end of his life. He was elected F.R.S. in 1717, and in 1753 was admitted a foreign associate of the Académie des

Sciences, in place of Sir Hans Sloane. He died in 1761.

During his residence at Cambridge he applied himself diligently to the physical researches which continued to be his favourite pursuit through life. His first important publication was 'Vegetable Statics, or an Account of some Statical Experiments on the Sap in Vegetables,' &c.; and he made the first essays towards the modern discoveries in vegetable physiology. This work obtained for him a foreign reputation, being translated into French, Italian, Dutch, and German. 'Hæmostatics,' a similar treatise on the circulation of the blood, followed in 1733. Dr. Hales' genius was of a very practical turn: most of his numerous inventions and writings refer to some direct application of science to daily use, such as ventilation, the preservation of meat, the distillation of salt water, &c.

HALE'SIA, a genus of plants belonging to the natural order *Styracæa*. The species are trees with drooping white flowers. *H. tetraptera*, common Snowdrop-Tree, is a tree growing from 15 to 20 feet high, and is a native of South Carolina. The wood is hard and veined. It is one of the hardest and also one of the handsomest of the American deciduous trees.

HALF-PAY is an allowance made to military and naval officers, when not actively employed, as a retaining fee, the terms being very different in the navy and army. In the latter, superannuated officers retire on full-pay, and half-pay is only granted temporarily to those thrown out of employment by the reduction of the corps with which they are serving, or those who are compelled by ill-health to give up active service. The estimate of the half-pay of officers for the year 1865-66, is 324,359*l.* Colonels receive 14*s.* 6*d.* a day; lieutenant-colonels, sums varying from 8*s.* 6*d.* to 12*s.* 6*d.*; majors, 9*s.* 6*d.*; captains, 3*s.* 11*d.* to 10*s.*; lieutenants, 2*s.* 4*d.* to 5*s.* 2*d.*; cornets and ensigns, 1*s.* 10*d.* to 3*s.* 9*d.*; paymasters, 4*s.* to 15*s.*; and medical officers from 2*s.* to 30*s.* a day when on the half-pay list.

In the British navy all officers not afloat, whose ship is not in commission, are placed on the half-pay list until called upon again to serve, and as there are always more naval officers than appointments for them to fill, the non-effective list is very large. According to the navy estimates for 1865-66, the total number of naval officers on half-pay is 3516, for which the sum of 698,195*l.* is required for the year. Admirals receive sums varying from 1*l.* to 3*l.* 7*s.* per diem; captains, 10*s.* 6*d.* to 1*l.*; commanders, 8*s.* 6*d.* to 13*s.* 6*d.*; lieutenants, 4*s.* to 8*s.* 6*d.*; surgeons, 6*s.* to 18*s.* 6*d.*; and others proportionately.

HALFORD, SIR HENRY, was born on the 2nd of October, 1766, and was the son of Dr. James Vaughan, physician to the Infirmary at Leicester. Sir Henry received his early education at Rugby, and was afterwards admitted at Christ Church, Oxford; he graduated in medicine at Oxford in 1794, and was elected a fellow of the College of Physicians in the same year. Having been well introduced into London society, and being distinguished for the elegance of his manners, and having early married a daughter of Lord St. John, it was not long before his practice became considerable. He was appointed by George III. one of his physicians, and in 1809

he became possessed of a large fortune by the death of his mother's cousin, Sir Charles Halford, and changed his name from Vaughan to Halford. He was made a baronet in the same year. Sir Henry continued to hold the office of physician to George III. till the king's death, and subsequently held the same appointment under George IV., William IV., and Queen Victoria. He was appointed president of the College of Physicians in 1824, and delivered the oration on the occasion of that body removing from their old building in the city to the new one in Pall Mall.

In 1813 Sir Henry Halford descended with the Prince Regent into the royal vaults of St. George's Chapel, Windsor, where, amongst other curiosities, they discovered the head of Charles I. Of this visit and discovery Sir Henry has given an account, which is deposited in the British Museum, and is authenticated by the signature of the Prince Regent. He died on 9th March, 1844. He had been for more than twenty years president of the College of Physicians, and was mainly instrumental in establishing the evening meetings of that body. His urbanity of manners and devotion to the interests of the college have left a grateful recollection amongst the members of that corporation. His publications consist of essays and orations.

HALIBUT. [PLEURONECTIDÆ.]

HALICARNASSUS. [ANATOLIA.]

HALICHTHUS (Gr. *als*, 'the sea,' and *choiros*, 'a pig'), in Zoology, a genus of cetaceans, known as the Gray-seal. It is distinguished by a very flat head, and a deep and obliquely-truncated muzzle.

HALIDON HILL, the scene of a battle between the English and Scotch on the 19th of July, 1333, is about a mile from the town of Berwick-upon-Tweed. Edward III. was supporting the claims of Edward Balliol to the crown of Scotland, and was here met by the acting regent of Scotland with a large force. The English charging in a compact body put them to rout with immense slaughter, leaving the flower of the Scotch nobility and 11,000 men on the field, while they sustained but little loss themselves. The result was that Edward Balliol was again put in possession of the throne.

HALIFAX, a large manufacturing town, in the West Riding of the county of York, in the wapentake of Morley, was created a parliamentary borough by the Reform Act, and now sends two members to the House of Commons. Registered electors (1864), 1664. The population of the borough in 1861 was 37,014; that of the parish, which is one of the most extensive in England, and nearly as large as the whole of Rutland, 147,988. Halifax is about 200 miles from London, and 35 S.W. of York. It has first-class railway accommodation to all parts of the kingdom, and the river Calder communicates with Liverpool on one side and with Hull on the other. Coal is plentiful in the neighbourhood.

The chief articles at present manufactured at Halifax are worsted stuffs, including shalloons, tammies, calamancoes, corduroys, everlastings, moreens, shags, serges, merinos; also baizes, narrow and broad cloths, and kerseymeres. Bombazines, crapes, and other fabrics, composed of silk and worsted, are also manufactured here, and the cotton trade is carried on to a considerable extent. There are

extensive damask manufactories, and the carpet works of Crossley and Sons are the largest in the world, employing nearly 4000 persons.

The appearance of the town of Halifax is generally handsome; it contains many edifices entirely of stone; it is well lighted, and amply supplied with soft water from reservoirs about a mile north-west of the town, which were opened in 1827. The Hebble flows through the eastern parts of the town, and falls into the Calder. The scenery in the immediate vicinity of the town is of a highly interesting and beautiful character.

The parish church of Halifax is a handsome and spacious edifice of pointed Gothic architecture, erected at different dates. About eighteen other churches and chapels are subordinate to the parish church; the most notable is the magnificent Gothic church erected by Scott at the expense of Edward Ackroyd, Esq. Trinity Church is a handsome Grecian building, with Ionic pilasters, and an elegant tower surmounted by a dome: it was built in 1795. St. James' Church, built in 1831, is in the pseudo-Gothic style, with turrets at the west end. There are numerous places of worship for every denomination of dissenters, including a beautiful Independent chapel in the Gothic style, with a spire 235 feet high, erected at the cost of Sir F. Crossley, M.P. The free grammar-school at Skircoat was established in 1585 by letters-patent of Queen Elizabeth. Its property yields about 270*l.* a-year, exclusive of the school-house, garden, and offices, which are occupied by the master. The school is free for classical instruction to the sons of parishioners. There are also some smaller school charities. Waterhouse's Charity, established in 1636, provides almshouses for twelve poor widows, a stipend for the lecturer at the parish church, small yearly stipends to the curates of certain chapels of ease within the district, and various sums for other local purposes. The property of this trust has of late years greatly increased in value. The infirmary is a very noble building, which was built in 1836. It affords medical and surgical assistance both to in and out patients. The literary institutions of Halifax are, the Literary and Philosophical Society, which has an elegant hall and a museum; the Mechanics' Institution; assembly-rooms, and theatre.

There have been several modern additions to the public buildings of the town, the chief being the piece-hall, a vast quadrangle, containing 315 rooms or warehouses, in which the manufacturers keep their cloths for sale. Here most of the goods are sold to the merchant in an unfinished state. Messrs. Crossley have also recently erected some handsome almshouses, at a cost (including endowment) of 25,000*l.*; 30,000*l.* have also been expended by them on a beautiful park, designed by the late Sir J. Paxton. There is also the gorgeous church, already noticed, built and endowed by Mr. Ackroyd, at a cost of 50,000*l.*, designed by Mr. Scott; and a magnificent town-hall, designed by Sir Charles Barry (his last work, and executed by his son), with tower and spire 100 feet high. This was opened by the Prince of Wales in August, 1863; it cost 60,000*l.* In 1864 the Messrs. Crossley completed a vast orphanage, to accommodate 480 children, at an expense of about 100,000*l.*

The parish of Halifax comprises nineteen townships. The borough is governed by a mayor, ten aldermen, and thirty councillors.

In 1862 Halifax was constituted an Inland Bonding town. [INLAND BONDING TOWN.] The amount of customs revenue in 1864 was 10,090*l.*, and the trade is reported to be gradually on the increase.

Some of the refugee Flemings settled in the parish of Halifax at an early date, and stimulated the woollen manufactures of the district, if they did not originate them. Down to a recent period the dialect of the working classes strikingly resembled that of operatives in the Low Countries, especially in Friesland.

There formerly existed a very peculiar local law, by which every felon taken within the liberty, with stolen goods to the value of thirteence-pence-halfpenny, could, after three market-days, be taken to the Halifax gibbet, and be decapitated. The instrument used was somewhat similar to the guillotine, and the axe is preserved in the old prison in Jail Lane. The law was enacted as a protection to the manufacturers against the thievish propensities of their work-people, who were in the habit of robbing their employers by keeping to themselves a portion of the material which ought to have gone into the cloth, so that when the latter was manufactured it was found to be of inferior weight and body.

HALIFAX. [NOVA SCOTIA.]

HALIFAX, GEORGE MONTAGU, EARL OF, was the fourth son of George Montagu, Esq., of Horton in Northamptonshire, who was the fifth son of Henry, first earl of Manchester. He was born at Horton, on 16th April, 1661. His education was begun in the country, but he was eventually sent to Westminster School, where he was chosen a king's scholar in 1677, and whence in 1682 he was removed to Trinity College, Cambridge. He produced, on the death of Charles II., in February, 1685, some verses, which so charmed the earl of Dorset that he induced the young poet to come up to town, where he was introduced by his lordship to all the wits of his acquaintance. In 1687 he and Prior brought out in conjunction their burlesque upon Dryden's 'Hind and Panther,' entitled 'The Hind and the Panther transversed to the Story of the Country Mouse and the City Mouse.' It is preserved in the 'Supplement to the Works of the Minor Poets,' 1750, vol. i. pp. 47-82, under the head of 'Additions to the Works of the Earl of Halifax.'

Montagu appears to have some time before this entered upon his career as a politician. Johnson, in his 'Lives of the Poets,' says that 'he signed the invitation to the Prince of Orange, and sat in the convention.' In the convention parliament he sat for Malden; and he was returned for the same place to the next parliament, which met in March, 1690. It is stated to have been about the time of the Revolution that he married the Countess Dowager of Manchester: she was Anne, widow of Robert, third earl of Manchester, and daughter of Sir Christopher Yelverton, Bart.

According to Johnson, it was his intention when he formed this connection to take orders; but, afterwards altering his purpose, he purchased for 1500*l.* the place of one of the clerks of the council. He was also fortunate in his next poetical performance,

'An Epistle to Charles, Earl of Dorset, occasioned by His Majesty's Victory in Ireland,' being a celebration of the battle of the Boyne; for which King William, to whom he was introduced upon the occasion by Dorset, is said to have bestowed upon him a pension of 500*l.*

The rest of his history is that of a political character, and a patron of poets. He raised himself by his speaking to great distinction; and on the 21st of March, 1691, he was taken into office as one of the Lords of the Treasury. He was appointed Chancellor of the Exchequer on the 1st of November, 1695, and to which on the 1st of May, 1697, he conjoined that of First Lord of the Treasury. In 1695 and 1696 he obtained great credit by his management of the operation of the general recoinage of the silver money. It was in the latter of these years that, to supply a temporary circulating medium, he contrived what are called Exchequer Bills, the convenience of which species of paper, both for the government and the public, has kept it in use ever since. On the modification of the ministry in November, 1699, Montagu was removed to the auditorship of the Exchequer. In the end of the following year he was created Baron Halifax (with remainder, failing his own issue male, to George Montagu, son and heir of his eldest brother, Edward Montagu).

Lord Halifax was impeached by the new House of Commons, in April, 1701, for several alleged acts of misconduct in office, along with Lord Somers and the earls of Portland and Oxford. The question was carried in the House by a vote of 186 against 163; but the impeachment was not prosecuted, and on the 24th of June the charges were dismissed by the Lords.

In 1703, after the accession of Queen Anne, Halifax was again attacked by the Commons on the charge of having been guilty of breach of trust in the management of the public accounts while he was Chancellor of the Exchequer; but he was again protected by the Lords. Halifax first moved for the establishment of a public library, out of which eventually came the British Museum.

Having always kept up a connection with the Hanoverian family, Lord Halifax was found, on the death of Queen Anne, to be one of the nineteen persons appointed by the new king to hold the government along with the seven great officers of state till his majesty should come over. On the 14th of October, 1714, he was raised to the dignities of Earl of Halifax and Viscount Sunbury, and was restored at the same time to his former post of First Lord of the Treasury, his office of auditor of the Exchequer being given to his nephew. He died of an inflammation of the lungs on the 19th of May, 1715.

HALIOTIDÆ, *Haliotis* Tribe or Family (*Les Ormiers* of the French; Ear-shells, or Sea-ears). Of this group of Gasteropods, Linnæus records only seven species, and Mr. Dillwyn seventeen. They are now known to be very numerous.

Cuvier, in the edition of his 'Règne Animal' (1830), makes the *Ormiers* (*Haliotis* of Linnæus) the first genus of his eighth order of Gasteropods, *Scutibranchiata*. He observes that it is the only genus of the order which has its shell turbinated, and that among this sort of shells that of the *Ormiers* is remarkable for the amplitude of its aperture, its

flatness, and the smallness of the spire, which is seen from within. This form, he adds, has caused it to be compared to the ear of a quadruped. Cuvier divides the genus into the following subgenera:—1. The *Haliotids*, properly so called (*Haliotis* of Lamarck). 2. The *Padolli* of De Montfort. 3. The *Stomatia* of Lamarck. The *Ormiere*s are immediately followed by genera dismembered from the *Patellæ*, namely, *Fissurella*, *Emarginula*, and *Paramorphus*. M. De Blainville's arrangement is very similar to that of Cuvier.

Genus *Haliotis*.—In the genus *Haliotis* the shell is wonderfully brilliant, with iridescent hues, reflected from its nacreous surface. Mingled tints of purple, red, blue, and green, interchanging in various lights, produce an admirable effect. The general form of the shell is oval, more or less depressed, with a small spire having a lateral aspect posteriorly; the aperture is as large as the shell, with a continuous border; the right border is delicate; the left or columellar border is flattened, enlarged, and trenchant; along this border is a series of orifices, in lineal order, as if drilled in the shell. Muscular impression oval, and in the centre of the under side.

Animal.—One of the most ornamental of Gastropods. All round its foot to its mouth there is, at least in the more common species, a double membrane cut out into leaflets (*feuillages*) and furnished with a double row of filaments. On the outside of its long tentacles are two cylindrical pedicles for carrying the eyes. The mantle is deeply divided on the right side, and the water, which passes by means of the holes in the shell, can, through this slit, penetrate into the branchial cavity; along its edges again are also three or four filaments, which the animal can also cause to come out through these holes. The mouth is a short proboscis.

The *Haliotides* are marine and littoral in their habits. Covered with their buckler-like shield, and destitute of an operculum, they adhere by their foot to the surface of the rocks, where they creep about, feeding on herbage, which, according to Lamarck, they seek for, during fine summer nights, along the margin of the shore.

Excepting in the colder latitudes, the genus *Haliotis* is distributed through all seas; the largest, however, are natives of the hotter regions. Of these some are nearly as large as a plate, and are absolutely dazzling from the splendid iridescence of their nacre. One species, the *Haliotis tuberculata*, is common on the coasts of southern Europe, and is found in tolerable abundance on the coasts of Guernsey and Jersey, where it is used as food. Empty shells are occasionally washed up on the southern shores of our island.

Genus *Padollus*, Montfort.—This genus, says Cuvier, has the shell nearly circular, almost all the holes obliterated, and a profound furrow which follows the middle of the whorls, and is marked externally by a salient crest.

Genus *Stomatia*, Lamarck.—In this genus the shell is more hollow and with a more salient spire than in *Haliotis*; it is, moreover, destitute of perforations; in other respects it resembles that of *Haliotis*, being a link between it and certain groups of *Turbo*. The animal is far less ornamented than is that of *Haliotis*. Example, *Haliotis imperforata*.

HALISPONGIA. According to the structure and composition of the numerous species of sponges, they may be divided into genera. If, in accordance with the observations of Dr. R. Grant, we consider sponges in three groups, one having a horny tubular structure, another containing calcareous spiculae, a third containing silicious spiculae, we may adopt the three generic types, *Spongia*, *Calcispongia*, and *Halispurgia* of De Blainville.

Halispurgia is thus characterized:—Mass more or less rigid or friable, of irregular figure, porous, traversed by winding canals, which end in openings scattered over the surface; substance subcartilaginous, supported by simple silicious spiculae.

The species exhibit various external forms, incrusting, branching, or foliaceous. Dr. Fleming includes them under the title *Halichondria*.

HALL. [JAXT.]

HALL, the principal apartment of the castles and mansions of the middle ages. After the Saxon invasion of Britain, and even after the Norman conquest, the palaces and principal dwelling-houses consisted of only two rooms, the hall and the sleeping apartment. For centuries succeeding, the hall continued to be the chief room, and was generally well built and grandly decorated. The roofs, especially, were very carefully and elegantly constructed. Westminster Hall, formerly the hall of the king's palace, built by William II., and restored by Richard II., is the finest remaining example in England, being 300 feet long and 100 feet broad. At many other ancient castles and palaces the feudal hall may still be seen. The passage leading from the front door to the other rooms on the same floor, and to the staircase, in modern houses, is called the hall.

HALL MARK. The 'Hall Mark,' so called because it is impressed at the Goldsmith's Hall, is the stamp guaranteeing the degree of fineness of gold or silver. It consists of punch-marks, struck upon some conspicuous part of the article, containing respectively the initials of the maker, the head of the reigning sovereign, the lion passant, the leopard's head, and a letter to denote the year in which the plate was assayed and marked. The last is a relic of a clumsy and truly mediæval mode of declaring the date. Twenty letters, from A to U (J being excluded), complete a cycle of as many years; which ended, the same letters, but of a different type, commence a fresh cycle. By referring to the list of these letters—obtainable at the hall—the date of any piece of plate can be ascertained as far back as 1696. But the custom dates from the year 1336, and in his late work on the subject Mr. Chaffers, F.S.A., has completed the list of assay letters, by comparison with actual examples, as far back as the beginning of Elizabeth's series in 1558-59.

In London the assay year commences on the 30th May, and the date marks are continued regularly with twenty letters of the alphabet, using in succession Roman capitals, Roman smalls, and old English capitals.

The series of London date marks, commencing May 30, 1796, are as follow:—

A to U from 30th May, 1796, to 29th May, 1816.
a to u from 30th May, 1816, to 29th May, 1836.
A to A from 30th May, 1836, to 29th May, 1856.
A to U from 30th May, 1856, to 29th May, 1876.

The assay of gold and silver in England originated with the bishop of Salisbury, who was treasurer to Henry I. The first act, however, that regulated the standard was in the reign of Henry III., in 1238; and the privilege of assay was granted to the Goldsmith's Company by Edward I., in the year 1300. The leopard's head, with which all are so familiar in the English hall marks, was introduced by this charter. It is the device of the Goldsmith's Company. In 1336 the mark of the actual manufacturer was introduced, and also the assayer's mark, or variable letter, showing the year of the assay, previously alluded to. The lion passant, or 'Her Majesty's Lion,' is first mentioned in the company's records in 1597, but was not referred to in any statute till 1675.

Until the year 1798 no gold was allowed to be hall-marked if of a lower standard than twenty-two carats, *i.e.*, twenty-two parts of pure gold to two of alloy; then that of eighteen (or one quarter alloy) was permitted, as being a quality best adapted for watch-cases, chains, and jewellery designed for hard wear. 'But,' says Mr. C. W. King, in his recent work on 'Precious Stones and Precious Metals,' 'a few years ago a bill, inspired by the Birmingham interest, was smuggled through Parliament, the collective wisdom of the three kingdoms not being able to espy its true object, that of legalizing the grossest fraud. By this bill it was allowed to hall-mark gold of fifteen, of twelve, and even as base as nine carats—mere *aurichalcum* or *billon*. This concession, so unaccountably granted, has fully answered the ends of its promoters; articles of this vile alloy, strongly gilt, are sold under the time-honoured prestige of the hall mark. Few purchasers are aware of the change in the law; the carats are marked, it is true, but the minute numerals are unobserved or purposely obscured.'

Gold is impressed with all the above-named marks, excepting the lion passant, which is omitted, and in lieu thereof (on the superior standards), a crown and the figures 22 or 18 are stamped, to denote the quality. On the lower standards, no crown, but merely the figures 15, 12, or 9, and a corresponding decimal number, to indicate the quality.

The standard for silver in England (both coin and plate) from the Norman times till recently was very high, only 18 dwts. of alloy being allowed to the pound Troy, or less than one-twelfth. Under William III. this standard was for a few years raised from 11 oz. 2 dwts. to 11 oz. 10 dwts. of fine silver in the pound Troy, for plate alone. Plate of this quality is marked with a figure of Britannia, and a lion's head raised in line of the leopard's head, and the lion passant. 'But,' again says Mr. King, 'to the disgrace of our times, the bill above-mentioned also legalized a similar imposition on the buyer in the quality of silver plate, disguised by the proviso "for exportation."'

Although the larger part of English plate is stamped in London, some other towns, such as Exeter, Birmingham, Chester, Sheffield, and Newcastle, have like privileges. There are also assay offices at Dublin, Edinburgh, and Glasgow. Exeter commenced in 1701, with a cycle of twenty-four letters, and the distinguishing mark of a castle. The Birmingham cycles, containing the full twenty-six letters of the

alphabet, began in 1773, with the distinguishing mark of an anchor; for Chester, the city arms, *viz.*, three garbs; for Sheffield, a crown; and for Newcastle, the town arms, *viz.*, three towers. Scotch plate may have an earlier date. The first cycle of the Edinburgh assay office commenced under Charles II., in 1681. The distinguishing standard stamp of this office is a thistle, while Glasgow has a lion rampant. The hall mark of Edinburgh is a castle; that of Glasgow, the inartistic combination of a tree, a fish, and a bell. The Dublin assay-letters, twenty-five in number, began in the year 1646. The distinguishing stamp is a harp crowned.

As to foreign hall marks, no works have as yet been published on the subject. The great continental centres of works in the precious metals during the sixteenth and seventeenth centuries were Augsburg and Nuremberg. The first city used the stamp of a pine-apple, and Nuremberg that of a capital N; but no date-stamps seem to have been employed. The goldsmiths of Amsterdam, on the other hand, seem to have used date-letters in conjunction with the town mark (a shield containing three crosses in saltire) and the maker's mark. The marks of the French goldsmiths are more systematic, but they have not been fully investigated. A formidable list of nearly 200 French communities of goldsmiths, existing previously to 1786, and each using a proper emblem, has been compiled by MM. Lacroix and Seré in their '*L'Histoire de l'Orfèverie*.' The first ordinance that compelled the French goldsmiths to stamp their works seems to have been one of Philippe le Hardi in 1275.

The best works of reference on hall marks are 'Hall Marks on Gold and Silver Plate, with Tables of Annual Date-Letters,' &c., London, 1865; 'Precious Stones and Precious Metals' by C. W. King, London, 1865; and 'Assay-Marks' in No. 34 of the *Archæological Journal*.

HALL-MOTE, a term among the Anglo-Saxons which signified a convention of citizens in the general hall where they were in the habit of assembling. It was sometimes called *folk-mote*. At other times the name was applied to the manorial court of the lord, where disputes between the tenants were settled, as in the courts-baron of the Norman era.

HALL, BASIL, Captain, R.N., was born at Edinburgh in the year 1788. His father was Sir J. Hall, Bart. Basil Hall entered the Royal Navy in 1802; in 1808 received his first commission as lieutenant; in 1814 was promoted to the rank of commander; and in 1817 he was made a post-captain. In 1813, when acting-commander of the *Theban* on the East India station, he accompanied Sir Samuel Hood in a journey over the greater part of the island of Java. Soon after his return to England, he was appointed to the command of the *Lyra*, a small gun-brig, in which he accompanied the expedition which took out Lord Amherst as ambassador to China. While the ambassador was pursuing his journey inland to Peking, Captain Hall in the *Lyra* visited the places of greatest interest in the adjacent seas, and on his return to England in 1817 he published '*A Voyage of Discovery to the Western Coast of Corea, and the Great Loo Choo Island in the Japan Sea*.' Captain Hall was next employed on the South American station in command of the *Conway*. The period

was one of great interest to the Spanish colonies of South America.

Having returned to England early in 1823, Captain Hall published 'Extracts from a Journal written on the coasts of Chili, Peru, and Mexico, in the years 1820, 1821, and 1822.' In 1825 he married Margaret, youngest daughter of the late Sir John Hunter, Consul-general for Spain; and in April, 1827, he and his wife and child sailed for the United States, where they remained above a year, during which he travelled nearly nine thousand miles by land and water conveyances. In 1829 he published his 'Travels in North America,' 3 vols. 8vo. He next published 'Fragments of Voyages and Travels.' They form three series, each of three volumes, 12mo. In 1834 he met at Rome with a sister of Mrs. Dugald Stewart, who had married Count Purgstall, an Austrian nobleman. He accepted an invitation to visit the countess, and his book 'Schloss Heinfeld, or a Winter in Lower Styria,' was the result of his notes during his residence there. Captain Hall's last work was published at the end of the year 1841, in three volumes, under the title of 'Patchwork.' It consists of detached papers.

Captain Hall was a fellow of the Royal Societies of London and Edinburgh, and a member of the Astronomical Society of London. Having been unfortunately seized with mental alienation, he was placed in the Royal Hospital, Haslar, Portsmouth, where he died on the 11th of September, 1844.

HALL, ROBERT, was born May 2, 1764, at Arnsby, in Leicestershire. He lost his mother in 1776, and it appears to have been after this that he was sent to board at a Baptist school in Northampton, kept by the Rev. Dr. John Ryland, from which he went to the Bristol Academy, with the view of becoming a Baptist clergyman. In the autumn of 1781 he was selected by the authorities of the Bristol Academy to be sent to King's College, Aberdeen, which place he did not finally leave till May, 1785; but he had already, during the preceding summer, officiated as one of the regular pastors of the Baptist congregation at Broadmead, Bristol, in association with Dr. Caleb Evans; and in August, 1785, he was also appointed classical tutor in the Bristol Academy. His father died in 1791, and the same year a difference with Dr. Evans led to his removing from Bristol, and accepting an invitation to become pastor of the Baptist congregation at Cambridge.

He had already acquired considerable celebrity as a preacher, but it was not till now that he appeared as an author. His first publication (unless we are to reckon some anonymous contributions to a Bristol newspaper in 1786-87) was a pamphlet entitled 'Christianity consistent with a Love of Freedom, being an Answer to a Sermon by the Rev. John Clayton,' 8vo., 1791. In 1793 he published another liberal pamphlet, entitled 'An Apology for the Freedom of the Press, and for general Liberty, with Remarks on Bishop Horsley's Sermon preached 31st January, 1793.' The impression that had been made upon him, however, by the irreligious character of the French revolutionary movement was indicated in his next publication, 'Modern Infidelity considered with respect to its Influence on Society, a Sermon,' 8vo., 1800. It was the publication of this able

and eloquent sermon which first brought Hall into general notice.

In November, 1804, Hall was visited by an attack of insanity, from which he did not entirely recover for some years. His state of health made it necessary for him to resign his charge at Cambridge; but, apparently about 1807, he became minister of the Baptist chapel in Harvey Lane, Leicester, and this situation he held for nearly twenty years. He married in March, 1808. At last, in 1826, he removed to the pastoral care of his old congregation at Broadmead, Bristol; and here he remained till his death, which took place at Bristol, 21st February, 1831.

Besides occasional contributions to various dissenting periodical publications, Hall published various tracts and sermons in the last twenty years of his life, which, along with those already mentioned, have since his death been collected and reprinted in 6 vols. 8vo., London, 1831-32.

HALLAM, HENRY, an eminent historian and critic, was born in 1777, at Windsor, and educated at Eton and Christ Church, Oxford. He studied the law for some time, and became a bencher of the inner temple. His political creed was that of liberalism, but he never actively engaged in politics; co-operating, however, and that heartily, in the movement for the abolition of the slave-trade. He was one of the earliest contributors to the *Edinburgh Review*. In 1818 was published his first elaborate work, the 'View of Europe during the Middle Ages.' In 1827, the 'Constitutional History of England from the Accession of Henry VII. to the Death of George II.' was published. This work has become a standard authority, and is a text-book at the universities. In 1838 appeared the 'Introduction to the Literature of the fifteenth, sixteenth, and seventeenth centuries.' All these works have passed through numerous editions, and been translated into the languages of the leading European nations. Mr. Hallam was a fellow of the Royal Society, a member of the Society of Antiquaries, and a trustee of the British Museum. He married a daughter of Sir Abraham Elton; and of a numerous family only two sons and two daughters survived the period of adolescence. Both the sons and one daughter were prematurely cut off; the elder, Arthur Henry, who died in 1833, was the intimate friend of Alfred Tennyson, the poet, and is the subject of 'In Memoriam.' Mrs. Hallam, her eldest daughter, and remaining son died soon after. 'Bowed but not broken by these sorrows, Mr. Hallam preserved his vigorous faculties to the last, and closed his long and honoured life in calm Christian peace,' on the 22nd of January, 1859.

HALLAR, or HALLAWAR, a district of India, in the province of Gujerat. It is inclosed by the Arabian Sea, the Gulf of Cutch, &c. The surface is varied, and the soil is light, yielding wheat, millet, maize, and cotton. The district is well watered. There are manufactures of cotton fabrics, and dye-works. The area is given at 4960 square miles; and the population at 358,560.

HALLE, a town in the district of Merseburg and province of Prussian Saxony, stands on the Saale, 53 miles S. by E. from Magdeburg, and 19½ N.W. from Leipzig, by the railway that unites those two cities. Population (1861), civil, 41,507; military, 1469. It

is celebrated chiefly for its salt-springs and salt-works, and as the seat of a university. It consists of three towns—Halle itself with five suburbs, and Glaucha, and Neumarkt, which have magistrates of their own. The university was founded in 1694, and united in 1815 with that of Wittenberg. It possesses a valuable library, museum, anatomical theatre, chemical laboratory, botanic garden, and observatory. Outside the walls is a monument to the Germans who fell in the battle of Leipzig. The university buildings, the churches of St. Mary, St. Ulrich, and St. Maurice, the cathedral, the Red Tower in the market-place, and the town-hall, are the most remarkable structures. The ancient castle of Moritzburg was reduced to a ruinous condition in the Thirty Years' War, and only a wing now remains. Halle possesses many educational and charitable institutions; foremost amongst which is the Francke Institution, embracing an orphan house and schools. The town is distinguished by the activity of its printing-presses, and is rapidly becoming an important railway centre. Its name is derived from *Hall*, an old word for 'salt,' in consequence of the numerous brine springs of the place and neighbourhood, from which a large quantity (from 225,000 to 300,000 cwt.) of salt is made annually, by a peculiar class of workmen, called the 'Hallores.' The town is the birthplace of Handel and Michaelis, and many eminent names are associated with its University.

HALLE. [BRABANTE, SOUTH.]

HALLEIN. [SALZBURG.]

HALLELUJAH, properly *Hallelu-yah*, *Halleluia*, or *Alleluia*, a Hebrew compound word, which means 'praise ye Yah or Yehovah,' was used by the Jews in songs of praise and in solemn thanksgivings to God. It was retained in the Greek and Latin liturgies in the original Hebrew; but in the prayer-book of the Church of England, its English equivalent, 'Praise ye the Lord,' is used.

HALLER, ALBERT VON, was born at Berne, October 16, 1708, of an ancient and respectable family. His father, Nicholas Emmanuel von Haller, was an advocate. In his early life Haller was feeble and delicate. His father had intended him for the church, but, his own inclination leading him to the study of physic, he went in 1723 to the University of Tübingen. Being but little satisfied with his progress here, he resorted in 1725 to Leyden, where the zeal and talent of the professors afforded him an opportunity of pursuing his studies in a manner more accordant with his wishes. At this university Boerhaave was then in the height of his fame, attended by 120 pupils, whose instruction was his greatest delight; and Albinus was delivering the lectures on anatomy and surgery. At the end of 1726 he offered himself for his doctor's degree, and delivered his thesis '*De Ductu Salivali Coschwiziano*,' which he showed to be merely a blood-vessel. In 1727 he visited London, where he became acquainted with Sir Hans Sloane and Cheselden; thence he went to Oxford, and thence to Paris, whence, having pursued his anatomical and surgical studies for some time under Winslow and Le Dran, he went to Basel to study mathematics under Bernoulli, and then returned to his native country, and began to practise as a physician. In 1735 he was appointed physician to the hospital at Berne, and soon after princi-

pal librarian to the large public collection of books and medals; but these offices he did not hold long, for in the following year he was offered the professorship of medicine, anatomy, botany, and surgery, at Göttingen, by George II., which after some hesitation he accepted. Having declined practising, he devoted himself to the duties of his office with the greatest zeal, and especially exerted himself to increase the facilities for the study of anatomy. During eighteen years that he retained this appointment, while fully discharging all his laborious duties, he was a constant contributor to the different scientific Transactions. In 1747 he published the first edition of his '*Primæ Linæ Physiologiæ*,' which he had that year used as the ground-work of his lectures, having previously employed the '*Institutiones*' of Boerhaave. In 1751 the Royal Society of Göttingen was established, and Haller, at whose house the first meeting took place, was appointed perpetual president. To their Transactions, of which the first volume appeared shortly after under the title of '*Commentarii Societatis Regiæ Scientiarum Göttingensis*,' he was a constant contributor, even after 1753, when, in consequence of the delicate state of his health, being obliged to leave Göttingen, he retired to Berne. Here he resided during the rest of his life, constantly occupied in the publication of his most important and voluminous works, in the cultivation of the science of his profession and of general literature, and in the active and honourable discharge of various duties in the service of the republic, in which he at all times strenuously advocated the cause of the aristocracy. He died in October, 1777, in the enjoyment of the highest reputation, both as a citizen, a scholar, and a philosopher, his literary labours ceasing only with his life.

Haller was fortunate in receiving the high honours which he deserved during his lifetime. In 1739 he was appointed physician to the king of England. In 1743 he was elected a fellow of the Royal Society of London, and at different times subsequently of all the scientific societies of Europe. When George II. visited Göttingen in 1748, he was ennobled by the emperor: he was invited by Frederick the Great to settle in Berlin, with a handsome salary, to which no duties were attached, and was offered a professorship at Oxford and at Utrecht. He enjoyed throughout his life the friendship and esteem of the most eminent of his contemporaries throughout Europe.

Some idea of the extent of the works of Haller may be formed from the fact that the titles of nearly two hundred treatises published by him from 1727 to 1777 are given by Senebier in his '*Eloge*' of Haller, and that this list does not profess to be complete. He is unanimously received as the father of modern physiology, whose history commences with his writings. He was the first to investigate independently the laws of the animal economy, which had before been studied only in connection with the prevailing mechanical and chemical or metaphysical theories of the day. Commencing with a sound knowledge of anatomy and of the structure of the organs in the dead body, he sought experimentally and systematically to discover the laws which governed their actions during life, proceeding from the most simple to the most complex phenomena. Excluding all the metaphysical explanations which Van Helmont

and Stahl had invented, and all those deduced from mechanics and chemistry which were not clearly sufficient for the phenomena ascribed to them, he sought for powers peculiar to the living body, which he believed must govern the actions which he found occurring only in it. These he thought might be restricted to two—sensibility and irritability; the former seated in the brain and nerves, the latter in muscular fibre. But it was soon shown that the restriction of the vital powers to the two, as defined by Haller, was much too exclusive, for that there were many parts which, though they gave no evidence of possessing either of them, were not the less alive, while others to which Haller refused these properties gave sufficient demonstration of possessing them when excited by other and appropriate stimuli. Hence first originated the discovery of the fact that for the action of each organ a peculiar stimulus is required, and that each tissue has, what Bichat, who illustrated it most completely, called a *vie propre*.

HALLER, JOHANN, a German sculptor, was born at Innsbruck in 1792. He studied in the academy of Munich, and in his third year obtained the prize for a statue of Theseus raising the rock to discover the sandal of his father. He executed many works in Munich for the king of Bavaria; the principal of which are the models of the sculptures for the pediment of the Glyptothek, representing Pallas Ergane ('Εργάνη, the 'worker'), from a design by Wagner; the six colossal statues of the niches in the front of the same building; and the Caryatides of the royal box of the great theatre at Munich; besides a basso-relievo in the interior of the Glyptothek after a design by Cornelius, representing the Fall of the Giants; and many busts of eminent men, some of a colossal size. He executed the bust of William III. of England for the Walhalla. He died in 1826, aged only thirty-three. He studied some time at Rome.

HALLEY, EDMUND, was born October 29, 1656, at Haggerston, near London, at a country-house belonging to his father, who was a soap-boiler in London. He was educated at St. Paul's School, under the care of Dr. Gale, and was placed at Queen's College, Oxford, in 1673, being then possessed of much erudition for his age, and a strong turn for observation, as appears by his having discovered for himself before he left school the alteration in the variation of the magnetic needle. At the university, being well supplied with instruments by his father, he began to apply himself to astronomy, and before he reached the age of twenty he had given (in the 'Phil. Trans.') a memoir on the problem of Kepler, had invented a method of constructing the phases of a solar eclipse, and had made many observations, particularly of Jupiter and Saturn. Finding, however, that nothing could be done in planetary astronomy without more correct tables of the stars, and relying upon Flamsteed and Hevelius for the amelioration of the northern catalogues, he determined, with his father's consent and assistance, to appropriate to himself the task of forming a catalogue of the southern hemisphere. Furnished with a recommendation from Charles II. to the East India Company, he set sail for St. Helena in November, 1676, and remained there two years. His 'Catalogus Stellarum Australium,' published in 1679, was the

result of this voyage, and contains, besides the positions of 350 stars, some other points of interest, particularly an observation of the transit of Mercury over the sun's disc, and a hint that such observations might be employed to determine the sun's parallax (afterwards so successfully carried into effect with the planet Venus). He also notices the increased curvature of the moon's orbit when in quadratures, which was afterwards explained by Newton. In his voyage out he had observed the fact that the oscillations of a pendulum increase in duration as the instrument approaches the equator.

On his return from St. Helena, the king granted him a mandamus to the University of Oxford for the degree of Master of Arts, and he was elected a fellow of the Royal Society. This body sent him to Danzig in 1679 to judge of the observations of Hevelius, who maintained the superior accuracy of instruments with simple sights in opposition to Hook, who advocated the use of the telescope. Halley was a man of rapid movements: in November, 1678, he returned from St. Helena; in May, 1679, he set out for Danzig, having in the interval published his catalogue, and procured his Oxford degree, and admission to the Royal Society. He returned from Danzig in July, and remained at home till the end of 1680, at which time he set out on a continental tour, accompanied by his schoolfellow Mr. Nelson, since well known as the author of a work on the Feasts and Fasts. In December, being on the road to Paris, he saw the celebrated comet of 1680 in its return from perihelion, being the first who perceived it since it was lost in the preceding month. This body he observed with Cassini at Paris, and the observations thus made are remarkable as forming part of the foundation upon which Newton, in the 'Principia,' verified his deduction of a comet's orbit from the theory of gravitation. He returned to England at the end of 1681, and in 1682 married the daughter of Mr. Tooke, auditor of the Exchequer, with whom he lived fifty-five years. He resided at Islington till 1696, and in 1683 published his theory of the variation of the magnet, followed by other papers in subsequent years, containing ingenious speculations, now forgotten. His astronomical occupations during this period consisted chiefly of lunar observations and comparisons. He was strongly of opinion that the moon would, when sufficiently known, furnish the means of finding the longitude, and at this period it seems that he had formed the idea of observing that body through a whole revolution of the nodes.

Among other objects of speculation, he had considered the law of attraction, which he imagined must be as the inverse square of the distance. Having applied in vain to Hook and Wren for assistance in the mathematical part of the problem, he heard of Newton, and paid him a visit at Cambridge. Finding all he wanted among the papers of his new friend, he never rested until he had persuaded Newton to publish the 'Principia,' of which he superintended the printing, and supplied the well-known copy of Latin verses which stand at the beginning. In 1691 he was a candidate for the Savilian professorship, which he lost, according to Whiston, on account of his avowed disbelief of the Bible.

In 1698 King William, who had heard of his

magnetic theory, gave him the commission of captain in the navy, with the command of a small vessel, and instructions to observe the variation of the magnet, and the longitude and latitude of places in the American settlements, and to attempt the discovery of land south of the Western Ocean. He set out in November, but was compelled to return by the insubordination of his first lieutenant. Having tried this officer by a court-martial, he set out again in September, with the same ship and another, observed in many parts of the Atlantic as far as the ice would permit, touched at the Canaries, Madeira, Cape de Verd Islands, St. Helena, Brazil, Barbadoes, and returned, September, 1700, without having lost a man by sickness during the whole voyage. He published in 1701 a chart of the variation of the magnet in all seas of the known world, and immediately afterwards sailed to survey the coasts of the Channel, of which he also published a chart. He was then twice successively ordered to the coast of the Adriatic, to assist in the formation and repairs of harbours in the emperor's dominions, and returned to England in November, 1703, just in time to succeed Dr. Wallis, who had died a few weeks before, in the Savilian chair of geometry at Oxford.

If Halley was active and energetic, he was no less universal. The captain-professor found an unfinished translation by Dr. Bernard of a tract of Apollonius, and, though he did not understand Arabic, undertook to complete the work. We must also mention the splendid edition of the whole of Apollonius, published in 1710.

The 'Miscellanea Curiosa,' a collection of pieces, mostly from the 'Philosophical Transactions,' many of them by himself, was superintended by him, and published in 1708.

From the manner in which his name is mixed up with the affair of Flamsteed, he must have resided in town for some years previous to 1713. [FLAMSTEED.] In the article cited we have called Flamsteed's work the *Principia* of practical astronomy; and it were to be wished that the connection of Halley with the printing of this one had been as creditable as that which links his name with the '*Principia*' of Newton. It is difficult to say to what extent Halley was involved in originating any of the unworthy proceedings to which we allude; and we must protest against his being made a scapegoat for Newton, in which position even Flamsteed seemed inclined to place him, as well as several more recent writers on the controversy. Neither the position nor the character of Halley renders it likely that he would prefer making a tool of Newton to any direct mode of aggression. The committee appointed by Prince George of Denmark must bear the blame of all the formal proceedings; and in that committee the name of Halley is not found, though it is on the list of those who published the '*Commercium Epistolicum*,' a position which we cannot defend.

At the beginning of 1720, after the death of Flamsteed, Halley was appointed astronomer-royal. [GREENWICH OBSERVATORY.] He died January 14, 1741-42, in the eighty-sixth year of his age.

Among the Englishmen of his day Halley stands second only to Newton, and probably for many years after the publication of the '*Principia*' he was the only one who could and would rightly appreciate

the character and coming utility of that memorable work.

In astronomy we owe to Halley—1. The discovery and the detection of the amount of what is called the *long inequality* of Jupiter and Saturn, which he confidently expected would be shown to be a consequence of the law of gravitation, as was afterwards done. 2. The detection, by comparison of ancient and modern observations of eclipses, of the slow acceleration of the moon's mean motion. 3. The first prediction of the return of a comet. [HALLEY'S COMET.] 4. The explanation of the appearance of Venus in the daytime at particular seasons, arising out of the now well-known method of estimating the brilliancy of the planet. 5. The recommendation to observe the transit of Venus for the determination of the sun's parallax.

The following list of the most remarkable labours of Halley out of astronomy, arranged in the order of publication, will instruct the reader to what articles to look for further information:—1. On the variation of the compass. 2. The law according to which the mercury falls in the barometer while the instrument ascends, being the first application of this instrument to the measurement of heights. 3. Theory of the trade-winds. 4. Construction of equations of the third and fourth degree. 5. Estimation of the quantity of vapour raised from the sea. 6. Inquiry into the point at which Julius Cæsar made his entry into Britain. 7. Tables of mortality, from observations made at Breslau, the first of the kind constructed. 8. Application of algebra to the problem of lenses. 9. Method of constructing logarithms, a celebrated paper, reprinted in Sherwin's '*Logarithms*.' 10. Improvements in the diving-bell. Those papers only have been cited which refer to points on which Halley's name is inseparably connected with the history of the progress of science.

HALLEY'S COMET, the first of the comets which was proved to be a constituent part of the solar system, and to revolve regularly round the sun, deriving its name from HALLEY, the astronomer, who first discovered that it had made several revolutions within the era of correct astronomical observation, and predicted the year of its return.

The '*Astronomiæ Cometice Synopsis*' of Halley was published in the '*Philosophical Transactions*' for 1705, and in several other forms. This work was a consequence of the '*Principia*' of Newton, in which the method of applying Kepler's laws to the computation of the parabolic orbit of comets, the idea of the possibility of a periodic comet, and even an implied assertion that such things would be discovered, is to be found. Halley, acting upon this hint, collected the observations of all such comets as had been observed with any degree of accuracy up to the year 1700.

On looking over the list, it needed only a glance to see that three of these comets (in 1531, 1607, and 1682) exhibited very nearly the same orbit, and that the intervals of the appearances were very nearly the same.

The interval between the perihelion passages of the first and second comet is fifteen months longer than that between the second and third, which might have puzzled a person not acquainted with the '*Principia*.' But the disturbing action of the planets,

which has since been so successfully computed that the motion of this body is now much better known than was that of the moon in the time of Halley, immediately suggested itself. He announced, accordingly, the return of the comet about the year 1758.

In the latest edition of the 'Synopsis' Halley examined the elements of the comet's orbit further, and repeated his prediction still more confidently, desiring that all would remember that its author was an Englishman.

The prediction of Halley caused various astronomers to compute orbits of the coming comet, but none of these took into account the perturbations caused by the planets. In 1757 Clairaut and Lalande undertook the enormous labour of computing the effect of the perturbations of the principal planets through a period of 150 years. Assisted by Madame Lepaute, wife of a well-known watchmaker of that name, Lalande performed the drudgery of the process, while Clairaut, the first who extended Newton's application of his theory, applied the results. The consequence was, that in November, 1758, when the comet was already expected, the announcement was made that it would arrive at its perihelion within a month, one way or the other, of April 13, 1759. The announcement of Clairaut was just in time, for on December 25, 1758, George Palitzsch, a farmer and amateur astronomer in the neighbourhood of Dresden, detected the comet. It was afterwards repeatedly observed in various parts of Europe, but it is not on record that any one saw it with the naked eye, nor was its position at all favourable for that purpose. Various orbits were computed, but no one seemed inclined to undertake the task of applying the corrections for perturbation, so as to predict the perihelion place for 1835. The comet slept in peace therefore until the improvement of methods of computing the perturbations, and the approach of a new appearance.

The comet was first seen at Rome on the 5th of August, 1835, at the observatory of the Roman college. From that time it continued to be observed till the end of the year in Europe, and through a great part of the ensuing spring in the southern hemisphere. During a part of the time it was distinctly visible to the naked eye. The number of good observations which were procured greatly exceeded, as might be supposed, those made on any previous occasion.

HALLUIN. [NORD.]

HALO is a circular band of faintly coloured light which is occasionally seen surrounding the disc of the sun or moon at a distance from it equal to 22 or 23 degrees. The colours of the solar halo are such as are observed in the rainbow, but they are less bright, and they do not always, in the halo, follow the same order as in the bow. The lunar halo in general appears to be white, but it is at times tinted with pale green or red. Often about either luminary the halo is double, consisting of two concentric circular bands, the exterior one being broader than the other.

When a mist or a thin cloud is between the sun or moon and a spectator, there is frequently observed an ill-defined circle of coloured light immediately surrounding the disc of the luminary; this is called a corona; it sometimes appears when a halo is also

seen, but it is more commonly observed without such accompaniment. It is supposed to be produced by the refractions of light in the globules of water which are suspended in the atmosphere between the spectator and the luminary.

It may be observed, in this place, that images of the sun have been occasionally seen as if by reflection from some cloud, the sun being near the horizon: these are called anthelia; and they are supposed to be produced by the reflections of light in prisms of ice having their axes in vertical positions.

Halos are frequently accompanied by a horizontal ring or band of whitish light passing through the sun or moon; and at times a similar band appears in the direction of a diameter perpendicular to the horizon. At the intersections of these bands with the halo are sometimes seen images of the sun or moon, which are ill defined and less bright than the true disc of the celestial body; these, when the halo is formed about the sun, are called parhelia; and, when about the moon, paraselenæ. Occasionally, also, segments of circles or branches of curves of contrary flexure, proceed from these images of the sun or moon so as to assume the appearance of wings or tails.

Many remarkable phenomena of this kind have at various times been observed: in the 'History of England,' by Matthew Paris, there is a description of a halo with four false suns, which is stated to have been seen in the year 1233, on the borders of Herefordshire and Worcestershire. In 1586 Rothman observed at Cassel, soon after sunrise, a false sun above, and one below the true sun, all being in one vertical line; and in 1661 Hevelius at Danzig observed a double halo accompanied by three false suns, and by several segmental bands of light, two of which had false suns at their places of intersection. In the last mentioned year Hevelius also observed a halo, with two paraselenæ and a double corona encircling the body of the moon; and a very remarkable halo was seen by Sir Henry Englefield at Richmond, in 1802. ('Journal of the Royal Institution,' vol. ii.) Besides these, many such phenomena have been observed in Europe, in the United States, and in Canada; and Captain Parry observed and measured several during his voyages to the arctic regions. One of these was a great double halo with a horizontal circle of light, at the intersections of which with the interior halo were parhelia; and there were segments of circles both at the upper extremities of the two halos and at the lower extremities of the exterior one, the latter being incomplete. Above the sun, and between the two halos, was a small portion of a third halo, which appeared to be elliptical; and the space between the two segments was extremely brilliant, in consequence of strong reflections of the sun's rays from the snow which floated in the atmosphere.

In the tropical regions coloured halos are frequent and brilliant; and, near the equator, Humboldt has observed small ones surrounding the planet Venus.

The explanation which has been given of the halo by Mariotte and Dr. Young is nearly as follows:—Between the spectator and the sun innumerable crystals of snow or ice, having nearly the form of equilateral prisms, may exist in the air, in all possible positions: of these vast numbers many have their transverse sections in planes nearly passing through the sun and spectator; and it will follow, after two

refractions at the edges, that the deviation of the refracted from the incident ray, at the eye of the observer, is about equal to the semi-diameter of the halo. This taking place in all planes so passing, a circle of refracted light is seen. Mr. Cavendish suggests that the exterior halo may be produced by the two refractions which a ray would undergo in passing through a face and one end of a prism, that is, through two surfaces which are at right angles to one another.

Plates of ice disposed so as to reflect the sun's light in a vertical plane may be the cause of the column which is sometimes seen to form a vertical diameter of a halo; and the blending of the reflected rays with the rays refracted from the sides of the prisms, at the places where the horizontal and vertical bands of light intersect the halo, is, apparently, the cause of the parhelia which are very generally observed in those parts of the halo. When the transverse sections of the refracting prisms deviate from a plane passing through the observer, towards the right or left, the axes being horizontal, there will be produced a curvilinear band of light, like a wing, inclining upwards on either side of a parheliion.

A beautiful optical instrument called a *haloscope* has been invented in France for the exhibition of all the phenomena connected with halos, such as the corona, anthelia, parhelia, &c. It consists of prisms, sheets of plate-glass, and mirrors, mounted on an axis, and having a rotatory motion; and differently arranged to show the various circles.

(See Plate 'Halos' for illustrations of numerous forms of halos, parhelia, and other kindred meteorological phenomena.)

HALONIA, a genus of fossil plants, allied to *Lepidodendron*, and occurring in the coal formation.

HALORAGÆE, a small group of exogenous plants, many of which inhabit watery places, and all of which have minute inconspicuous flowers. They are often considered to form a peculiar section of *Onagraceæ*, or, if separated from that order, are at least stationed in the immediate vicinity of it. Upon this supposition, they are looked upon as an imperfect condition of the onagraceous type.

HALS, FRANCIS, an eminent portrait-painter, born at Mechlin, 1584; died in 1666. He devoted himself almost exclusively to portrait-painting, and in that department no artist of his time was superior to him except Vandyck, and very few could be compared with him.

HALSTED. [ESSEX.]

HALYS. [KIZIL ERMAK.]

HALYSITES, the name given by Fischer to a genus of fossil corals, synonymous with *Catenipora* of Goldfuss.

HAM, EAST and WEST. [ESSEX.]

HAM. [SOMME.]

HAMADAN. [ECBATANA.]

HAMADRYADES (Gr. *ama*, 'together,' and *drus*, 'an oak'), a name frequently mentioned by the Greek and Roman poets, and applied to certain woodland deities who were presumed to be the divinities presiding over woods and forests, or even over particular trees with which they were co-existent.

HAMAMELA'CEÆ, or HAMAMELI'DEÆ, a very small group of woody exogenous plants. There are only three genera in the gardens of this country,

Hamamelis, *Trichocladus*, *Fothergilla*. Some of the species are large forest trees, affording good timber, but nothing is known of any other useful property in the order.

HAMBURG, a large city in Germany, the most important centre of commerce in that country, is situated in 53° 32' 51" N. lat., 9° 58' 37" E. long., 184 miles by railway N.W. from Berlin, and about 70 miles from the mouth of the Elbe. Its origin is attributed to Charlemagne. The founder chose for its site the most elevated spot on the north bank of the Elbe and the east bank of the Alster, about 75 miles from the German Ocean. It was several times destroyed by the neighbouring barbarians, yet it always recovered, and had attained considerable commercial importance at the beginning of the twelfth century. In the thirteenth century it concurred in the formation of the Hanseatic League. [HANSEATIC LEAGUE.] By degrees it extended widely on both sides of the Alster. Its rights as an estate of the empire were long contested by the Danish kings; and it was not until 1618 that they were recognized. It did not, however, obtain a seat or vote in the Diet of the German empire till 1770. From 1802 till 1815 Hamburg was scarcely free for a year from French domination and exaction, and it suffered most severely. In 1815 it joined the German Confederation as a free Hanseatic city. For all its severe sufferings, including the robbery of the bank, a very inadequate indemnity was obtained from France at the peace; but the public spirit of the inhabitants, its internal resources, and its favourable situation, have gradually restored it to more than its former prosperity.

The territory of Hamburg, including the area of the city, is about 148 square miles, bounded on the south by the Elbe, and on the other sides by the Danish territories. It has likewise some islands in the Elbe, some parcels of land on the Hanoverian side of the river, and the bailiwick of Ritzebüttel at the mouth of the Elbe, in which is the harbour of Cuxhaven. Conjointly with Lübeck it has the bailiwick of Bergedorf, and the districts called Vierländen, 16 miles from Hamburg. The population of the territory in 1861 was 229,941; of the city, with the suburbs, 178,000, of whom 10,000 were Jews—the latter being amongst the wealthiest and most energetic members of the community. The majority of the inhabitants are Lutherans.

The present constitution of Hamburg was published on the 28th of September, 1860, and came in force on the 1st of January, 1861. According to the terms of this fundamental law, the Government—*Staatsgewalt*—is intrusted, in common, to two chambers of representatives—the Senate, and the Bürgerschaft, or House of Burgesses. The Senate, which exercises chiefly, but not entirely, the executive power, is composed of eighteen members, one-half of which number must have studied jurisprudence, while seven of the remaining nine must belong to the class of merchants. The members of the Senate are elected for life by the House of Burgesses; but a senator is at liberty to retire at the end of six years. A first and second burgomaster, chosen annually in secret ballot, presides over the meetings of the Senate. No burgomaster can be in office longer than two years, and no member of the Senate is

allowed to hold any public office whatever. The House of Burgesses consists of 192 members, eighty-four of whom are elected in secret ballot by the votes of all tax-paying citizens. Of the remaining 108 members, forty-eight are chosen, also by ballot, by the owners of house property in the city valued at 3000 marks, or 187*l.*, over and above the amount for which they are taxed; while the other sixty members are deputed by various guilds, corporations, and courts of justice. All the members of the House of Burgesses are chosen for six years, in such a manner that every three years new elections take place for one-half the number. The House of Burgesses is represented, in permanence, by a Bürger-Ausschuss, or committee of the house, consisting of twenty deputies, of which no more than five are allowed to be members of the legal profession. It is the special duty of the committee to watch the proceedings of the Senate, and the general execution of the articles of the constitution, including the laws voted by the House of Burgesses. In all matters of legislation, except taxation, the Senate has a veto; and in case of a constitutional conflict, recourse is had to an assembly of arbitrators, chosen in equal parts from the Senate and the House of Burgesses.

The annual revenue and expenditure of the city is each about 620,000*l.* The public debt is about 3,500,000*l.* A considerable part of this sum was incurred after the great fire in 1842, and spent in rebuilding the city on a new and improved plan. The whole damage caused by the conflagration—which laid more than 5000 buildings in ashes—was estimated at the time at 90,000,000 thalers, or nearly 36,000,000*l.* sterling.

The troops in the service of the state are divided into two classes, namely, the standing army and the Bürgermilitär, or militia of burgesses. The first-named, which is formed by enlistment for periods of six years, consists of two battalions of infantry, numbering 1686 men; one company of Jägers, of 120 men; a detachment of pioneers, of about fifty; and two companies of dragoons, of 336 men. These form the sum total of troops which Hamburg has to contribute to the army of the Confederation. The militia of burgesses amounts to more than 10,000 men, divided into nine battalions of infantry, one battalion of Jägers, two troops of cavalry, and three companies of artillery. Every citizen, not exempt on account of bad health, is liable to service, from the twenty-first to the fortieth year.

Hamburg is divided into the old and new town; but since the great fire in 1842, when fully one-fourth of the city was destroyed, including most of its public buildings, it has been greatly altered in appearance; and the present city is remarkable for its fine, open, well-lighted, and well-drained streets, and its spacious and lofty houses. The arm of the Elbe, next the town, is narrow, but the two harbours are capable of receiving a considerable number of ships. The old town is so intersected with canals as to resemble a Dutch city; the canals are filled chiefly by the Elbe, but partly by the Alster, and almost all the warehouses are close to them. The Alster forms on the north side of the town a fine basin, on the south side of which is the finest line of houses in the city, with a spacious walk, the Jungfernstieg, planted with trees. This favourite prome-

nade has been continued along the west side of the basin, so as to join the ramparts, the whole of which are beautifully laid out as a public garden and promenade all round the city. North of this Inner Alster is the Outer Alster, a very large basin, on the banks of which are numerous fine country seats. The place of worship most worthy of notice is the great Church of St. Michael, begun in 1751, and completed in 1762, except the spire, which was not erected till 1778. This church, built by Sonnin, is the pride of Hamburg; it is capable of accommodating 2000 persons: the height of the steeple is said to be 423½ feet. The other churches are not remarkable. The exchange—the most commodious in Europe—the bank, the observatory, and the theatres, are among the chief public buildings. The charitable and scholastic institutions are numerous, and on a most liberal scale. The former include an infirmary for between 4000 and 5000 patients; an hospital, for the support of 142 aged persons; and a large orphan school, for the improvement of depraved and abandoned children. There are two educational institutions supported by the state, designed to qualify young men for the University, and a gymnasium. There is also a fine botanical garden. Hamburg has been the birthplace of many learned men, and the chosen residence of many others. Its numerous literary institutions, its private collections of paintings, the general taste for music, the fondness for the study of foreign languages, prove that the whole attention of the inhabitants is not absorbed by thirst of gain. The principal public library, called the City Library, contains nearly 200,000 volumes, besides 5000 volumes of MSS.

Hamburg is essentially a commercial city, its port being the main channel of communication between North Germany and foreign countries. At high tide vessels can come up the Elbe and unload in the harbours; while by means of the various canals (crossed by eighty-four bridges), lighters can carry the cargoes into the very heart of the city. Hamburg ranks as the greatest emporium of trade on the Continent, and, next to London, has the largest money-exchange transactions in Europe. It is also one of the principal ports for transatlantic emigration, and the centre of a very extensive business in marine insurances.

The number of ships (sailing vessels and steamers) which arrived at the port of Hamburg from all parts of the world in 1864, was 5012—their total burthen being 465,509 commercial lasts. (A last is equal to 6000 lbs.) The number of vessels which left the port in the same year was 5006, of 463,074 lasts burthen. Of the entries, no less than 2247 were from Great Britain—about half, however, being colliers. But in order to form a complete view of the foreign trade of the 'Free City,' it will be necessary to add to the number of ships arrived at Hamburg those which came to the neighbouring ports of Altona and Harburg. It has already been stated that the Hamburg ships in 1864 amounted to 5012, of the total burthen of 465,909 commercial lasts of 6000 lbs. The number of those which discharged at Altona in the same year was 1316, burthen 58,066 Danish lasts, of 5200 lbs.; the number which discharged at Harburg was 890, burthen 39,722 lasts, of 4000 lbs. The total number of sea-

going ships which arrived in the Elbe in the year was, therefore, 7218; and their total burthen, reduced to commercial lasts, was 542,747 lasts, or 1,628,241 tons, English measure.

The number of sea-going ships registered as belonging to the port of Hamburg in 1865, was 530; and their total burthen, 79,380 commercial lasts, including twenty-one steamers of the burthen of 6252 commercial lasts, and with 3725 horse-power. The Hamburg-American Steam-Packet Company has six large screw steamers running regularly between Hamburg and New York, and continues to carry on its business with great success. The ships registered at Altona amounted at the close of 1864 to fifty-seven in number, their total burthen being 7069 Danish lasts.

The imports in 1864 were valued at about 55,000,000*l.*, chiefly from Great Britain, Germany (by land carriage, railway, and the river), America, France, and the West Indies.

The amount of the exports cannot be ascertained, inasmuch as no official account of them has been kept since 1856, when the export duty was abolished.

The official statement of British trade and navigation does not furnish a separate account for Hamburg; but enables us to give the imports and exports into and from the Hanse Towns, viz.—Hamburg, Bremen, and Lubeck. About five-sixths belong to Hamburg.

The total value of the exports from the Hanse Towns to the United Kingdom in 1863 amounted to 6,946,234*l.* There has been little variation for some years. The following table shows the principal articles, with their values:—

Animals—oxen and bulls, ...	12,862 number	£209,683
" sheep, ...	165,828 "	220,642
Bacon, ...	104,531 cwts.	284,300
Butter, ...	160,167 "	800,978
Cheese, ...	32,805 "	85,116
Corn—wheat, ...	73,013 qrs.	159,414
" barley, ...	171,361 "	255,400
" wheatmeal and flour, ...	306,217 cwts.	229,773
Cotton manufactures, ...	—	103,709
Hops, ...	41,962 "	199,539
Pork, salted, ...	39,998 "	95,554
Seed, clover, ...	66,990 "	176,758
Spelter or zinc, ...	10,601 tons.	197,295
Wool—sheep and lambs', ...	8,542,774 lbs.	747,493
Woolen rags, torn up for use as wool, ...	6,543,936 "	119,836
Woolen yarn, ...	1,744,556 "	412,334

Minor articles sent to the English market comprise arms, beads of glass, beef, bones, books, china-ware, fruit, glass-ware, hair, hides, lard, musical instruments, paper, plumbago, rags, skins, spirits, and toys. A considerable quantity of cheap and often fictitious 'wine' and brandy is exported from Hamburg to this country; and in many cases the Commissioners of customs have recently refused to allow such to be passed as wine, and ordered it to be rated at what it has been really proved to be, 'mixed spirits.' Most of the plain spirit used to fortify wine in bond is also exported to England from Hamburg.

The imports from Great Britain into Hamburg, Bremen, and Lübeck, in 1863, amounted to the enormous sum of 17,132,717*l.*, an increase of four millions as compared with 1860. The produce and manufactures of the United Kingdom comprised in the total

amount were valued at 10,806,092*l.*, and consisted of an endless variety of goods, of which the following are the chief articles:—

Apparel and haberdashery, ...	—	£173,782
Coal, ...	539,059 tons.	216,566
Copper, wrought and unwrought, ...	34,373 cwts.	149,785
Cotton-yarn, ...	10,943,058 lbs.	1,104,680
Cotton manufactures, ...	36,426,127 yards	918,140
Hardware, cutlery, ...	48,091 cwts.	259,860
Iron manufactures, ...	62,845 "	430,497
Linen yarn, ...	6,425,651 lbs.	483,346
" manufactures, ...	9,268,587 yards	357,800
Machinery, ...	—	267,107
Silk manufactures, ...	—	153,941
Woolen yarn, ...	20,010,597 lbs.	2,968,822
Woolen manufactures, ...	26,559,424 yards	1,520,578

The foreign and colonial produce and manufactures imported from England were valued at 6,326,625*l.*, a few of the more prominent articles being as follows:—

Coffee, ...	2,392,802 lbs.	£89,838
Cotton, ...	419,102 cwts.	3,844,526
Hides, ...	107,192 "	358,434
Indigo, ...	10,159 "	285,383
Silk, raw, ...	104,313 lbs.	106,052
Tea, ...	1,922,266 "	150,177
Wool, sheeps', ...	2,196,140 "	150,601

Among the manufacturing establishments within the Hamburg territory, sugar refineries, breweries, and distilleries take the lead. There are also cotton mills and a number of manufactories of cement, chemicals and dye-stuffs, machinery, hats, soap, walking-sticks, &c., also copper-smelting works, printing offices, and other smaller branches of industry. Beef and pork are cured largely for exportation; and the fabrication of imitation wine, chiefly port, sherry, and champagne, for the London market, continues to be carried on very extensively.

An important change took effect in 1865 in the system under which trades are allowed to be exercised within the republic of Hamburg. The guilds, to which all tradesmen and artisans were personally required to belong, and exclusive privileges formerly enjoyed by certain trading corporations, were abolished; and all trades, or industrial occupations, may now be freely exercised, not only by Hamburg citizens, but by foreigners, not subjects of the republic, who shall have obtained from the police permission to reside, and upon payment of moderate fees. Some exceptions are made in the case of advocates, medical men, brokers, &c., who are still governed by special regulations. The Jews have been declared entitled from the same date to equal rights of citizenship, and on equal conditions, with the Christian inhabitants of the republic.

These important alterations can hardly fail in the course of a few years to augment the population of the city and its suburbs in a much higher ratio than that in which it has hitherto increased. How far it may be found possible to repress the growth of pauperism, as the result of these new measures, remains to be seen. It is thought that great vigilance will be required on the part of the police authorities to prevent the settlement within the republic of mendicants and others having no visible means of subsistence.

Hamburg communicates with Lübeck by a canal

and railway, and with Berlin, Brunswick, Altona, Keil, Hanover, &c., by railway.

(Wappan's *Handbuch der Geogr. und Statist.*; *Almanach de Gotha*, 1866; *Statesman's Year-book*, 1866; and *Consular reports from Hamburg*.)

HAMELN. [CALEMBERG.]

HAMILCAR, BARCAS, the leader of the popular party at Carthage, was appointed in the eighteenth year of the first Punic War (B.C. 247) to the command of the Carthaginian forces. He ravaged with his fleet the coasts of the Bruttii and the Epizephyrian Locrians, and afterwards seized upon a strong fortress in Sicily, between Eryx and Panormus. In this place he maintained himself for some years. He frequently ravaged the southern coasts of Italy as far as Cumæ, and defeated the Roman troops in Sicily. The Romans at length fitted out a fleet to cut off all communication between Hamilcar and Carthage; the Carthaginian fleet sent to his assistance was defeated by the Roman consul, Lutatius Catulus (B.C. 241), and the Carthaginians sued for peace, which was granted by the Romans; and Hamilcar led his troops to Lilybæum, whence they were conveyed to Africa. But a new danger awaited Carthage. The Carthaginian treasury was exhausted; and it was proposed to the troops that they should relinquish a part of the pay which was due to them. The soldiers rejected the proposal, and proceeded to enforce their demands. Being joined by many of the native tribes of Africa, they defeated Hanno, the Carthaginian general sent against them, and brought Carthage to the brink of ruin. Hamilcar, being appointed to the command, succeeded in subduing them after the war had lasted above three years.

Hamilcar was sent into Spain (B.C. 238), where he remained nearly nine years, during which time he extended the dominion of Carthage over the southern and eastern parts of that country. He fell in a battle against the natives, B.C. 229.

Hamilcar was succeeded in his command in Spain by his son-in-law Hasdrubal, who must not be confounded with Hasdrubal, the brother of Hannibal. He carried on the conquests of Hamilcar, and reduced almost the whole of the country south of the Ibrus (Ebro), which river was fixed by a treaty between the Carthaginians and the Romans, B.C. 226, as the frontier of the Carthaginian dominions. Hasdrubal was murdered in his tent by a Gaul, B.C. 221. (Polybius, b. i. ii.; Appian; Nepos.)

HAMILTON, a city of Upper Canada, at the west end of Lake Ontario, 38 miles by rail from Toronto. It is one of the most prosperous and beautiful cities of the colony, mainly owing to its situation on Burlington Bay, and on the Grand Trunk and United States Railway. It is the station for steamers from Montreal, and is the seat of extensive commerce. Population in 1863, 20,000. In 1841 the number was only about 3500, and in 1851, 10,312. The principal manufacturing establishments are locomotive works, foundries, and car works. The town is in the very centre of the finest grain-producing country in America.

HAMILTON. [LANARKSHIRE.]

HAMILTON, A. [GRAMMONT.]

HAMILTON, GAVIN, descended from a noble family of Scotland, spent the greater part of his life

at Rome. Though not perhaps gifted with eminent genius for invention as an artist, yet a liberal education and refined taste enabled him at least to equal his most distinguished contemporaries. This is manifest in several subjects which he painted from the 'Iliad.' He made excavations in many parts of the Roman territory, especially at Tivoli, in Hadrian's villa. In the Museo Clementino, the statues, busts, and bas-reliefs contributed by him form the most important portion, next to the treasures of the Belvedere; and many great collections in Russia, Germany, and England are indebted to him for their chief ornaments. The 'Townley Gallery,' published under the superintendence of the Society for the Diffusion of Useful Knowledge, contains a list of the marbles procured by him for the collection of Mr. Townley. Neither the date of his birth nor death is certainly known; he died, however, between 1790 and 1800.

HAMILTON, SIR WILLIAM, Bart., Ph.D., and Professor of Logic in the University of Edinburgh, was born in Glasgow in 1788. He was for some time a student of the university of that city, and afterwards went to Oxford, where he obtained the first-class honours. In 1813 he was called to the bar; but his studies were more directed to literature and philosophy than law; and in 1821 he was appointed professor of universal history in the University of Edinburgh. In 1836 he obtained the chair of logic and metaphysics; and under his powerful ægis those subjects assumed an importance which, from the days of Dugald Stewart, Scotland may be said to have lost. While pursuing the inductive methods of Reid and Stewart, he enunciated the philosophy of the Absolute as one great step made in advance of his predecessors of the Scottish school of metaphysics. In 1852 Sir William published a volume of essays (chiefly consisting of articles previously published in the *Edinburgh Review*), entitled 'Discussions in Philosophy, Literature, Education, and University Reform.' In 1854 he brought out the first volume of the collected works of Dugald Stewart, to which he had devoted many years' close attention; but death arrested his career before its completion. He died in 1856. 'By the death of Sir William Hamilton, Scotland has lost one of the most illustrious of her sons. His attainments in general erudition were of the highest order; at once so varied and minute as rarely to be equalled, and in these times certainly unsurpassed. His writings and academic teaching have inaugurated a new era in the history of Scottish speculation.'

HAMILTON, SIR WILLIAM, a well-known diplomatist and lover of art, was born in Scotland in 1730. He began life, he says, 'with an ancient name and 1000*l.*,' but removed the discrepancy between his name and his fortunes by marrying in 1755 a lady of very large property. It is said that he was foster-brother to George III., which may account for his appointment in 1764 to be English ambassador at Naples, whence he was not recalled till 1800. He was made a Knight of the Bath in 1771, and a privy-councillor in 1791. He died, much impoverished, in England, April 6, 1803.

His great work, the 'Campi Phlegrei,' Naples, 1776-77, 2 vols. folio, is a noble monument of his researches into volcanic phenomena. Ten papers by

him, upon matters observed during his abode in Italy, are printed in the 'Phil. Trans.' for the years 1767 to 1795 inclusive. His other works are, 'Observations on Mount Vesuvius, Mount Etna,' &c., London, 1772; and 'Lettera sul Monte Vulture,' Naples, 1780.

HAMILTON, WILLIAM, of Scottish descent, but probably born in London, studied at a very early age under Zucchi, the painter of ornaments, at Rome. After his return he soon obtained general employment. He was engaged in all the public works, such as the Shakspeare Gallery, Macklin's Bible, &c. He excelled in ornament, to which he gave propriety, richness, and a classic appearance. He died in 1801, at the age of fifty.

HAMILTON, ELIZABETH, born at Belfast in Ireland, but probably of Scottish parentage, filled the office of governess to the daughters of a Scottish nobleman, for the eldest of whom her 'Letters on the Formation of the Religious and Moral Principle' were written. She died July 25, 1816.

The following are her chief works:—'Letters of a Hindoo Rajah,' 1796; 'Modern Philosophers,' 1800; 'Letters on the Elementary Principles of Education,' 1801–2; 'Life of Agrippina,' 1804; 'Letters on the Formation of the Religious and Moral Principle,' 1806; 'Cottagers of Glenburnie,' 1808; 'Exercises in Religious Knowledge,' 1809; 'Popular Essays,' 1813. Of these the 'Letters on Education' is the most sterling and important.

HAMILTON, DAVID, a Scottish architect, to whom Glasgow is indebted for its chief modern edifice (the Exchange) and some other buildings, was born in that city, May 11, 1768. Of his professional education and earlier studies little is known.

Hamilton entered into the competition for the New Houses of Parliament, on which occasion one of the four 500*l.* premiums was awarded to him for his designs. He died at Glasgow, December 5, 1843, in his seventy-sixth year.

HAMITES, a genus of cephalopodous Mollusca. It includes only fossil species, and is yet incompletely understood. According to the original views of Mr. Sowerby, only those chambered shells belong to *Hamites* which have the form of a hook or siphon bent in one plane with parallel but unequal limbs, and sinuous septa. But the specimens having these characters appear always imperfect; and when Professor Phillips found in Yorkshire many fossils, in other respects perfectly resembling *Hamites* described by Mr. Sowerby, rolled in a plane spiral, the volutions in some species touching, in others free, and in a few terminating in a straight elongation (like spirula), he extended the use of the term.

Hamites of the typical forms occur at Folkestone, Hamsey, and other situations in the gault, greensand, and other cretaceous beds. Crioceratites and Tropæum belong chiefly to the same groups of rocks in England, France, Switzerland, &c.

HAMMER POWER. For many purposes hammers are required of greater weight than a man can wield, and a great variety of steam and power hammers have come into use. As illustrations of the power-hammer we may mention Froming's forge-hammer, which is applicable to heavy castings, and also to the hammering of edge-tools, files, and knives. It may be set to work either by hand, water, or steam

power. There is a driving shaft which, when once made to rotate by any source of power, effects all the rest, through the medium of a heavy hammer-head, guide-rod, cones, and a vertical spring. The rapidity and the force of the blows can be varied. Cotton's air tilt-hammer, worked by any source of power through the intervention of a shaft, fly-wheel, fast and loose pulleys, and cones, is provided with an air cylinder to regulate the force and rapidity of the blow; there is a piston-rod in the cylinder, with a piston at the top and the hammer at the bottom, and the admission of air into the cylinder is so regulated as to give complete command over the action of the hammer. There are many other kinds, but all inferior to the steam hammer specially so called.

[STEAM HAMMER.]

HAMMERFEST. [NORWAY.]

HAMMERSMITH. [MIDDLESEX.]

HAMMOCK. In various parts of South America it is the custom of the natives to fasten the two ends of a piece of coarse cloth, or net, to the branches of trees, into which they then climb and lie suspended at their ease. This is called a *hamac*. Maritime nations have adopted the custom for the sailors' beds on shipboard. A sailor's hammock is a piece of linen-cloth, or canvas, about six feet long and three wide, with cords attached to each end, and hung on hooks under the deck. They are placed in rows about two feet apart, and are taken down every morning and stowed away. Each hammock contains a mattress and blankets, and forms the most comfortable form of bed during a voyage.

HAMMOND, HENRY, a learned divine of the Church of England, was born at Chertsey, in Surrey, August 18, 1605. Having been educated at Eton and Magdalen College, Oxford, of which he became fellow, he was presented to the rectory of Penshurst in Kent in 1633, ten years after which he was appointed archdeacon of Chichester. He was appointed canon of Christ Church and public orator in 1645, and attended Charles I. as his chaplain from the time when he fell into the hands of the army until the end of 1647. He then returned to Oxford, and was chosen sub-dean of Christ Church, from which situation he was expelled, in March, 1648, by the parliamentary visitors, and placed for some time in confinement. He died, after long suffering from a complication of disorders, April 25, 1660. Of his numerous works, chiefly controversial, the following are some of the most remarkable: 'Practical Catechism,' 1644; 'Humble Address to the Right Hon. the Lord Fairfax and his Council of War,' 1649, concerning the impending trial of Charles I.; 'Paraphrase and Annotations on the New Testament,' 1653, best edition, 1702. He began a similar paraphrase of the Old Testament, but advanced no farther than the Psalms, 1659, and one chapter of Proverbs. His works were collected by his amanuensis Fulman, 4 vols. folio, 1674–84.

HAMMOND, JAMES, was the second son of Anthony Hammond, Esq., of Somersham Place, in Huntingdonshire. He was born in 1710, and educated at Westminster; he sat in Parliament for Truro, on the interest of the prince of Wales, whose equerry he was. He died in 1742.

His verses are mostly elegiac, and addressed in the rapid style of pastoral sentiment, then in fashion, to

a fictitious object whom he names Delia. He is said to have been in love with a Miss Dashwood, who refused him, and to have lost his intellect in consequence.

HAMOAZE. [PLYMOUTH.]

HAMPDEN, JOHN, the eldest son of William Hampden, of Hampden, in Buckinghamshire, and Elizabeth, daughter of Sir Henry Cromwell, and aunt of the Protector, was born in London in 1594. He was educated at a grammar-school at Thame, afterwards at Magdalen College, Oxford, and in 1613 was admitted a student in the Inner Temple. In 1619 he married Elizabeth, only daughter of Edmund Symeon.

In the first Short Parliament to which he was elected (for the borough of Grampound) Hampden took no very forward part in the business of the house. At the close of Charles I.'s second Parliament, the king required a general loan; to this Hampden resolutely refused to contribute, denying the king's right to demand it. In consequence he was imprisoned, but was afterwards, with seventy-six others, liberated by an order of council. His resistance to the imposition of ship-money (1636) induced many to follow his example. Proceedings were instituted against him. The case was argued in the Exchequer Chamber (1637) during twelve days before all the twelve judges, who, two excepted, gave a decision in favour of the Crown.

For an account of Hampden's conduct generally in the Long Parliament we must refer to Lord Nugent's 'Memorials of Hampden,' to Clarendon, Whitelock, and the general histories. At the commencement of the civil war he raised and commanded a troop, with which he joined the parliamentary army. His counsel was for vigorous and resolute attack; he considered that Essex, the parliamentary general, should have acted more on the offensive. In an engagement with Prince Rupert upon Chalgrove Field, June 18, 1643, Hampden placed himself at the head of the attack, but in the first charge received his death-wound.

HAMPSHIRE, a county of England, lying between 50° 34' and 51° 22' N. lat., and 0° 43' and 1° 54' W. long. It includes the Isle of Wight. [WIGHT, ISLE OF.] Hampshire is bounded N. by Berkshire, E. by Surrey and Sussex, S. by the English Channel, and W. by Wiltshire and Dorsetshire. The length of the mainland portion of the county from N. to S. varies from 37 to 46 miles; the breadth from 28 to 41 miles. The area of the county, including the isle, is 1625 square miles, or 1,070,216 acres. The population in 1861 was 481,815.

Surface, Geology, &c.—The coast is low towards the east, where there is a wide bay or inlet, divided by Hayling Island and Portsea Island into three parts; Chichester Harbour on the east, Langston Harbour in the middle, and Portsmouth Harbour on the west. The coast from Portsmouth Harbour to Southampton, up the Southampton Water, is mostly flat; as is also the further portion, westward, which forms Christchurch Bay.

The surface of this county is rather irregular. The South Downs enter it from Sussex on the south-east, near Petersfield, and cross it in a north-west direction into Wiltshire. The North Downs enter the county from Surrey, near Farnham, and extend

across by Odiham, Basingstoke, and Kingsclere, into Wiltshire. The Alton Hills form a connection on the east side of the county between the South and North Downs, and run from Petersfield northwards past Alton. Portsdown is an isolated eminence, extending east and west just above Portsmouth and Langston harbours; its height is about 447 feet; its length 7 miles, and its breadth 1 mile.

A large part of Hampshire is within the basin of the Southampton Water. The principal streams which drain the Southampton basin are the Avon, or Test, the Itchin, and the Hamble. One branch of the Test rises near Hurstbourne Tarrant, and another near Whitechurch; their united stream flows by Stockbridge and Romsey to Southampton. The Itchin rises in the hills around Alresford, and flows past Winchester to Southampton. The Hamble rises near Bishop's Waltham, and joins the Southampton Water some miles below Southampton. The Beaulieu River and the Boldre Water flow through the New Forest. None of these are above 35 miles long. The Wey, the Aubourne, and the Loddon flow into the Thames basin; the Rother into the Arun basin; and the Avon and Stour flow into the Wilts and Dorset basin.

The Basingstoke canal is in the N.E., and the county is intersected by the London and South-Western Railway, with several branches, and the South Coast Railway terminating at Portsmouth.

That vast district of chalk which overspreads so large a portion of Wiltshire, and of which Salisbury Plain forms a part, extends into Hampshire, and occupies a considerable part of it, constituting the North and South Downs, and Portsdown. North of the chalk the strata belong to the London basin; south, to the Isle of Wight basin; east, to the Weald strata; west, to the chalk of Wilts and the plastic clay of Dorset.

The New Forest in this county has varied in area from time to time: at present it includes 64,000 acres, and is the property of the Crown, subject to rights of common and other ancient claims. The Crown has also manorial rights over some, and the absolute property of other, plots of ground included in the former, but not in the present, bounds of the forest. Much of the oak and beech timber for the navy is grown here. Bere forest extends northward from Portsdown Hill, and its bounds comprehend about 16,000 acres, of which one-third is inclosed. Alice Holt and Woolmer Forest contain together about 15,000 acres. Alice Holt contains much valuable timber, but Woolmer Forest, except a few patches of modern plantations, is a barren moor. Besides these forests, there is a waste of about 2000 acres, called Waltham Chase, situated near Bishop's Waltham.

Climate and Agriculture.—The climate of Hampshire is generally mild, and favourable to vegetation.

The northern part of the county consists chiefly of the poor dark sand, mixed with an ochreous loam, which is well known as the Bagshot-Heath soil. It is naturally very unproductive, and till within a few years was almost entirely covered with a brown heath, on which some hardy forest sheep and a few miserable cattle were reared, and contrived to pick up a scanty living; but a good deal of heath has been brought into cultivation. South of this district the chalk prevails, better adapted for pasture than for

corn culture. In the valleys and along the lower slopes of the chalk-hills, the soil is of a tough tenacious nature, being a mixture of stiff clay with chalk washed down the hills by the rains. This is a soil very difficult to cultivate; but it can be made to yield good crops of beans, wheat, and oats.

The land in the New Forest, and on the opposite side of the Southampton Water, is mostly of a light nature, intermixed here and there with heavier loams and clays. It requires careful drainage to make it fertile. The country generally may be said to possess poor soils.

Hampshire, although it is not equal to some eastern and northern counties for agricultural improvements, is not far behind them; and there are some farms as well managed as any in England. The farm-buildings and the agricultural implements have greatly improved of late years.

There are no breeds of cattle, horses, or sheep peculiar to Hampshire, unless we consider the small New Forest ponies in that light. The cows are of various breeds. The oxen are chiefly Sussex and Devon. The horses used in husbandry are mostly bred in other counties. The sheep are the common small forest breed, or heath sheep; the Dorset and Leicester sheep, in the richer meadows; and the South-Down, on the chalky hills. The native hogs, which live on the acorns and beech-mast of the New Forest, although the flavour of their flesh may be good, are coarse, raw-boned, flat-sided animals, and are now seldom met with. The improved breeds produced by crosses of the Berkshire, the Suffolk, Essex, and Chinese pigs, are those from which the Hampshire bacon is usually prepared. The excellence of this bacon is mainly due to the care with which the curing is effected. Hops are cultivated on the eastern border of the county, near Farnham; and large quantities of cider are made.

Manufactures and Trade.—The manufactures of Hampshire, except those connected with the dock-yard and shipping establishments at Portsmouth, are of little importance. Emsworth, on the border of Sussex, has extensive oyster beds; and Aldershot, on the borders of Surrey, is famous for its military camp, capable of accommodating 20,000 troops. Trade centres chiefly at Southampton and Portsmouth.

Divisions and Towns.—Hampshire is divided into fourteen divisions, comprehending thirty-nine hundreds. It is included in the diocese of Winchester and province of Canterbury. It is in the western circuit. The assizes are held at Winchester. For parliamentary purposes the county is divided into North Hampshire and South Hampshire, each of which returns two members to Parliament, and the Isle of Wight, which returns one; besides which Winchester, Andover, Lymington, Portsmouth, Southampton, and Newport, return two members each; and Christchurch and Petersfield one member each; total, 19 members. Registered electors (1864), Northern Division, 4116; Southern Division, 5424.

The following are the principal towns, with the population of each in 1861:—

Aldershot. [ALDERSHOT.]

Alresford, a market-town, is situated on the river Itchin, 8 miles W.N.W. from Winchester. It was formerly a more important place than it is at present. Population of the parish, 1546.

Alton, a market-town, 18 miles N.W. from Winchester. There are two well-known breweries in the town, and extensive hop plantations in the neighbourhood. The population is 3769.

Andover, a municipal and parliamentary borough, 58 miles from London by the South-Western Railway. The town contains a church, a union workhouse, two almshouses, and meeting-houses for dissenters. The town-hall is a handsome stone building, with a Grecian front. The chief business of the town consists in malting, and in the manufacture of silk and iron. The municipal borough is governed by four aldermen, and twelve councillors. The parliamentary borough returns two members. The population is 5221. Registered electors, 224.

Basing is 2 miles N.E. of Basingstoke, with a population of 1193. In the civil wars of Charles I. the castle was defended for two years against the parliamentary forces, by the fifth marquis of Winchester. It was finally stormed by Cromwell, October 14, 1645, and after yielding rich plunder to the besiegers, was burnt to the ground.

Basingstoke, a municipal borough, is 48 miles from London by the South-Western Railway. It has a considerable trade from its standing at the junction of five important roads. The church is a spacious and handsome building. There are a free school and three charity schools in the town. The malting and corn trades constitute the principal business of the place. Population, 4654. Near Basingstoke is a tract of 108 acres, on which every householder has a right of pasture.

Bishop's Waltham, a market-town, is 9 miles S.S.E. from Winchester. The principal trade of the place is in leather; and there is also some business in malting. There is an endowed free school, and several minor charities. Population, 2267.

Christchurch, a parliamentary borough, is 25 miles S. from Salisbury, and 100 miles from London by the railway. It contains a free grammar-school, a national and Lancastrian schools, and several endowed charities. The rivers Stour and Avon flow into Christchurch Bay. The borough sends one member to Parliament; population, 9368. Population of the parish, 7042. Registered electors, 413. The phenomenon of a double tide every twelve hours occurs in Christchurch Bay. The town has manufactures of watch springs and hosiery, and a salmon fishery.

Fareham is 10 miles N.W. from Portsmouth. Some small vessels are built here, and cordage, sack-ing, and coarse pottery are made. A considerable trade in corn and coal is carried on. Population of the parish, 6197.

Fordingbridge is situated on the N.W. bank of the Avon, 10 miles S. from Salisbury. There are some manufactures of sail-cloth and bed-ticking. Population, 2925.

Gosport is a fortified sea-port town, in the parish of Alverstoke, and separated from Portsmouth by the mouth of the harbour, across which a floating bridge connects the two towns. It is the terminus of a branch of the London and South-Western Railway, 66 miles from London. The inhabitants within the lighting district of Gosport numbered 7789 at the census of 1861. Most of these are engaged in the Government navy works, or in retail trade and

the supply of shipping. The ramparts form a section of the fortified barrier, inclosing Portsmouth, Portsea, and Gosport. There are extensive barracks, the Royal Clarence Victualling Yard, a powder magazine, iron foundries, and a county house of correction. Outside of the town on the south is Haslar hospital, an infirmary for seamen. The place is governed by the county magistrates, and is a polling town for the southern division of the county of Hants.

The population of the parish of Alverstoke, with Gosport, is 22,653.

Havant is situated near the head of Langston Harbour, 7 miles N.E. from Portsmouth. It has little trade. Some of the inhabitants are engaged in fishing and fowling. Population, 2470.

Kingsclere is a small town of mean appearance, 8 miles W.N.W. from Basingstoke. There is some trade in malt carried on. Population of the parish, which includes several tithings, 2774.

Lymington is a parliamentary borough, situated in the New Forest, of which it is regarded as a kind of capital, and where the Forest courts are held. Population, 4098. Population of the parliamentary borough, which returns two members, 5179. The number of registered electors in 1864 was 328. The town is situate on a steep declivity, has many houses for the accommodation of sea-bathers, a church subordinate to the parish of Boldre, a town-hall, theatre, baths, and custom-house, shipbuilding yards, and salt-works. The harbour admits vessels of 600 tons, but has little trade. Steamers ply to Portsmouth and the Isle of Wight.

Odiham is 7 miles W. from Basingstoke. The church is a large ancient brick building. Population, 2833. The town has remains of a royal palace and park, and the ruins of a castle in which David I., king of Scotland, was confined for eleven years, after his capture at Neville's Cross.

Portsmouth. [PORTSMOUTH.]

Ringwood is an ancient town, situated in the New Forest, on the eastern bank of the Avon, 16 miles S.W. from Romsey. Population, 3751.

Romsey is situated on the eastern bank of the Test, 8 miles N.N.W. of Southampton, with which it is connected by a branch of the London and South-Western Railway. It is a municipal borough, governed by four aldermen and twelve councillors. The church is ancient, and formerly belonged to a Benedictine nunnery. It is very large, lofty, and massive, and affords a fine example of Norman architecture. Population of the parish, 5848; of the municipal borough, 2116. Broadlands, the country seat of the venerated Lord Palmerston, is in the vicinity of Romsey. The town is the head of a poor-law union, and is a polling place for the county.

Southampton. [SOUTHAMPTON.]

Stockbridge is on the eastern bank of the Test, 9 miles W.N.W. from Winchester. It formerly returned two members to Parliament, but was disfranchised by the Reform Act. It is a small place, with a population of 935.

Whitchurch is 8 miles E.N.E. from Andover, on the north-west bank of the river Test. It formerly returned two members to Parliament, but was disfranchised by the Reform Act. It is an irregularly built place. Population, 1962.

Winchester. [WINCHESTER.]

History and Antiquities.—Before the Roman invasion, the county was inhabited by three tribes; the Regni (*Ρηγνοι*, Ptol.), who occupied the coast as well as the counties of Sussex and Surrey; the Belgæ (*Βελγαι*, Ptol.), who inhabited the middle portion, and extended into a district of Wiltshire; and the Atrebatæ, or Atrebatii (*Ατρεβατιοι*, Ptol.), who occupied, it is probable, the northern part, on the confines of Berkshire. This part of the island was reduced by the Romans under Vespasian. Winchester was the Roman station *Venta*. There are also remains of Roman stations at Silchester, a village on the border of the county, north of Basingstoke; and at Broughton, not far from Stockbridge. The county appears to have been the scene of contest in the Saxon invasion. Hampshire was included in the kingdom of Wessex, and *Venta* (called Wintanceaster by the Saxons) became the seat of government, and, upon the predominance of the West Saxon kings over the other Saxon potentates, became the metropolis of England. Hampshire was the scene of continual contests during the invasion of the Danes, who ravaged the Isle of Wight in the reign of Ethelred II. In the New Forest occurred several disasters to the family of William the Conqueror. His son Richard lost his life here, by what Camden describes as a 'pestilential blast;' his grandson Henry, son of Robert, was entangled among some branches and killed while hunting; and his successor William was shot there in 1100.

HAMPSHIRE, NEW. [NEW HAMPSHIRE.]

HAMPSTEAD. [MIDDLESEX.]

HAMPTON COURT CONFERENCE. [CONFERENCE.]

HAMPTON COURT PALACE is in the parish of Hampton, and county of Middlesex, fifteen miles from the city of London. It has been the favourite residence of many sovereigns, and is still one of the finest of the royal palaces in England. The river Thames flows under its walls. The original building was erected by Cardinal Wolsey, and many sumptuous entertainments were here given by him. Henry VIII. enlarged it, and stocked the park with deer. Here Edward VI. was born, and his mother, Queen Jane Seymour, died, in 1537. Elizabeth held grand Christmas festivals in 1572 and 1593. Charles I. was imprisoned in this palace, and Cromwell, Charles II., and James II., made it their occasional residence. William III. and his queen also abode here, and in great measure rebuilt it, and laid out the extensive gardens in their present style. Hampton Court Palace consists of three principal quadrangles, with some smaller courts, the eastern and southern fronts having been erected by Sir Christopher Wren. The picture-gallery comprises Lely's Beauties of the Court of Charles II., valuable specimens of Holbein, Kneller, West, Rembrandt, and numerous other celebrated painters—in all, more than 1100 pictures. Many of the ceilings and walls were painted by Verrio. The gardens, the wilderness, and maze, are a great attraction to visitors, as also is the celebrated vine, said to be the largest in Europe, which bears on an average 2500 bunches of grapes annually. These are specially set apart for Her Majesty's table. The palace is now divided into suites of apartments, which are occupied by persons of rank, who have

been reduced in circumstances. [See ARCHITECTURE, Plate 10.]

HAMSTER (*Cricetus*, Cuv.), a genus of burrowing Rodents, thus characterized by its founder. The Hamsters have nearly the same dentition as the rats, but the tail is short and hairy. On each side of their mouth are extensive sacs or cheek-pouches, which they fill with grain in order to transport it to their deep subterranean retreats. Nocturnal. Hibernates during the depth of winter. Example, the common Hamster (*Cricetus vulgaris*).

Description.—Reddish brown above; black below, with three great whitish spots on the sides. Feet white; a white spot on the throat, and another on the breast. Length about 9 inches; tail 3. Males bigger than females. Weight of some males from 12 to 16 ounces; weight of females seldom exceeding from 4 to 6.



Hamster (*Cricetus vulgaris*).

Varieties.—Variations in colour are not uncommon. There is one variety entirely black. Pennant figures one which is entirely black, with the exception of the edge of the ear, the muzzle, the under-jaw, and feet.

Localities.—All the north of Europe and Asia (Lesson), Austria, Silesia, and many parts of Germany, Poland, and the Ukraine; all the southern and temperate parts of Russia and Siberia; and even about the river Yenesei, but not farther to the east. In the Tartarian deserts, in sandy soil; they dislike moist places. Swarming in Gotha (Pennant).

Food, Habits, Reproduction.—The common Hamsters are no friends to the farmer. The quantity of grain which they consume is very great, nor does the destruction stop with mere satiety of appetite. The animal never forgets its hoard, and fills its two cheek-pouches till they seem to be bursting with the booty. In summer they feed upon various kinds of herbage; but they are also carnivorous, attacking and devouring rats, mice, birds, reptiles, &c., and even the weaker individuals of their own species. Their voice is a short growl or bark, but when irritated they utter a yelling cry. Their dwellings are under the earth; their mode of forming them, and the purposes to which they apply them, have been thus described:—They first form an entrance, burrowing down obliquely. At the end of this passage one perpendicular hole is sunk by the male; the female sinks several. At the end of these they excavate various vaults, some as lodges for themselves and young, some as storehouses for their food. Every young one is said to have its separate apartment, and each sort of grain its different vault. The 'living apartments,' as they may be called, are lined with

straw or grass. The vaults are said to be of different depths, according to the age of the constructor; a young Hamster, it is stated, makes them scarcely a foot deep, but an old one sinks to the depth of four or five, and the whole 'curtilage,' so to speak, is sometimes eight or ten feet in diameter. From the mode of proceeding in their work, the reader will be prepared for the statement that the male and female live in separate apartments; and indeed it appears that, excepting at the short season of courtship, they have very little or no intercourse. Pennant gives them a very unamiable character. 'The whole race,' writes that zoologist, 'is so malevolent as to constantly reject all society with one another. If it happens that two males meet in search of a female, a battle ensues; the female makes a short attachment to the conqueror, after which the connection ceases. She brings forth two or three times in a year, and produces from sixteen to eighteen at a birth: their growth is very quick, and at about the age of three weeks the old one forces them out of the burrows to take care of themselves. She shows little affection for them; for, if any one digs into the hole, she attempts to save herself by burrowing deeper into the earth, and totally neglects the safety of her brood; on the contrary, if she is attacked in the season of courtship, she defends the male with the utmost fury.'

Siberia produces several small species of Hamster, which have been described by Pallas.

HANAPER OFFICE, one of the offices belonging to the Court of Chancery. Writs relating to the business of the subject, and their returns, were originally kept in a hamper, *in hanaperio*; and the others, relating to matters wherein the Crown was immediately or mediately concerned, were preserved in a little sack or bag, *in parva baga*; whence the distinction of the Hanaper Office and Petty Bag Office, both of which belong to the Common-Law Court in Chancery.

HANAU-MÜNZENBERG. [HESSE-CASSEL.]

HAND. [SKELETON.]

HAND-GLASS is a name given by gardeners to a portable glazed cover which they place over certain plants for one of two purposes: either to screen them from the effects of cold and wet without depriving them of much light, or to maintain around them an atmosphere of uniform humidity. Bell-glasses differ from hand-glasses in no respect with regard to the purpose they are intended to serve, but are blown from a single piece of glass instead of being composed of many pieces fastened together. Glasses of this description are principally used to assist cuttings of plants in the process of striking root, or newly-planted individuals in establishing themselves in the soil.

HAND-TREE. [CHEIROSTEMON.]

HANDEL, GEORG FRIEDRICH, was born at Halle in Saxony, February 24, 1685 (new style). His father, a physician, destined him for the profession of the civil law, but the child's passion for music frustrated this plan, and led to his being placed under Friedrich Zachau, organist of the cathedral of Halle. He advanced rapidly under this judicious teacher. In his fourteenth year he went to Berlin, where he stayed some time. In 1703, when about nineteen, he went to Hamburg, and shortly afterwards became director of

the Opéra, which involved him in a duel, happily of no serious result, with a jealous rival named Mattheson. He was soon employed to set a drama entitled 'Almeria,' the success of which was remarkable. Next year he produced 'Florinda,' and 'Nerone' in the year following, both of which were as favourably received as his former work. He now found himself possessed of the means of visiting Italy. At Florence he was welcomed in the most flattering manner by the grand-duke, and there, in 1709, produced the opera of 'Rodrigo.' He then proceeded to Venice, and brought out his 'Agrippina,' in which horns and other wind instruments were first used in Italy as accompaniments to the voice. Handel went next to Rome, where he produced 'Il Trionfo del Tempo,' the text of which was written for him by Cardinal Pamfili, and a sacred opera, a kind of mystery, 'La Resurrezione.'

After visiting Naples, Handel returned to Germany in 1710, and accepted the office of maestro di capella to the elector of Hanover, afterwards George I. Having obtained the elector's permission, he came to England, where he composed his opera of 'Rinaldi,' his 'Te Deum,' and 'Jubilate,' his 'Water Music,' his operas of 'Amadis,' 'Teseo,' and 'Il Pastor Fido,' his 'Acis and Galatea,' 'Esther,' and other minor pieces—all before 1720. When the elector became king of England, Handel received numerous testimonials of royal favour.

The busiest but not the most fortunate period of Handel's life now arrived. The English nobility formed a project for converting the Italian theatre into an Academy of Music, and engaged him as manager, with a condition that he should supply a certain number of operas. His first opera was 'Radamisto,' the success of which was unparalleled. But Bononcini and Ariosti, two rival composers, raised a great feud against him, to calm which it was proposed that an opera in three acts should be produced, and that each of the contending composers should set one act. The drama chosen was 'Muzio Scevola,' and Handel's portion was declared the best. Handel, now master of the field, produced about fifteen new operas; but his managerial troubles were so great, that he retired from the theatre in 1726 with the loss of 10,000*l.*, and a constitution much damaged by incessant labour and constant turmoil. He then made an attempt to give operas at Covent Garden Theatre, but this proved equally mortifying and unprofitable. He next commenced giving spiritual concerts, or oratorios, at first with very little success, owing to the exertions of a clique or cabal against him. His 'Messiah' was produced in 1741, and 'Samson' in 1742; and from this time the undoubted excellence of his compositions bore down all opposition. The 'Messiah' was, during a long period, performed annually at the Foundling Hospital, and alone added 10,300*l.* to the funds of that institution. He continued his oratorios to nearly the last day of his life, deriving considerable pecuniary advantage from them.

Late in life Handel was afflicted with blindness. He died April 13, 1759. He was buried in Poet's Corner, Westminster Abbey, where a monument by Roubiliac is erected to his memory. In 1784 a great festival, the 'Commemoration of Handel' (being the centenary of his birthday), was held in the abbey,

when nearly 13,000*l.* were received for five days' performances.

Grand musical festivals, at which Handel's compositions alone were performed, were held in 1785, 1786, 1787, 1791, and 1834. In June, 1857, the first 'Great Handel Festival' was held at the Crystal Palace, when the 'Messiah,' 'Judas Maccabæus,' and 'Israel in Egypt' were performed by 2000 vocalists and 386 instrumentalists, under the supervision of the Sacred Harmonic Society. A large organ was erected specially for the occasion. A Commemoration Festival took place in 1859, with an increased number of performers, and an improved orchestra, which attracted 81,319 visitors during four days. This success led to the establishment of a Triennial Handel Festival to be held in the same place, and on the same plan, as that of 1859. The first was held in June, 1862; and the second in June, 1865, on a scale unequalled in this or any other country. At the latter the performers numbered 4000, including the principal vocalists of the day, conducted by Mr. Costa. Nearly 60,000 persons visited the Crystal Palace during the three days of the Festival and the Rehearsal which preceded it.

Handel was great in every style. In sacred music, especially of the choral kind, he not only throws at an immeasurable distance all who preceded and followed him, but reaches that sublimity which, it is now almost universally admitted, the art is so capable of attaining. The various choral societies of London are, year by year, making Handel's Oratorios more extensively known than at any former period. His works are gradually gaining favour on the Continent and in America.

In the Queen's library are the original MSS. of nearly all Handel's works, filling eighty-two large folio volumes. These include 32 Italian operas, 23 oratorios, 8 volumes of anthems, 4 of cantatas, 3 of Te Deums, and a Jubilate, together with concertos, sonatas, &c. Not in the royal collection are 11 operas, harpsichord lessons, fugues, organ concertos, water-music, &c., &c. Of the oratorios 'Deborah' was first performed in 1733; 'Israel in Egypt' in 1738; 'Saul' in 1740; 'Messiah' in 1741; 'Samson' in 1742; 'Judas Maccabæus' in 1746; 'Joshua' in 1747; 'Solomon' in 1749; and 'Jephthah' in 1751.

HANDBASTING. [BETROTHMENT.]

HANDS, IMPOSITION OF, a ceremony employed in many ancient and modern religious ceremonies, symbolical of the conferring of certain spiritual gifts. The laying on of hands is mentioned in the earliest portions of scripture: the priests laid their hands on the heads of the animals offered in sacrifice; Joshua was consecrated to his sacred office by Moses laying his hands upon his head; and Jesus Christ adopted the same rite when blessing little children. The apostles ordained ministers to their churches by the same ceremony. The early fathers, when speaking of the rite of confirmation, term it 'Imposition of hands.' The usage still remains in the Roman Catholic, Anglican, and Lutheran churches, in the ordination of ministers and confirmation, and in the former ceremony it is retained by the Presbyterians.

HANSEL, is the first act of anything. The word is used popularly to signify a first transaction in trade, the money taken for the first sale, the first

instalment paid on a debt, or the first business done on any day or week. The first Monday in the year is called *Handsel-Monday*, and a gift made on that day, a *handsel*. The word is more commonly used in Scotland than in any other part of the United Kingdom.

HANDWRITING IN LAW. [EVIDENCE.]

HANG-CHEW, a large city of China, situated on the river Yang-tze-kiang, and near the basin of the grand canal. It is the capital of the province of Tche-kiang, and one of the five first-class cities of the empire. It is extremely populous, and the number of inhabitants is supposed to equal the population of Pekin. Not less than 60,000 persons are said to be employed in the manufacture of silk.

HANGING, the principal mode of execution in the United Kingdom since the year 1240. It is only in the cases of treason and murder that capital punishment is now carried out, though in Scotland the crime of rape is also liable. Hanging is considered the most humane way of executing a sentence of death, as it is as nearly instantaneous as possible. In all cases it is done in public; but of late efforts have been made either to abolish capital punishment altogether, or at least to have it carried out privately. In the army and navy, a prisoner under sentence of death is usually shot, but sometimes hanged, which is considered a more disgraceful mode of execution. In Austria, criminals convicted of capital offences are executed as in England, Ireland, Scotland, and the British colonies. In France, convicts are decapitated by the *GUILLOTINE*; in Germany, and nearly all other European states, they are beheaded; and in Spain, garroted.

HANGING GARDENS, a term commonly applied to the celebrated gardens of Babylon, which are frequently mentioned in ancient history, and fully described by Herodotus, Diodorus, and other Greek writers. So magnificent and extensive was their structure, that they have been classed among the seven wonders of the world. It is related that they occupied a square of 400 feet on every side; and the different terraces were carried upwards one above another, until the height equalled that of the walls of the city. This prodigious work was constructed by Nebuchadnezzar for the gratification of his favourite wife Amytis, who was the daughter of a Median king, and wished to have something constructed to imitate the grandeur of her native mountain woods and forests. The whole was sustained by stupendous arches; and the soil laid upon them was sufficiently deep to enable the largest trees to take root therein.

HANGO, the name of a promontory and small town on the coast of the Gulf of Finland, belonging to Russia, and notorious for the treacherous massacre, during the last war, of a party of English who had landed with a flag of truce. It has a harbour and custom-house, and is situated 20 miles E. of Ekna, in lat. 59° 56', and long. 22° 57'. Off this promontory the Swedes were defeated by the Russians in 1714.

HANKOW, one of the treaty ports of China, in lat. 30° 30' N., and long. 114° E., is situated inland, 750 miles up the Yang-tze-kiang river. It is of great extent, in reality consisting of several cities and towns, and has a population of about 400,000. The

town suffered severely from the recent civil war, but is rapidly rising into importance again, and promises to become the most extensive mart in the empire for foreign commerce. A British settlement was made on the eastern side in 1864, and there are now more than fifty foreign business firms, a foreign inspectorship of customs, and English and American consulates. It is the chief mart of the tea districts in the interior, and carries on a large trade with Shanghai; cargoes are also sent direct to England from this port. The total value of the imports and exports in 1864 was between seven and eight millions sterling. The imports comprise shirtings, opium, copper coin, cloths, and articles of foreign manufacture. Among the exports, tea figures for 2,250,000*l.*, the other articles being silk, wood-oil, safflower, tobacco, &c. The total tonnage entered inwards for 1864 was 191,127, and cleared outwards, 204,185 tons. More than half this quantity is due to American ships—the remainder being chiefly English.

HANNAN, a city of China, on the left bank of the Yang-tze-kiang, opposite to Wunchang, 180 miles W. from Nankin. It carries on an immense trade.

HANNIBAL, the son of Hamilcar Barca, was born B.C. 247. At the age of nine he accompanied his father to Spain, who, previous to his departure, made his son swear that he would never be a friend to the Romans. He was at a very early age associated with Hasdrubal, who succeeded his father in the command of the Carthaginian army in that country. On the death of Hasdrubal, B.C. 221, he obtained the undivided command of the army, and quickly conquered many of the Spanish tribes. The inhabitants of Saguntum, alarmed at his success, sent messengers to Rome to inform the Romans of their danger. A Roman embassy was accordingly sent to Hannibal, who was passing the winter at New Carthage, to announce to him that the independence of Saguntum was guaranteed by a treaty between the Carthaginians and Romans (concluded B.C. 226), and that they should consider any injury done to the Saguntines as a declaration of war against themselves. Hannibal paid no regard to this remonstrance.

In B.C. 219 Hannibal took Saguntum, and employed the winter in making preparations for the invasion of Italy, and providing for the security of Africa and Spain. He set out from New Carthage in the spring, B.C. 218, with 80,000 foot and 12,000 horse. Before crossing the Pyrenees he left Hanno to secure his recent conquests with a detachment from his own army of 11,000 men. He sent back the same number of Spanish troops to their own cities, and, with an army now reduced to 50,000 foot and 9000 horse, he advanced to the Rhone. Two Roman armies had been levied; one, commanded by the Consul P. Cornelius Scipio, was intended to oppose Hannibal in Spain, and a second, under the other consul, T. Sempronius, was designed for the invasion of Africa. The departure of Scipio was delayed by a revolt of the Boian and Insubrian Gauls, against whom the army was sent which had been intended for the invasion of Spain, under the command of one of the prætors. Scipio raised a new army, sailed to the Rhone, and anchored in the eastern mouth of the river. But Hannibal had already crossed the Rhone, and Scipio did not arrive at the place where the Carthaginians had passed the river

till three days afterwards. Upon this, he sailed back to Italy with the intention of meeting Hannibal when he should descend from the Alps. Scipio sent his brother Cnæus into Spain, with the greater part of the troops, to oppose Hasdrubal.

Hannibal continued his march up the Rhone till he came to the Isère. Marching along that river, he crossed the Alps (probably by the Little St. Bernard), descended into the valley of the Dora Baltea, and followed the course of the river till he arrived in the territories of the Insubrian Gauls. The passage of Hannibal across the Alps has been a matter of much dispute.

Hannibal completed his march from New Carthage to Italy in five months, during which he lost a great number of men, especially in his passage over the Alps. His army was reduced to 12,000 Africans, 8000 Spaniards, and 6000 cavalry, when he arrived in the territories of the Insubrian Gauls. His first battle was with P. Cornelius Scipio on the right bank of the river Ticinus (Tesino). The Romans were defeated, and Scipio, retreating along the left bank of the Po, crossed the river, and encamped near Placentia. He afterwards entrenched himself strongly on the right bank of the Trebia, where he waited for the arrival of the army under the Consul T. Sempronius, who had been recalled from Africa. After the union of the two armies Sempronius determined, against the advice of Scipio, to risk another battle. The Romans were entirely defeated, and the troops which survived took refuge in the fortified cities. In consequence of these victories, the whole of Cisalpine Gaul (the northern part of Italy) fell into the hands of Hannibal; and the Gauls of North Italy now eagerly assisted him with men and supplies.

In the following year (B.C. 217) the Romans raised two new armies; one was posted at Arretium, under the Consul Flaminius, and the other at Ariminum under the Consul Servilius. In Hannibal's progress through the swamps of the basin of the river Arno, his army suffered much, and he lost the sight of one eye. He marched past Arretium, ravaging the country as he went, with the view of drawing out Flaminius to a battle. Flaminius hastily followed Hannibal, and, being attacked in the basin of the Lake Trasimene, was completely defeated by the Carthaginians, who were posted on the mountains which encircled the valley.

To conciliate the Italians, Hannibal dismissed without ransom all the prisoners whom he took in the battle; and, to give them an opportunity of joining his army, he marched slowly along the eastern side of the peninsula, through Umbria and Picenum, into Apulia; but he did not meet with that co-operation which he appears to have expected.

After the defeat of Flaminius, Q. Fabius Maximus was appointed dictator, and a defensive system of warfare was adopted by the Romans till the end of the year. In the following year, B.C. 216, the Romans raised an army of 80,000 foot and 6000 horse, which was commanded by the Consuls L. Æmilius Paulus and C. Terentius Varro. The Carthaginian army now amounted to 40,000 foot and 10,000 horse. The armies were encamped in the neighbourhood of Cannæ, in Apulia. In the battle which was fought near this place the Romans were defeated with dreadful carnage, and with a loss

which, as stated by Polybius, is quite incredible. The Consul L. Æmilius, and the two consuls of the former year, Servilius and Atilius, were also among the slain. Hannibal lost only 4000 Gauls, 1500 Africans and Spaniards, and 200 horse.

This victory placed the whole of Lower Italy in the power of Hannibal. Capua and most of the cities of Campania espoused his cause, but the majority of the Italians continued firm to Rome. The defensive system was now strictly adopted by the Romans, and Hannibal was unable to make any active exertions for the further conquest of Italy till he received a reinforcement of troops. Capua was retaken by the Romans, B.C. 211. Hannibal was therefore obliged to depend upon the Carthaginians for help, and Hasdrubal was ordered to march from Spain to his assistance.

Cnæus Scipio, who had been left in Spain to oppose Hasdrubal, was joined by P. Cornelius Scipio, and the war was carried on with various success for many years, till the Roman army was entirely defeated by Hasdrubal, B.C. 212. Both the Scipios fell in the battle. Hasdrubal was preparing to join his brother, but was prevented by the arrival of young P. Cornelius Scipio in Spain, B.C. 210, who quickly recovered what the Romans had lost. It was not till B.C. 207, when the Carthaginians had lost almost all their dominions in Spain, that Hasdrubal set out to join his brother in Italy. He crossed the Alps and arrived at Placentia before the Romans knew that he had entered Italy. But, before he could effect a junction with Hannibal, he was attacked by the Consuls C. Claudius Nero and M. Livius, on the banks of the Metaurus, in Umbria, his army was cut to pieces, and he himself fell in the battle. This misfortune obliged Hannibal to act on the defensive, and from this time till his departure from Italy, B.C. 203, he was confined to the country of the Bruttii; but by his superior military skill he maintained his army without any assistance from home.

After effecting the conquest of Spain, Scipio passed over into Africa (B.C. 204). With the assistance of Massinissa, a Numidian prince, he gained two victories over the Carthaginians, who recalled their great commander from Italy to defend his native state. Hannibal landed at Leptis, and advanced near Zama, five days' journey from Carthage towards the west. Here he was entirely defeated by Scipio, B.C. 202; 20,000 Carthaginians fell in the battle, and an equal number were taken prisoners. The Carthaginians sued for peace; and thus ended the second Punic War, B.C. 201.

After the conclusion of the war Hannibal vigorously applied himself to correct the abuses which existed in the Carthaginian government; but he thus incurred the enmity of many powerful men, who represented to the Romans that he was endeavouring to persuade his countrymen to join Antiochus, king of Syria, in a war against them. A Roman embassy was sent to Carthage to demand the punishment of Hannibal, but he escaped and sailed to Tyre. From Tyre he went to Ephesus to join Antiochus, B.C. 196, and contributed to fix him in his determination to make war against the Romans. But the king only employed him in subordinate command, and he had no opportunity for the exertion of his great military

talents. At the conclusion of this war Hannibal went to Prusias, king of Bithynia; and when a Roman embassy was sent to demand him of Prusias, Hannibal poisoned himself at Nicomedia, in Bithynia, B.C. 183, in the sixty-fifth year of his age.

The personal character of Hannibal is only known to us from the events of his public life, and even these have not been commemorated by any historian of his own country; but we cannot read the history of his campaigns, of which we have here presented a mere outline, even in the narrative of his enemies, without admiring his great abilities and courage.

HANNO'S PERIPLUS is a small Greek treatise, entitled 'The Periplus (i.e., voyage) of Hanno, king (i.e., commander) of the Carthaginians, round the parts of Libya beyond the Pillars of Hercules, which he posted up in the temple of Kronos.' The treatise which we possess appears to be a translation of the Carthaginian document preserved in the temple of Kronos. The time at which this voyage was performed is uncertain; Pliny (*N. H.*, ii. 67) places it in the flourishing period of Carthaginian history.

The object of the expedition is stated at the commencement of the Periplus: 'It was decreed by the Carthaginians that Hanno should sail beyond the Pillars of Hercules, and found Liby-Phœnician cities. He sailed accordingly with 60 ships of 50 oars each, and a body of men and women to the number of 30,000, and provisions and other necessities.' The first city to be founded was Thumiatierion, near the Pillars of Hercules, probably in the neighbourhood of Marmara. The most southern was Kerne. From Kerne the voyage was one of discovery; and after advancing as far south as Sierra Leone or Sherbro, according to Rennell, he was obliged to return through want of provisions.

HANOVER, THE KINGDOM OF, is situated between 51° 20' and 53° 51' N. lat., and 6° 51' and 11° 51' E. long. It is bounded on the N.W. by the German Ocean, N. by the Elbe (which separates it from the territories of Hamburg, Denmark, and Mecklenburg), E. and S.E. by Prussia and Brunswick, S.W. by Hesse Cassel, Lippe, and Prussia; and W. by Holland. The area is 14,845 square miles. The Germans write the name *Hannover*.

Divisions.—The kingdom of Hanover is divided into six provinces, called Landdrostei, and one Mining District (Berghauptmannschaft), their area and population being as follows:—

Landdrostei.	Area in sq. miles.	Pop. in 1861.	Chief Towns.
Hanover, . .	2,263	368,973	Hanover.
Hildesheim, .	1,750	366,766	Hildesheim.
Lüneburg, . .	4,488	367,669	Lüneburg.
Stade, . . .	2,528	296,626	Stade.
Osnabrück, .	2,418	262,316	Osnabrück.
Aurich, . . .	1,158	192,329	Aurich.
Mining District,	240	33,391	Clausthal.
Total, . . .	14,845	1,888,070	

Of the above population 943,581 were males, and 944,489 females. In twenty-one towns—the largest, Hanover, with 71,170 inhabitants; the smallest,

Münden, with 4432—there lived 507,156 persons, while the country was inhabited by 1,603,124. Through emigration, particularly to the United States, the country loses on the average between four and five thousand persons annually.

The nobility possess large privileges as regards the right of holding property, and civil and criminal jurisdiction. Hanover was one of the last states of Germany—the last, except Mecklenburg—in which serfdom and legal torture were abolished. The jurisdiction of the nobility on their own estates was done away with, to a great extent, in 1831 and 1848, but remnants of it still exist. The feudal service of the agricultural population was abrogated in 1831, on the condition that the value of such service be paid to the owner of the land at the rate of twenty-five years' income. It being impossible, in many cases, for the labouring people to raise the necessary capital, the redemption has not been accomplished of more than one-half in the course of thirty years.

Surface and Productions.—The southern provinces are mountainous, but from the cities of Hildesheim, Hanover, and Osnabrück, to the sea-coast, the whole country is one vast plain, with only occasional and not considerable elevations. The mountains abound in mineral wealth, and are covered with forests of red pine and fir, with some oaks and other timber. A broad sandy tract crosses the country from east to west between the mountains and the sea. The coasts are under the level of the sea, from the encroachments of which they are protected by dykes. The principal rivers are the Elbe, the Weser, and the Ems, which receive in their course numerous secondary streams, as the Aller, Leine, Ilmenau, and Lûhe, and empty themselves into the German Ocean. There are only two large lakes; the Steinhudermeer and the Dümmersee. The rivers and lakes abound in fish. In East Friesland is the subterraneous Lake Jordan, the surface of which is so thickly overgrown with vegetation that waggons can pass over it.

Agriculture, the chief source of subsistence to the inhabitants, is much favoured by the facilities for exportation when the harvest is abundant, as well as by the transit trade, and the consumption of the neighbouring maritime towns. In the marsh-land the breeding of cattle is more followed than agriculture. The country produces barley and oats, potatoes, rye, and vegetables; tobacco, hops, chicory, and hemp. The horses of East Friesland, which are celebrated, are bred for exportation to the number of 20,000 annually, and there is a government stud at Celle. The sheep are of improved breeds, and geese are extensively reared in the polders. Bees yield valuable produce in Meppen, Lüneburg, and Verden. Timber is abundant, and considerable quantities are exported.

Mining is the most important branch of industry; the chief products are those of the Harz, including iron, copper, lead, litharge, salt, turf, coal, alum, marble, and granite. The *Lower Harz* consists of detached districts on the northern and western declivities of the Harz, lying in the territory of Hanover and Brunswick, and belonging to both in common, Hanover having four-sevenths, and Brunswick three-sevenths of the revenue.

The following summary shows the comparative extent and value of the mining and metallurgic

industry of Hanover during the three years 1862, 1861, and 1860.

As regards the number of mines, foundries, salt-works, &c., there were in 1862, 246 works, employing 9751 hands; in 1861, 244 works, employing 9810 hands; in 1860, 251 works, employing 9240 hands. The total produce of these works amounted in 1862 to 13,272,846 cwts., valued at 5,094,364 dollars; in 1861 to 12,685,590 cwts., valued at 5,059,407 dollars; in 1860 to 11,208,416 cwts., valued at 4,798,168 dollars.

This summary does not include the results of the working of those mines and foundries which are owned conjointly with Brunswick. These latter produced, in 1862, 463,109 cwts., valued at 859,310 dollars; in 1861, 419,542 cwts., valued at 719,528 dollars; in 1860, 384,253 cwts., valued at 659,596 dollars.

There are several mineral springs, some of which have establishments of baths. The principal manufactures are linen, hemp, woollen and cotton fabrics, paper, soap, leather, and hats. The value of linen produce in 1861 was 98,310 dollars. Brewing and the manufacture of metals are important branches of industry.

The country is traversed by excellent roads, and railways connect the capital with Hamburg in the north, Brunswick in the east, and Hildesheim in the south. There are also several excellent canals. The railways and the telegraph lines belong exclusively to the state.

Commerce.—Although advantageously situated on the North Sea, and traversed by navigable rivers, the commerce of Hanover is not extensive, and it is conducted mostly by the towns of Bremen and Hamburg. The principal exports are linens, yarns, agricultural and mineral produce. The imports comprise manufactured goods, colonial produce, wine, and spirits. Emden and Harburg are the chief ports in Hanover; and Münden, at the junction of the Werra and the Fulda, has an active trade with the interior of Germany.

The mercantile navy of Hanover consists at present of 869 sea-going vessels, with an aggregate tonnage of 105,250 tons. The great majority of these, however, are vessels under 200 tons, only twelve being above 500 tons, and the largest of them measuring 900 tons. In 1862 there entered the different ports of the kingdom 3682 vessels, measuring 327,876 tons, and 3700 vessels, measuring 329,390 tons, cleared. Of the former, 2191 with 137,684 tons were Hanoverian, and 407 with 81,102 tons British. The trade with Great Britain engrosses nearly three-fourths of the foreign trade of Hamburg.

The value of the exports from Hanover to the United Kingdom, in 1863, was 189,643*l.*, or only one-half of the amount in 1860. The chief articles were bran, butter, caoutchouc manufactures, oats, beans, lead, oil seed-cake, paper, and sheep's wool. The imports reached 1,583,608*l.*, only one-third being the produce of Great Britain. Cotton amounted to more than one-third of the whole, the figures being 65,655 cwts., value, 590,375*l.* The other goods comprised coffee, value, 171,387*l.*; herrings, 84,181*l.*; steam engines, 61,333*l.*; iron manufactures, 59,169*l.*; linen yarn, 46,037*l.*; cotton yarn, 43,707*l.*; cocoa-nut oil, 39,242*l.*; coal, 30,196*l.*; and agricultural imple-

ments, 8613*l.* Hanover joined the German Zollverein in 1854.

Constitution and Government.—The present constitution of Hanover is embodied in the 'Landesverfassung's Gesetz' of July 31, 1840, with modifications introduced April 10, September 5, and October 26, 1848; August 1, 1855; September 7, 1856; and March 24, 1857. According to these fundamental laws, the crown is hereditary in the male line of the house of Brunswick-Lüneburg, the sovereign coming of age at eighteen. The whole legislative and executive power is vested in the king, and the representatives of the people can only give advice to the crown, or afford co-operation. These consultative and co-operative functions are vested in two bodies, an Upper and a Lower Chamber. The former consists of the princes of the royal house; the heads of five families of the upper nobility of the kingdom; the hereditary court marshal; four members nominated by the king; thirty-three deputies of the largest landed proprietors; ten deputies of chapters and colleges; ten deputies of commercial bodies; and four deputies of inns of court. One-half of the elected members of the Upper House quit their seats every three years, to be replaced by deputies nominated in new elections. The Lower House consists of two members nominated by the king, who must be ministers; of thirty-eight deputies of towns, and forty-four of country districts. The members are elected only for the term of one session; which, however, by prorogation, may extend over several years. Consultative functions are assigned, besides, to seven provincial diets, which meet every three years, and in them the ultra-conservative element is very largely represented.

The executive power is entirely and unreservedly in the hands of the sovereign, acting through responsible ministers. For facilities of administration, the ministry is divided into seven departments, the limits between which, however, are not kept up with strictness. These departments are:—Royal House of Finance and Commerce; Interior; Foreign Affairs; Justice; War; Public Education and Ecclesiastical Affairs; and Finance and Commerce.

Revenue and Expenditure.—The annual expenditure of Hanover is about 3,000,000*l.*; the revenue is somewhat less than that sum.

The public debt of Hanover has been increasing for many years, chiefly through the establishment of a network of state railways. In 1862 it amounted to—

Old debt, . . .	15,721,760	thalers, or	£2,358,264
Railway debt, . . .	30,623,075	"	4,593,460
Total, . . .	46,344,835	"	£6,951,724

Army.—The army of the kingdom is formed partly by conscription and partly by enlistment, the former supplying any insufficiency of the latter mode of raising soldiers. All citizens above twenty are liable to be drawn for conscription; but, as a rule, only a very small per centage are called up for active service in the infantry; a great portion of these troops, and nearly the whole of the cavalry and artillery, being formed of volunteers. The cavalry, especially, is a branch of service much sought after by the sons of peasants and small farmers, on account of the advantages connected therewith. The privates in

these regiments, as soon as the short term of drill and first practice is passed, are sent home on furlough, being allowed to take their uniforms and their horses. They must keep their horses partly at their own expense; but they may use them in agricultural and other labour, taking due care of the health of the animals under their charge. The term of service is seven years in the infantry, and ten years in the cavalry; but about three-fourths of this period may be spent on furlough, interrupted only by a short annual practice of arms.

On July 1, 1862, the army consisted of eight regiments of infantry, numbering 17,904 men, with 2640 troops of reserve; three brigades of cavalry, numbering 2742, with 504 reserve; three battalions of artillery, numbering 2671; two companies of engineers, 257; staff, 40. Total, 23,614 men, with 3144 troops of reserve.

The quota contributed to the German Confederation is 15,230 men. The principal fortresses are those of Stade, Harburg, and Fort-William in the harbour of Bremen.

Church and Education.—The great majority of the inhabitants of Hanover are members of the Lutheran Church. The census of 1861 showed 1,555,448 Lutherans; 97,018 members of the Reformed Church, or Calvinists; 221,576 Roman Catholics; 1943 Christians of other sects, chiefly Mennonites and Moravians; and 12,085 Jews. The administration of the Lutheran Church is under consistories, at Hanover, Stade, Otterndorf, Osnabrück, and Aurich; while the ecclesiastical government of the Calvinists is under the Church-council, or Kirchenrath of Aurich, with sub-committees at Neustadt and Nordhorn. The Roman Catholics have two bishops, at Hildesheim and Osnabrück, the former residing mostly at Rome. Like other countries of Northern Germany, Hanover is well provided with educational institutions. The most celebrated is the University at Göttingen; there are also seventeen high and thirteen lower gymnasia, five normal and twenty-one polytechnic schools, a military academy at Hanover, schools for the blind, deaf, and dumb, and about 3600 free parish schools, both Protestant and Catholic. There are also good mining and forest schools in different parts of the kingdom.

The poor are supported in workhouses, partly by the proceeds of their own labour, and partly by voluntary contributions.

The administration of the law is presided over by a special ministry. Criminal cases are tried before sworn juries. Rather more than 11 per cent. of the children born annually in the kingdom are illegitimate. In many parts of the kingdom marriage is subject to great restriction, and requires the sanction of the authorities.

History.—In the remotest times of which we have any record, the countries between the Elbe and the Weser were inhabited by small independent tribes of hunters and herdsmen. When Charlemagne first introduced the Christian religion, the country was in the power of the Saxons. Otto the Great gave, in 970, the investiture of the duchy of Saxony to Hermann Billung, a wealthy lord in Lüneburg; and his descendants, by acquiring also the principalities of Brunswick and Göttingen, laid a foundation for the larger electorate. But numerous petty broils occurred, and many little republics rose, several of which became

considerable cities. The Hanseatic League found great favour here, and of the eighty-five towns composing that celebrated confederation, thirteen were in the present kingdom of Hanover. The subsequent history of Hanover presents very little of interest, until, by the death of Queen Anne, the elector succeeded to the British throne. In consequence of this event, the electors of Hanover continued to be kings of Great Britain, till, on the death of William IV., the crown of Great Britain devolved on Queen Victoria, and the succession to the throne of Hanover being limited to the male line, the two countries were separated, and the duke of Cumberland, eldest surviving brother of King William, ascended the throne of Hanover, by the name of Ernest Augustus. Hanover was for the most part prosperous during the eighteenth century; but it suffered many diversities of fortune during the wars consequent on the French revolution, and was frequently in the hands of the French. After the battle of Leipzig in 1813, the whole electorate was restored to the lawful king, who assumed in 1815 the title of King of Hanover, that of elector having in fact ceased by the dissolution of the German empire.

In 1816 the duke of Cambridge was appointed governor-general of Hanover, and in 1819 a new constitution was granted, and two representative chambers associated with the provincial states. In 1833 another constitution was drawn up by the ministry and the states, which received the signature of William IV.; but at his death the duke of Cumberland abrogated it, and restored that of 1819. He was, however, obliged to sanction numerous liberal measures and reforms in 1848. He died in 1851, and was succeeded by his son, George V.

In consequence of a family treaty, dating back to the seventeenth century, ratified by the German Diet, and renewed between the houses of Hanover and Brunswick on March 3, 1863, it is settled that the crown of Hanover, in the event of the extinction of the male line, shall fall to the dual house of Brunswick, and *vice versa*. The present duke of Brunswick having no male heirs, it is probable that this treaty will have to be executed before long, in favour of the royal family of Hanover.

The question of the income of the kings of Hanover has never been satisfactorily settled. Since the death of King William IV. of Great Britain, and the accession of Ernest Augustus, duke of Cumberland, to the throne of Hanover, the states and the sovereign have been in conflict on this subject. The constitution of 1833 settled a civil list of 500,000 thalers, or 75,000*l.*, upon the king; but Ernest Augustus declared this sum to be wholly insufficient, and his demands for the possession of the state domains not being acceded to, he overthrew the constitution chiefly on this account. From 1841 to 1848 the royal family enjoyed the whole produce of the crown property; but in the last-named year the king was compelled to give up this source of income, and to accept the grant of the civil list of 500,000 thalers as sole income. In 1855, however, the constitution was once more overthrown, and by a royal decree part of the state property was assigned to the king's use; besides the interest of a sum of 600,000*l.*, invested by the Hanoverian government in English stocks in the years 1784 and 1790, and that of a so-called 'Schattul-

lenkapital' of 2,400,000 thalers, formed of the accumulated excess of state income over expenditure during a period of forty years. At present the income of the sovereigns of Hanover, as far as it is known, amounts to about 850,000 thalers, or 125,000*l*. (Kloden's *Erdkunde*, 1861; Milner's *Gallery of Geography*, 1864; *Statesman's Year Book*, 1866; *Consular Reports*, &c.)

HANOVER, the capital of the kingdom, lies in 50° 22' N. lat., and 9° 44' E. long. It is situated in an agreeable and well cultivated plain on the river Leine, which is navigable from the city to its junction with the Weser. The city consists of three parts, the Old Town, the Ægidian New Town, and the New Town on the left bank of the river. In the first the streets are for the most part crooked and narrow, and the houses old-fashioned and irregular; but the two other parts are handsomely and regularly built. The most interesting public buildings are the palace, the theatre, one of the largest in Germany, the mint, the arsenal, the royal mews, the town-hall, with a good library of 40,000 volumes, the royal library, with the archives, both situated on the esplanade, the museum, and fine gallery of paintings. Hanover has also four Lutheran, three Calvinistic, one Roman Catholic church, and a synagogue. Among the charitable institutions are the Orphan Asylum, infirmaries, hospitals, and poor-houses. For the purposes of education there is a collegiate school for the sons of noblemen, called the Georgianum, a lyceum, a female school of industry, many elementary schools, and a seminary for schoolmasters. In the neighbourhood are the royal country palace of Montbrillant, the gardens formerly belonging to Count Walmoden and now to the crown, with fine collections of works of art, and the royal palace of Herrenhausen. Hanover was founded in the eleventh century. Its walls, with five gates, and broad ditches, were partly levelled in 1780, and laid out in streets, and the remainder converted into a handsome esplanade. The population in 1861 was 53,089; with suburbs, 71,170.

Hanover was the first city in Germany that was lighted with gas (in 1826). The chief manufactures are gold and silver articles, oil-cloth, bronze and plated goods, starch, and chicory. It was the birth-place of the elder Herschel, and the scene of the deaths of Leibnitz and Zimmerman. It is connected by railway with Cologne, Bremen, Brunswick, and the chief cities of Germany.

HANSARDS' DEBATES, or reports of the parliamentary sessions, are the recognized authority for reference to anything that has been said or done in the English Parliament. They comprise a record of all the speeches made in both houses, collected from the London daily papers, and generally revised and corrected by the speakers themselves. The printing and publishing of these debates, though encouraged by the Government, is purely a private speculation carried on by the Messrs. Hansard. The work is issued at a fixed price, computed and guaranteed at the commencement of each session. The same publishers once enjoyed a monopoly of the parliamentary printing, of which they still retain a portion, such as the bills, reports, and some of the accounts.

HANSEATIC LEAGUE or HANSA, a celebrated commercial confederacy, which took its name from the ancient German word 'Hanse,' signifying an

association for mutual support. The cities of Hamburg, Lübeck, and Bremen were, in the middle ages, the depositories of the manufactures of Italy and Germany, with which they supplied the northern countries of Europe in exchange for their raw produce. The wealth which they acquired excited the envy and the rapacity of the princes and nobles; the imposition of new and the augmentation of old tolls were great impediments to trade, which was likewise rendered unsafe by numerous banditti and pirates who infested the roads and the neighbouring seas and rivers. Hamburg and Lübeck concluded an alliance in 1241 by which they engaged to maintain ships and soldiers for the purpose of protecting their commerce. The city of Brunswick joined the alliance in 1247. In course of time most of the trading towns in Europe joined this association, which included London, Rouen, Bordeaux, St. Malo, Bayonne, Marseille, Barcelona, Seville, Cadiz, Lisbon, Antwerp, Danzig, Dort, Amsterdam, Bruges, Rotterdam, Ostend, Dunkirk, Leghorn, Messina, Naples, Bergen, Novgorod, all the towns on the Baltic, the Elbe, and the Weser, Embden, Cologne, and other towns, to the number of 85. Their principal factories in foreign countries were Bruges, London, Novgorod, and Bergen. All the towns sent deputies to a congress which usually met in Lübeck. The Hanse Towns became so powerful that in 1348 they defeated the kings of Norway and Denmark, deposed Magnus, king of Sweden, and gave his crown to his nephew Albert; they equipped, in 1428, 40 ships of war and raised 12,000 troops, exclusive of seamen, in a war with Erick, king of Denmark; and in the same century they compelled Edward IV. to restore all their privileges and property in England, which he had attempted to withhold. That part of the city of London called the Steelyard was their exclusive property, and Bishop's-Gate, one of the principal entrances to London, was intrusted to them to guard. But when the roads and seas were no longer insecure, when America was discovered, and India was reached by doubling the Cape of Good Hope, the Hanseatic League gradually declined, and at the last general assembly at Lübeck, in 1630, the deputies from the several cities appeared merely to declare their secession from the League. Hamburg, Lübeck, and Bremen formed an association in 1641, and remained free republics till December, 1810, when they were incorporated with the French empire; but in 1813 they were again separated from France, and with Frankfurt-am-Main are now called the free Hanseatic Cities of the Germanic Confederation.

The imports and exports and other particulars of the Hanse Towns are noticed under HAMBURG, BREMEN, LÜBECK, and FRANKFORT.

HANTS. [HAMPSHIRE.]

HANWAY, JONAS, was born at Portsmouth in 1712, and died in 1786. He was a Russian merchant, connected with the trade into Persia. Business having led him into Persia, he published in 1753 his 'Historical Account of the British Trade over the Caspian Sea, with a Journal of Travels from London through Russia into Persia,' &c., 4 vols. 4to. He was made a commissioner of the navy. The Marine Society and the Magdalen Charity owe their establishment mainly to him: he was also one of the great promoters of Sunday-schools.

HAPSBURG. [HABSBURG.]

HAQUEBUT. [ARMS.]

HARBOUR, a port or haven for shipping, protected from the winds and waves, so as to secure a safe shelter for ships. Harbours of refuge are deep roadsteads where ships may take refuge at all times during storms, and are generally protected by **BREAKWATERS**. They sometimes contain an inner harbour for commercial purposes, as at Plymouth. [**DOCK.**] Ordinary harbours are formed in the mouths of rivers or other inlets of the sea, and are mostly tidal. In the earliest infancy of commerce, the necessity for artificial harbours caused the Phœnicians to exercise their engineering skill in the construction of two of enormous magnitude at Tyre. All the maritime nations of the Continent were long celebrated for their marine engineering, while England remained practically without a harbour till about the seventeenth century. Since that time, however, the progress has been rapid, and breakwaters and protecting piers have been erected at most of the numerous ports encircling our island. The best work on harbours—indeed, the only great one on the subject—is Sir J. Rennie's 'Theory and Construction of British and Foreign Harbours,' but much practical information on the subject may be found in Weale's 'Rudimentary Treatise on Civil Engineering.'

HARBURG. [LUNEBURG.]

HARCOURT, RIGHT HON. AND MOST REV. EDWARD, Lord Archbishop of York, was the youngest son of George, first Lord Vernon, and born at Sudbury Hall, county of Derby, in 1757. He was educated at Westminster, and afterwards at Christ Church, Oxford, where he received the degree of D.C.L. in 1786. At an early age he was instituted to the family living of Sudbury, appointed a prebendary of Gloucester, and made a canon of Christ Church. In 1791 he was consecrated Bishop of Carlisle, and translated, in 1807, to the archiepiscopal see of York, which he continued to hold for the lengthened period of forty years. The literary efforts of his lordship scarcely extended beyond the range of his sermons—a few only of which, delivered on special occasions, have appeared in print. He died in 1847, aged ninety.

HARD LABOUR, an addition made to a sentence of imprisonment when the offence deserves such punishment, and the condition of the prisoner will allow of it. Justices have the power of inflicting hard labour both for indictable offences and for those disposed of summarily, when the offence is of an aggravated character. It generally consists of working on the tread-mill, picking oakum, breaking stones, making mats, &c., and is limited to ten hours a day.

HARDICANUTE, HARDECANUTE, or HARDACANUTE, was the eldest son of Canute the Great, king of England, Denmark, and Norway, by Emma, daughter of Richard I., duke of Normandy. [**ETHELRED II.**] The death of Canute in 1035 brought forward, as claimants to the inheritance, Sweyn and Harold, his two sons by Alfgiva, daughter of the earl of Northampton; Hardicanute, his son by Emma; and Edward, the elder of the two sons of Emma by her former husband Ethelred. A civil war was prevented by an agreement that the authority of Hardicanute should be confined to the country to the south of the Thames, and that all

the rest of England should be resigned to Harold. Meanwhile Hardicanute remained in Denmark, leaving the government of his English province in the hands of his mother till the invasion of England, in 1037, by Emma's younger son Alfred, when Emma fled to the Continent, and Harold became undisputed king of all England. On the death of Harold, a deputation arrived from the English nobility, offering the crown to Hardicanute, who came over and assumed the government. His short reign affords scarcely any events requiring to be mentioned. His character appears to have been that of a good-natured debauchee. His death happened on the 8th of June, 1042, in consequence of what appears to have been a stroke of apoplexy.

HARDINGE, RIGHT HON. HENRY, LORD, Governor-General of India, a field-marshal of England, and commander-in-chief of the British forces, was a younger son of the Rev. H. Hardinge, rector of Stanhope, county Durham, and born in 1785. Few men had more experience in the tented field. He entered the army as an ensign in his fifteenth year, and through the whole of the Peninsular war was distinguished for his early gallantry. From 1809 to 1813 he was attached to the Portuguese army as deputy quarter-master-general, and was present at the battles of Busaco, Albuera, Salamanca, Vittoria, Pampeluna, the Pyrenees, Nivelle, and Orthes, and at the siege of Badajoz and Ciudad Rodrigo. He was again engaged in the campaign of Waterloo, and lost his left hand at the battle of Ligny. On the restoration of peace, our hero had the opportunity of resting on his military laurels; but at the end of eight years he was destined to shine in another sphere of action, as a politician and a statesman. In 1823 he was appointed clerk of the ordnance, and entered Parliament in 1826. During the premiership of the duke of Wellington, he was made secretary of war; and in 1830 he was appointed secretary of Ireland. When Sir Robert Peel came into power he resumed his post of secretary of war, and efficiently discharged its duties till 1844, when he was appointed to the important position of governor-general of India. There are few epochs in the eventful history of our Indian empire more momentous than the one for which the administration of Sir Henry Hardinge was distinguished. The war with the Seiks, who at one time threatened the safety of our northern territories, will be ever memorable in history. The battles of Moodkee, Aliwal, and Sobraon, in which Sir Henry took a prominent part, have immortalized the period. Throughout the whole of that campaign, the governor-general, though virtually superintending the conduct of the war, was content to act as second in command, and nobly to submit to the wishes and directions of the commander-in-chief. On the termination of this severe but important contest, Sir Henry was created Viscount Hardinge of Lahore. Parliament granted him an annuity of 3000*l.* for himself and his two next successors; and the East India Company gave him a pension, in addition, of 5000*l.* a year. On the death of the duke of Wellington in 1852, Lord Hardinge was appointed commander-in-chief; and during the same year was advanced to the rank of field-marshal, being the highest reward which can be conferred on military genius. He died in 1856.

HARDNESS (in Mineralogy). Mohs endeavoured to form a scale of hardness in minerals, according to the power of one mineral to scratch another. The following are ten degrees of the scale, the hardest being the diamond.

1. Talc, white or greenish.
2. Rock salt and uncrystallized gypsum.
3. Calcareous spar, cleavable.
4. Fluor spar, which cleaves perfectly.
5. Apatite, from Salzburg.
6. Adularia.
7. Rock crystal, transparent.
8. Topaz.
9. Corundum, from Bengal.
10. Diamond.

HARDOUIN, JOHN, commonly called *Père Hardouin*, was born at Quimper in Bretagne, in 1647. He entered the society of the Jesuits at an early age, and devoted himself to the learned languages, history, philosophy, and divinity. A large portion of his life was spent in undertaking to prove, chiefly from medals, that the greater part of those writings which are considered as ancient, both classical and of the early Christian age, were forged by monks of the thirteenth century. He excepted only the works of Cicero, Pliny's 'Natural History,' Virgil's 'Georgics,' and Horace's 'Satires and Epistles.' These he supposed to be the only genuine works of antiquity remaining, except a few inscriptions and Fasti; and that from these the monks had drawn up and published Terence's Plays, Livy's and Tacitus' Histories, Virgil's *Æneid*, Horace's Odes, &c. See his 'Chronologiæ ex Nummis Antiquis restitutæ Prolusio, de Nummis Herodiadum,' 4to., Paris, 1693. The society of Jesuits at last interfered, and Hardouin, in 1708, published the recantation of his faucies.

HARDWARE MANUFACTURES are among the chief sources of the wealth of England, the great seats of which are at Birmingham, Sheffield, Wolverhampton, Walsall, &c. The term includes the smaller articles made of any of the commoner metals, such as grates, tools, locks, keys, shovels, &c. We have no means of ascertaining the quantity manufactured for home use, but the export statistics give some idea of the extent of the trade. In 1864 the total value of hardwares and cutlery exported was 4,159,107*l.*, which was divided as follows:—Cutlery and surgical or anatomical instruments, 398,276*l.*; iron and steel manufactures, tools, &c., 514,221*l.*; and manufactures of German silver, pewter, Britannia metal, lamps, &c., 3,246,610*l.* The United States, Germany, France, Australia, India, and the colonies, were the principal markets.

HARDWICKE, PHILIP YORKE, first EARL OF, was the son of an attorney at Dover, where he was born 1st December, 1690. His father was not able to do much for his education, but the great abilities of the son enabled him to surmount all difficulties. He was a great favourite with Mr. Samuel Morland, a man of considerable learning, who kept a school at Bethnal Green, London, at which he was placed for a short time. When removed to the office of Mr. Salkeld, an eminent solicitor in London, his diligence and talents won the respect of that gentleman also. Mr. Salkeld caused him to be entered of the Middle Temple, in November, 1708. During the time he was keeping his terms, he became acquainted

with Mr. Parker, one of the sons of Lord Chief Justice Macclesfield, the consequence of which was an introduction to Lord Macclesfield, who employed him as the companion and tutor of his son. To this lucky acquaintance the rapid and extraordinary success of Mr. Yorke at the bar is mainly attributable. In May, 1715, he was called to the bar, when the support of his old benefactor Salkeld, who was in very extensive practice as a solicitor, together with the favour and patronage of Lord Macclesfield, enabled him at the very outset to acquire an extensive practice.

The elevation of Lord Macclesfield to the woolsack (1719) enabled him further to promote the interests of his favourite, and accordingly through his influence, in the same year, Yorke took his seat in the House of Commons as member for Lewes, the whole expenses of his election being defrayed by the ministry. In the same year he married Mrs. Lygon, a young widow, the daughter of Mr. Cocks, a gentleman of good estate in Worcestershire, and the niece of Lord Somers and Sir Joseph Jekyl, then master of the rolls.

In March, 1720, while upon the circuit, and within five years after his call to the bar, he was, through the influence of his patron the chancellor, appointed solicitor-general; and he justified the choice by his conduct. In 1724 he was made attorney-general. It was after this period that his patron, Lord Macclesfield, was impeached for gross corruption in office, and Sir Philip Yorke had great difficulty in procuring himself to be excused from the task of assisting the managers of the Commons in making good their charge. In 1733 he was appointed lord chief justice of the King's Bench, and created Baron Hardwicke. He presided in the King's Bench for three years and a half, during which period he added largely to his former high reputation. On the death of Lord Chancellor Talbot (1737) he was raised to the dignity of lord chancellor. It is upon his judgments as chancellor that the reputation of Lord Hardwicke is principally founded. He held the great seal during nearly twenty years, and his judgments are a lasting monument of his legal knowledge and the soundness of his understanding. His integrity was never called in question. In 1754 he was created Earl of Hardwicke and Viscount Royston. He continued to hold the great seal until the 19th of November, 1756. He died on the 6th of March, 1764. Lord Hardwicke's judgments are preserved, so far as the points decided by them, in the reports of Atkyns and Vesey, sen., and in a volume published from Lord Hardwicke's own notes, by Mr. West. Some notes of his decisions have also been made public by Mr. Lee. These volumes, however, do not give any notion of the language in which the judgments were delivered. Few specimens of his style of writing remain.

HARDYNG, JOHN, one of our old historians, was born in 1378, and at the age of twelve was admitted into the family of Sir Henry Percy, eldest son of the earl of Northumberland, and known by the name of Hotspur, with whom he fought as a volunteer at the battles of Homildon and Cokelawe. After the death of his patron, whom he accompanied in the battle of Shrewsbury, Hardyng enlisted under the banner of Sir Robert Umfravile, who was con-

nected with the Percys by affinity, and under whom in 1405 he became constable of the castle of Warkworth in Northumberland. How long he remained at Warkworth is unknown; but his knowledge of Scottish topography seems soon to have engaged him in the secret service of his country. The exact time when Hardyng was first sent to obtain restitution of the deeds of homage, which had been given up by Mortimer in the minority of Edward III., does not appear; but it must have been early in the reign of Henry V.

Several writers have considered our author as a dexterous and notable forger, who manufactured the deeds for which he sought reward. But whether this was the case, or that Hardyng, in his zeal for his country, became the tool of some more powerful person, or was imposed upon in the purchase of the deeds, cannot now be ascertained.

Actively as Hardyng was engaged in life, he seems to have been constantly employed in gathering materials for his Chronicle, the first composition of which he finished towards the latter end of the minority of Henry VI.

Hardyng appears to have received several grants and pensions as rewards for his services. The evening of his days was passed in the entire recomposition of his work, which was afterwards presented to King Edward IV. The history comes no lower than the flight of Henry VI. to Scotland. From a passage in which the queen is mentioned, it is evident that he could not have finished his work before 1465. How long he survived its completion is unknown, but he must then have been eighty-seven years of age.

HARE. [LEPORIDÆ.]

HARE-BELL. [CAMPANULA.]

HARE-LIP, a malformation in which the lip is divided in one or more places by clefts extending from its free edge towards its attachment. It has received this name from the resemblance which it bears to the divided upper lip of hares and other gnawing animals, and is one of the most common of the malformations by arrest of development. Hare-lip may be single or double, that is, there may be one or two fissures—the one may be seated in the middle line of the lip, or opposite to the union of the two incisors with the canine tooth—if there be two, they will be found in the latter situation on each side. It may be simple or complicated with fissures of the gum or palate, which, being developed in an analogous manner, may be influenced by the same cause as the lips, though being earlier united they are less rarely affected.

The cure of hare-lip is important, not only for the uncouth deformity, but because sucking is prevented in infancy, and in later life the speech is affected. It is accomplished by cutting off quite smoothly the opposite edges of the fissure in its whole length, and then bringing them together and maintaining them in accurate apposition till, like the edges of a common wound, they have firmly united.

HARE, VEN. ARCHDEACON JULIUS CHARLES, was born at Hurstmonceux, in Sussex, in 1796. He graduated as M.A. at Cambridge in 1819; was instituted to the rectory of Hurstmonceux in 1832; appointed archdeacon of Lewes in 1840; and collated to a prebend at Chichester in 1851. In 1847 he published, in conjunction with a

younger brother, a volume of miscellaneous thoughts and observations, entitled 'Guesses at Truth, by two Brothers,' which passed through various editions. His translation, however, of 'Niebuhr's History of Rome,' in 1828, more generally attracted the notice of the literary world. But he became still more distinguished by his theological and controversial writings, which extend over a period of nearly thirty years. Among others may be noticed, 'The Means of Unity' (1847); 'The Duty of the Church in Times of Trial' (1848); 'The True Remedy for the Evils of the Age' (1850); 'The Contest with Rome' (1852); besides a great number of charges and sermons at different periods. In 1848 he edited the *Essays and Tales of John Stirling*, with a Memoir of his life. The tolerant character of the biographer was well calculated to appease that *odium theologicum* which too frequently pervades an assembly of divines. He died in 1855.

HAREM, a seraglio, or place where Eastern potentates confine their women, who are prohibited from the society of others.

HARFLEUR. [SEINE-INFÉRIEURE.]

HARGREAVES, JAMES, the inventor of the carding-machine and the spinning-jenny, was an artisan at Stanhill, near Blackburn, in Lancashire, where he was born. He and his family supported themselves by weaving and spinning, carried on in his own house, according to the custom of the time and place. In 1760 he invented the carding-machine, as a substitute for the hand-cards previously used. In 1764 he contrived that kind of apparatus for spinning by machinery since known as the jenny, and made one with eight spindles, which was driven by hand. So strong was the prejudice at that time against the use of machinery in manufacturing, that it was necessary for Hargreaves to make and work his machines in secret. At length the unusually large quantities of yarn brought by his family for sale to the factory, drew attention and suspicion upon him, so that a band of workmen broke into his house, and destroyed his machinery and furniture, and he became the object of a persecution which compelled him to leave the neighbourhood. In 1768 he removed to Nottingham, whither he had been invited by a company of stocking-weavers to become the manager of a spinning mill. Soon afterwards, in conjunction with a partner named Thomas Jones, he set up a factory at Hockley for spinning yarn for the hosiers, which he carried on with moderate success till his death in April, 1778, when his share in the mill was bought by his partner, from his widow, for 400*l*.

HARICOT. [BEAN.]

HARINGTON, SIR JOHN, was born at Kelston, near Bath, in the year 1561. His mother was a natural daughter of Henry VIII., and his father held an office in the court of that king. Having been educated at Eton and at Christ's College, Cambridge, he, by means of his wit and accomplishments, gained the notice of Queen Elizabeth, and became a member of her court.

When the earl of Essex was appointed Lord Lieutenant of Ireland in 1599, Harington was made a commander of horse under Lord Southampton, in his service. When Essex shortly after made his precipitate return to England, Harington was one of the few officers whom he chose to accompany him, and he

came in for a share of the queen's indignation. She was angry also, we are told, that Essex had, in Ireland, conferred on Harington the honour of knighthood. On the accession of James I. in 1602, Harington continued in possession of royal favour. He now wrote for the private use of Prince Henry his 'Brief View of the State of the Church,' which is an account of the bishops who lived in the reigns of Elizabeth and James I. He died in 1612.

Sir John Harington, besides a translation of the 'Orlando Furioso,' wrote a satirical poem entitled the 'Metamorphosis of Ajax,' a volume of epigrams, and several occasional pieces in verse, most of which have never yet been published.

HARLEIAN COLLECTION. [BRITISH MUSEUM.]

HARLEQUIN, one of the performers in modern Christmas pantomime. The name is probably taken from the Italian *arlecchino*, or the French *arlequin*, who was the jester or satirist of the early drama. The harlequin of the present day wears a tight dress covered with spangles, and represents the most respectable part of the pantomime. The other principal characters in this kind of play are the columbine, a good dancer, and partner of harlequin: the clown, the comic fool of the entertainment; and pantaloon, the butt of the clown. It requires clever acting to sustain these parts, and many reputations have been made by them, notably that of Grimaldi, an English clown.

HARLESS, GOTTLIEB CHRISTOPH, a learned and laborious German philologist, was born at Culmbach in 1738, and died November 2, 1815. He held several academical offices in the University of Erlangen. The most important of his publications is an edition of the 'Bibliotheca Græca' of Fabricius, Hamburg, 1790-1811, in 12 vols. 4to.

HARLEY, JOHN P., a popular comedian, and for many years chairman of the Drury Lane Theatrical Fund, was born in London in 1786, and at a very early age adopted the stage as a profession. He first made his *début* in 1815 on the Metropolitan boards at the English Opera House, in the character of Marcelle, in the 'Devil's Bridge,' and Peter Fidget in 'The Boarding House.' He soon afterwards made his appearance on the boards of old Drury in the character of Lissardo, in 'The Wonder,' since which he continued to maintain a high position in public favour, as a lively and mirth-inspiring comedian. During the later period of his life he constantly played at the Princess' Theatre, where he was a deserved favourite. His last principal performance was in the laughable farce of 'Samuel in Search of a Wife.' He died, August 22, 1858, from a stroke of paralysis, with which he had been suddenly seized the previous night, while acting his favourite character of Launcelot Gobbo.

HARLEY, ROBERT, EARL OF OXFORD, was born in London in 1661, of a family of note in the county of Hereford. He entered Parliament after the Revolution as member for Tregony, and afterwards sat for Radnor, professing for some time the Whig principles of his family. After a transition period, however, he went fairly over to the Tories. In the House which met under the administration of Rochester and Godolphin, in February, 1701, Harley was elected speaker by a great majority, and

also in the next parliament. He was a third time chosen to the same office, in October, 1702, and retained it till April, 1704, when he was made secretary of state. He is believed to have been principally indebted for this promotion to the good offices of Miss Abigail Hill, who, according to the duchess of Marlborough, by Harley's management became Mrs. Masham, and in return exerted all her influence to attach the weak mind of the queen to Harley and his friends. In this state of things the Marlborough party began to seek a new support by inclining towards the Whigs. The struggle was finally decided against Harley by the public suspicion and odium to which he became exposed in consequence of the conviction of one of his clerks named Gregg, for carrying on a treasonable correspondence with France. In the beginning of February, 1708, the duke of Marlborough and Lord Godolphin intimated to the queen, that unless Harley were removed they would leave her service; on this the secretary resigned, along with Mr. St. John (afterwards Lord Bolingbroke). Harley remained out of power for about two years and a half; at the end of which time Godolphin was dismissed, and Harley was appointed chancellor of the exchequer. The duke and duchess of Marlborough, and all their connections, were completely discarded both from office and from the queen's favour. Harley was appointed lord high treasurer, created Earl of Oxford and Earl Mortimer, and invested with the order of the garter. The peace of Utrecht, concluded 5th May, 1713, is the event for which the administration of Harley is chiefly memorable. It was after this that the jealousy between the premier and Bolingbroke assumed the character of an open rivalry. Bolingbroke had now the art to gain the favourite, Lady Masham, and on the 27th day of July, 1714, the lord treasurer received his dismissal. The queen's death, three days after, put an end for ever to the political existence of both Oxford and Bolingbroke. In August, 1715, both were impeached by the House of Commons. St. John made his escape to France, but Harley was committed to the Tower, and there he lay two years, when he was brought to trial before the House of Lords; but the Commons not appearing to prosecute their impeachment, the prisoner was acquitted. After this the earl of Oxford lived in retirement till his death, May 21, 1724. Three disquisitions on financial and political subjects, said to be written by him, appear in the Somers Collection of Tracts.

HARLINGEN, a seaport in the province of Friesland, Holland, about 65 miles N.E. of Amsterdam. It is a flourishing port, has important commercial relations with England and Norway, exporting large quantities of butter and cheese, and numerous animals. It has a population of 9000, chiefly employed in commerce, refining salt, and making sail-cloth and bricks. The town is protected from the inroads of the sea by a very large dyke forty feet high.

HARLOW, GEORGE HENRY, was born in London in 1787. His father, who was a merchant, died while he was an infant. He was educated for a few years at Westminster School, but when about sixteen was placed with a Flemish landscape-painter of the name of De Cort, whom he left for Mr. Drummond, A.R.A., the portrait-painter; and he was finally placed in the studio of Sir Thomas

Lawrence (then Mr. Lawrence), with the privilege of copying pictures there, but with an especial proviso that he should receive 'no instruction of any kind.' At the expiration, however, of a year and a half, the master and pupil quarrelled.

Harlow never studied at the Royal Academy: he professed to consider study in schools and academies as so much time spent in the destruction of originality. His first picture of note was Hubert and Prince Arthur; and he painted a few other historical pieces; the most celebrated of them is the Trial of Queen Catherine, of which the principal characters were portraits, Mrs. Siddons as Queen Catherine, John Kemble as Wolsey, &c. Harlow painted many portraits, of which the best is certainly that of Fuseli.

Having obtained a considerable reputation and some means, Harlow set out, in June, 1818, upon a visit to Rome, where he attracted great notice and excited some wonderment by completing an effective copy of the Transfiguration, by Raphael, in 18 days. Canova was much pleased with it, and told Harlow that it looked like the work of 18 weeks; he exhibited one of Harlow's pictures at his house, and it procured him his election as a member of the academy of St. Luke, where it was also exhibited. Harlow wrote a most sanguine letter from Rome, November 23, 1818, full of hopes and plans for the future; but in less than ten weeks from that date he died in London on the 4th of February, 1819.

HARMATTAN, the name of a hot suffocating wind, which blows from the interior of Africa towards the Atlantic Ocean. The term is derived from the Fantees, a nation on the Gold Coast, where this terrible blast is the most prevalent. It occurs during the months of December, January, and February; and sometimes it continues with unremitting violence for six or seven days. It takes its rise in the great desert of Sahara, and passes over Senegambia and Guinea to that part of the coast of Africa, lying between Cape Verde in N. lat. 15°, to Cape Lopez in S. lat. 1°, an extent of coast line nearly 2000 miles. Extreme dryness is the property of the Harmattan; and during its continuance there is not the least appearance of moisture in the atmosphere. No dew falls; the grass withers; and all vegetation of a tender description perishes. The very furniture of the house and the panels of the doors crack and split from excessive heat and dryness. Still, with all these annoyances, the Harmattan is considered as highly conducive to health. During its influence fevers disappear, and the most malignant diseases are alleviated. The cause may be thus accounted for—the wind immediately follows the rainy and unhealthy season on the African coast, and by its excessive dryness dispels the humidity from the atmosphere, and counteracts its baleful effects on the animal system. It is thus in the physical as in the moral world—

'All partial evil, universal good.'

HARMO'DIUS. [ARISTOGITON.]

HARMONIC PROPORTION. The reciprocals of numbers which are in arithmetical proportion are themselves said to be in harmonic proportion; thus

$$\frac{1}{a}, \frac{1}{a+b}, \frac{1}{a+2b}, \&c.,$$

is a series in harmonic progression.

A line A B is said to be harmonically divided when two points, C and D, one within it and one

A	C	B	D

on its continuation, are so placed that A C is to C B as A D to D B. In this construction C D is an harmonic mean between A D and B D, or A D, C D, and B D are as the reciprocals of terms in arithmetical proportion.

HARMONICA, or **ARMONICA**, an instrument somewhat similar to that now known as musical-glasses. It was invented by Benjamin Franklin. He saw an Irishman playing airs by the friction of his finger on a row of drinking-glasses, which he tuned by putting water into each. He then mounted a number of glasses on an iron rod by means of a perforation in the bottom of each. The glasses partly fitted into each other without touching, and were tuned by grinding, and in this way three complete octaves were got into a small space. The rod was then fixed in a box, and being set in motion the tones were brought out by applying a wet finger to the surfaces of the glasses. The arrangement, however, was objectionable on account of its liability to get out of order, and none of its numerous admirers have ever succeeded in improving it. Other instruments of no merit or importance took the same name, but had very little resemblance to the original.

HARMONICS (Acoustics). By the harmonics of a musical note are meant all those other notes in which the number of vibrations per second are twice, three times, four times, or any multiple of, the number of vibrations which produce the note in question. Thus the harmonics of a note which is sounded by 200 vibrations per second are those notes which require 400, 600, 800, &c., vibrations per second. The harmonics of a note are infinite in number, theoretically speaking, and proceed by less and less intervals. And, since every note may be considered as identical with any of its octaves, every harmonic has a corresponding note in any given octave. Denoting any key-note by C, and the octave above it by C', there is no possible sound between C and C' which is not theoretically either an harmonic of C, or as near to one as we please.

But, in practice, not only is it impossible to produce any number of harmonics we please, that is, to maintain in vibration any aliquot part we please of a string or column of air, but even among the harmonics which we can produce we find a limit to the number of those distinct harmonics which deserve the name, etymologically considered. Some few of the first harmonics are melodious sounds, considered in relation to the key-note, but others are discordant, and find no place in the scale according to any system of temperament. We shall therefore, taking a given note, say C, simply mention the most important harmonics, and reduce them to their proper places between C and C'.

Let a be the number of vibrations per second which produce C; then $2a$ is well known to produce C', or the first harmonic of a note is its octave. The next has $3a$ vibrations, answering to G'; so that the twelfth, or octave of the fifth, is the second harmonic. The third has $4a$ vibrations, and answers to C'', the octave of the octave. The fourth har-

monic has $5a$ vibrations, and gives E'' , the double octave above the third, in the untempered diatonic scale. The fifth harmonic, with $6a$ vibrations, gives G'' , the octave of G' the second harmonic. In general, every harmonic whose vibrations are an even multiple of those in the key-note, is an octave to a preceding harmonic, and presents no new character. The sixth harmonic, having $7a$ vibrations, is an imperfect (being too flat) double octave to the flat seventh above the key-note, or B flat. The eighth harmonic, with $9a$ vibrations, is correctly D'' , or three octaves above the untempered major second. The tenth, with $11a$ vibrations, is a little too sharp for F''' , being $11a$ instead of $10\frac{3}{4}a$. The twelfth, with $13a$ vibrations, is a little too flat for A''' , being $13a$ instead of $13\frac{1}{2}a$.

The preceding summation is useful, as giving an account of the scale of all those musical instruments which consist of one unaltered pipe. These are the bugle, the French horn, the trumpet, and (but for its slide) the trombone; in all of which (except the last) no note can be produced except an harmonic of the fundamental note of the whole tube. Calling the fundamental note C (which, however, is not very easily sounded), the ordinary scale of these instruments is—

C C' G' C'' E'' G'' (B'' flat) C''' D''' E''' F'''
 G''' A''' ,

in which B'' flat is too flat, F''' is too sharp, and A''' too flat. A short pipe, however, will not produce many harmonics; the bugle goes no further than G'' , at least with common lips. Various contrivances have been introduced to extend and correct this scale; the keyed bugle, the use of the hand in the French horn, the pistons sometimes applied to the same instrument, and the short slide of the trumpet, to say nothing of the slide, which is the principal distinction of the trombone, will suggest themselves to all who are acquainted with musical instruments. In other instruments harmonics are much used, particularly in those of the violin class, and the flute. The performance of Paganini upon a single string, which created a great sensation among violin players, arose from extraordinary power of producing harmonics. In the flute, C''' may be attained without much practice, as an harmonic of the fundamental note of the instrument; and we have heard of players who could produce D''' and even E''' in the same way. On the long strings of a pianoforte, as the fundamental note subsides, G' , C'' , and E'' may be perceived; and we have heard, among the vaulted roofs of a cathedral, several of the harmonics of the notes sounded in chanting.
 [ACOUSTICS.]

HARMONIUM, a musical instrument which owes its origin to the invention, or rather the revival, of the *free vibrating reed*. There are many claimants to this invention, but the Chinese were undoubtedly acquainted with it long before its introduction into Europe. The harmonium is usually about three feet and a half high, and the same in breadth; it has a compass of five octaves of keys, from C to C or from F to F , the key-board being placed on the top below the lid. Under the key-board is the wind-box, inside which the different reeds are placed. The notes are produced by wind furnished by means of bellows, worked by the foot, and forced into the air-chest,

and thence into the wind-box. This latter occupies the whole width of the instrument, and is separated into two or more compartments. There is a complete row of reeds in each part, and the keys form valves closing all the cavities until pressed down, when it opens them all, and the wind rushing through makes the tongues or reeds vibrate. The free reed used in the harmonium is formed of a brass frame containing a narrow rectangular slit, at one end of which a thin elastic spring of the same metal is fixed. This tongue is a little smaller than the opening, so that when a current of air is projected against it, it yields to let it pass; but its elasticity forces it back into the opening, and its momentum carries it to an equal distance on the other side. The spring at the free end is permanently bent a very little outwards. The vibration produces a musical sound, so long as the current of air is maintained. The vibrations of the reed depend for their rapidity on the thickness of the tongue at the free end in proportion to its length. If thick at the free end and thin at the fixed, the vibrations will be comparatively slow, and the resulting note deep; if the tongue be thin at the free end and thick at the fixed, a higher note will be the result. The quality of sound is also affected by the breadth of the vibrating part of the reed and the shape of the aperture in the wind-chest covered by the valve. The sizes of the reeds differ according to pitch, from four inches to one-half inch in length. Any note may be made loud or soft by varying the pressure of the wind. Harmoniums are made of various sizes and qualities, at prices from 4L . to 50L . They are chiefly manufactured in Paris, and many of those professedly made in England are brought in pieces from France, and merely put together here. They are chiefly used as a substitute for the organ, which they resemble in tone and variety of powers. But the great drawback to the general use of these instruments is a certain reediness of tone, and especially the unmitigated volume of the sound. Many methods have been adopted to obviate these serious defects, but all seem to have been only partially successful, except that of Messrs. James Gilmour & Co., of Glasgow, who have obtained patents for improvements which completely obviate the defects referred to. In order to gain complete power of modulation, a box is placed over the reed chest, fitting closely, so that the sound is as effectively confined as if the instrument were shut into another room; in the top of this box two openings are cut, and valves or lids placed over them; these covers have arms attached to them, which being made to turn on a bridge, and projecting over the action towards the back of the instrument, the full power of the sound may be obtained by pressing down the extreme ends of these arms, and so opening the lids or covers which confine the sound. Part of Messrs. Gilmour's patent is for connecting these arms with the wind reservoir by means of an elastic cord, so that when a moderate supply of wind is used the covers remain closed; but as it expands, the elastic cords open the covers, and thus produce a most perfect swell. These arms may also be acted on by means of stops. In order to gain an improved tone and separate control over the bass and treble portions of the instrument, the reed chest and swell box are

both differently arranged; in the reed chest, instead of a continuous row of vibrators, the bass portion is placed a little towards the back of the instrument, and the treble portion a little towards the front, so as to admit of a division being run lengthwise between them by means of a partition in the swell box—in this case there are four openings cut in the cover of the box, one immediately over the reeds and one at the end farthest from the reeds, and fitted with covers so that when the cover most distant from the reeds is open, the sound having to travel, as it were, through a pipe, acquires a round organ-like quality. This arrangement has also this advantage, that either portion of the instrument may be kept subdued while the other is allowed to predominate; thus, if the covers over the treble portion only are opened, the treble will be powerful; while the bass is kept subdued the covers remaining closed.

Messrs. Gilmour & Co. have also constructed some very powerful instruments, for church use, built on quite a novel plan, which bring out the value of their patent improvements very strikingly. The reeds, instead of being all in one box, and placed, as is usual, under the keys, are divided into different boxes, no one of which contains more than two sets of reeds. These different reed chests with their swell boxes are built up one over another *above* the key board, thus giving free vent to the sound. They are generally covered with cases of a Gothic design, which, together with the organ-like tone they have, might easily be mistaken for a real pipe organ.

HARMONY (in Music), musical sounds simultaneously produced according to certain rules, forming a chord, or succession of chords. The simplest harmony, namely, the triad, or common chord [**CHORD**], is the result of the vibration of all sonorous bodies, and the foundation on which much artificial harmony is built.

In addition to the details given under **COUNTERPOINT**, the following are some of the rules of Harmony:—

1. No two perfect concords, namely, two 5ths or two 8ths, are allowed to succeed each other in the same progression, but are permitted in contrary motion, that is, when one rises and the other falls.

2. Most discords require to be *prepared*, and all must be *resolved*; i.e. the dissonant note is to be first heard as a concord, and after *percussion*, or being sounded, must pass into a concord, generally by falling a tone or semitone. But sometimes the resolution is brought about by the bass.

3. It is in the nature of sharpened intervals to rise, and of flattened ones to fall.

4. In music in four or more parts, the parts should be separated in a manner as nearly equal as possible: thus a more perfect symmetry is obtained, and a richer harmony produced. But, with a view to some particular effect, a very different distribution of the parts is occasionally made.

5. As a general rule, every composition, whatever its kind, is to commence in its key; but, as regards the termination, the rule is without exception and peremptory, though sometimes the third is changed from minor to major.

By *Harmónia* (*ἁρμονία*) the Greeks meant to express the proper relationship of one sound to another, the pleasing agreement of intervals, in a melody, and

nothing beyond; and it is a disputed question whether the Greeks were acquainted with what is now known by the name of *Counterpoint*.

HARMOTOME (*Andreeolite, Ercinite*) occurs at Strontian in Scotland, in right rhombic prismatic crystals, colour grayish red, yellowish white; sp. gr. 2.4. Its chief constituents are silica, barytes, alumina, and water.

HARO. [**CASTILLA LA VIEJA.**]

HAROLD I. was the younger of the two sons of Canute the Great, by Alfgiva. [**HARDICANUTE.**] He died in 1040.

HAROLD II., the second of the sons of Godwin, earl of Kent, makes his first appearance in political history after the death of Canute, as a supporter, in concert with Queen Emma, of the succession of Hardicanute. [**HARDICANUTE.**] On Godwin's death his earldom of Kent, which, besides that county, comprehended all Wessex and Sussex, was given to his second son, Harold, Harold's own earldom of East Anglia being transferred to Alfgar, the son of Leofric, styled earl of Leicester, the potent rival of the Godwin family. This arrangement was not submitted to by Harold: Alfgar was outlawed on a charge of treason which Harold brought against him; on which flying to Ireland he speedily returned with a force of Danes from that country, and of auxiliaries from Wales, to levy war against the king. Harold was despatched to meet the rebels; but a contest was prevented by a negotiation which restored his earldom to Alfgar. Harold meanwhile, as the king's commander-in-chief, turned to chastise the Welsh for the aid they had given to the revolt; and a series of hostilities with that people commenced, which did not finally terminate till 1063. It was about two years after this that Harold was shipwrecked on the coast of Ponthieu, where he was immediately seized by the Earl Guy, and on the demand of William, duke of Normandy, delivered over to that prince. William did not permit his prisoner to embark for England till he had compelled him to take a solemn oath that he would do everything in his power, on the decease of Edward, to promote the duke's succession to the English crown. On the death of Edward the Confessor (5th January, 1066), a report having been circulated that Edward had named Harold for his successor, he was proclaimed king, and next day solemnly crowned, a few hours after the interment of the late king.

For more than half a year Harold was left to occupy the throne. Two foreign enemies, however, at length assailed him nearly at the same time. His brother Tostig, having formed a confederacy with Harold Hardrada, king of Norway, sailed round at the head of his fleet of sixty vessels to the mouth of the Tyne, where he was joined about the beginning of September by Hardrada with a navy of three hundred sail. The invaders had made themselves masters of the entire province of York before Harold came up. On the 25th, however, he engaged them at Stamford Bridge, on the Derwent, when both Hardrada and Tostig fell, and the English king obtained a complete victory. Only three days after this the duke of Normandy landed at Bulverhithe, between Pevensey and Hastings, on the southern coast, with a mighty armament, which he had spent eight months in fitting out. Harold did not reach

the Norman camp till the 13th of October. On the morning of the following day battle was joined at a place then called Senlac (now Battle), about nine miles from Hastings. The issue of this memorable engagement was the complete defeat of the English, after Harold himself had fallen, pierced through the head by an arrow. This victory gave the crown of England to the duke of Normandy, by whose descendants it has ever since been worn.

HAROLD'S CROSS. [DUBLIN.]

HARP, among the Romans, the name of a species of framework used by the soldiers as a drawbridge when besieging the walls of a city, and so called from its resemblance to a harp.

HARP (*hearp*, Saxon), a musical instrument, which, under different forms and denominations, may be traced to the remotest ages. Martianus Capella found the harp in use among the northern tribes which overran the Roman empire in the fifth century. Jones, the Welsh bard, claims for his country the possession of a harp of twenty-six diatonic notes, so early as the beginning of the sixth century. An ancient Irish harp has been sketched by Bunting, which had in a row forty-five strings, and an additional seven in the centre, as unisons.

The Welsh triple-stringed harp of the present day extends from G an octave below the first line in the bass to G, or A in altissimo on the *right* side; and from G, the first line in the bass, to the same upper notes on the *left* side; the middle row consists of the semitones of the outward rows. Hence, if the outside rows be tuned in the diatonic scale of G, each parallel note being in perfect unison, the notes of the middle row are tuned a semitone higher.

The harp, as a generally useful instrument, may be said to date its existence from the time when pedals were added to it, by the invention of Sebastian Erard. With these it is possible to modulate into all keys, and to execute any music suited to keyed instruments. In the *single-action*, the pedals raise every string half a note; in the *double-action*, the instrument is tuned in C flat; and by fixing the pedals in the first groove the instrument is at once transposed into C natural; whereas by fixing them in the second groove it is transposed another semitone higher, into the key of C sharp. The compass of the harp thus improved is from double E below the bass to E in altissimo.

HARPAGINES (Gr. *arpages*, 'hooks'), naval implements of war used by the ancients for catching hold of the enemy's ships, and raising them up in the air, by which they were frequently sunk or destroyed.

HARPA'LIÐÆ, an extensive family of coleopterous insects of the section of *Geodephaga*, the species of which are distinguished by the tarsi of the two anterior pairs of legs being dilated in the male sex.

In these insects the tibia of the anterior pair of legs have always a deep notch on the inner side; the head is almost always short and rounded in front; the thorax is generally broader than long, somewhat convex, but slightly narrower behind than before, and nearly equal in width to the elytra. The body usually approaches more or less to a cylindrical form; the elytra are almost always rounded at the apex, and never truncated at this part. They are usually found under stones.

HARPER'S FERRY, is a town in the United States, 50 miles N.N.W. of Washington. It is in the state of Virginia, at the junction of the Shenandoah with the Potomac. It has three churches, an iron foundry, and a national armoury. It surrendered to the troops of the Confederacy, during the civil war, on the 15th September, 1862. It is celebrated as the scene of John Brown's abolition raid in 1858.

HARPIES (Gr. *arpazo*, 'to seize'), in mythological history, a kind of winged monsters, with faces like women, bodies like vultures, and hands and feet hooked, like the talons of a bird of prey. They are often mentioned by the poets under the names of Aello, Ocypete, and Celeno; and are noticed in the third Book of Virgil's 'Æneid,' as having plundered Æneas during his voyage towards Italy, and predicted many of the misfortunes which accompanied his journey.

HARPSICORD, a keyed musical instrument, in form the same as the grand pianoforte, but smaller, strung with steel and brass wires, two to each note, which were struck by *jacks*, armed with small pieces of quill, acting as plectrums, and thus made to render a brilliant but somewhat harsh sound, wholly unlike that produced by the hammers of the pianoforte. *Stops*, *swells*, and double rows of keys were occasionally employed to modify the power of the wires. The harpsichord came into use in England in the seventeenth century; but it is now entirely superseded by the PIANOFORTE.

HARPY EAGLE. [FALCONIDÆ.]

HARQUEBUSS. [ARMS.]

HARRIER, the English name for the hound employed in hunting the hare. It is similar to the foxhound, from which it differs chiefly in its smaller size, and its inability to run so fast. Its scent, however, is extremely keen, which enables it to follow all the doublings of the hare. Persons hunting with harriers are exempt from taking out a game licence.

HARRINGTON. [CUMBERLAND.]

HARRINGTON, JAMES, descended from an ancient and noble family in Rutlandshire, was born in January, 1611. At the close of his residence at the University of Oxford, during which his father had died, he set out on a course of travels; and on his return to England principally passed his time in retirement. But in 1646 he was requested by the commissioners whom Parliament had appointed to carry King Charles I. from Newcastle nearer to London to wait on his majesty. He complied with the request, and was shortly after made a groom of the bedchamber. On the king's removal from the Isle of Wight to Hurst Castle, Harrington was removed from the king's service, and on his subsequently refusing to swear that he would not assist or conceal the king's escape, he was placed under arrest, and detained until an application of General Ireton obtained him his liberty. He afterwards showed his attachment to the king by accompanying him to the scaffold.

'After the king's death,' says Mr. Toland, 'he was observed to keep much in his library, and more retired than usually, which was by his friends a long time attributed to melancholy or discontent.' He was engaged, however, in the composition of his 'Oceana.' When he had proceeded some way in its

composition, making no secret of his views on government and of his partiality towards a commonwealth, he found that he had already brought down upon himself the suspicions both of Cromwell and of the Royalists. His book was seized, while in the press, by Cromwell's order; but Harrington eventually recovered it through the intercession of Lady Claypole, Cromwell's favourite daughter.

The 'Oceana' on its appearance excited great attention. Answers were published, and those Harrington in turn answered. In 1659 Harrington published an abridgment of the 'Oceana,' under the title of the 'Art of Lawgiving;' and subsequently several tracts. He had also founded a club, called the Rota Club, at which he gave nightly discourses on the advantage of a commonwealth and of the ballot. The club was broken up after the Restoration. But the members had become marked men.

On the 28th of December, 1661, he was seized on a charge of having taken part in a conspiracy to subvert the monarchy and establish a commonwealth. Having received no answer to several petitions, he made application for a Habeas Corpus; and shortly after this had been granted he was removed without previous notice to a rock opposite Plymouth, called St. Nicholas' Island. His confinement soon produced an effect upon his health, and upon petition he was allowed to be removed to Plymouth. Shortly after he became deranged, owing, it is supposed, to a medicine recommended to him for the cure of the scurvy. Lord Bath, the governor of Plymouth, then made intercession with the king, and Harrington was released from imprisonment. On being removed to London, he rallied considerably as regards bodily health, but his mind was never again right. At his advanced age, and in this unsatisfactory state of health, he married. He died of palsy on September 11, 1677.

HARRIOT, THOMAS, an eminent mathematician and astronomer, was born at Oxford in the year 1560. He took his degree of Bachelor of Arts in 1579, and in 1584 he accompanied Sir Walter Raleigh in his expedition to Virginia, where he was employed in surveying and mapping the country, and upon his return to England in 1588 he published his 'Report of the Newfoundland of Virginia, the commodities there found to be raised,' &c. Harriot was introduced by Sir Walter Raleigh to the earl of Northumberland. This enlightened nobleman received Harriot into his house, and settled on him an annual salary of 300*l.*, which he enjoyed to the time of his death, in July, 1621. During his lifetime Harriot was known to the world merely as an eminent algebraist; but from a paper by Zach in the 'Astronomical Ephemeris' of the Royal Academy of Sciences at Berlin for the year 1788, it appears that he was equally deserving of eminence as an astronomer. Ten years after Harriot's death his algebra, entitled 'Artis Analyticæ Praxis, ad Æquationes Algebraicas nova, expedita, et generali Methodo resolvendas,' was published by his friend Walter Warner.

HARRIS, GENERAL LORD GEORGE, one of the most distinguished officers of our Anglo-Indian army, was born at Brasted in Kent, in 1746. After passing through the different grades of regimental rank, in 1799 he proceeded to India, as lieutenant-colonel of the 76th Regiment, and as secretary to

Sir W. Meadow, who had been appointed governor and commander-in-chief of Madras. Colonel Harris was actively engaged in 1790 and 1791 against Tippoo Saib; and on his return to England in 1794, he was appointed to the rank of major-general. He soon afterwards re-embarked for India, and received the appointment of commander-in-chief, under the presidency of Fort St. George. In 1798 he was chosen by the earl of Mornington to command the army against the sultan, Tippoo Saib, with a force of about 50,000 men. His skill and bravery in this important undertaking are matters of history. He eventually effected the capture of Seringapatam, and the annexation of the dominions of Tippoo to the eastern dependencies of the British crown. In acknowledgment of his distinguished services, he was in 1815 raised to the peerage, by the title of Lord Harris, of Seringapatam and Mysore in the East Indies, and of Belmont in Kent. In 1820 he was made a Grand Cross of the Bath, and in 1824 appointed governor of Dumbarton Castle. He died in 1829.

HARRIS, JOHN, D.D., born about 1667, died September 7, 1719, a voluminous writer, in the list of whose works we find numbers of sermons, treatises on algebra and fluxions, geometry, trigonometry, astronomy, and navigation. He also wrote 'Remarks on some late papers relating to the Universal Deluge and the Nat. His. of the Earth;' 'Navigantium atque Itinerantium Bibliotheca, or a complete collection of Voyages and Travels,' &c., 1705, 2 vols. folio, reprinted with additions and corrections in 1744 and 1764; 'Lexicon Technologicum, or an Universal English Dictionary of the Arts and Sciences, explaining not only the terms of Arts, but the Arts themselves,' 2 vols. folio, 1704-10 (from this, says Watt, 'have originated all the other dictionaries of arts and science and cyclopedias that have since appeared'); 'History of Kent,' 2 vols. folio, 1719. Harris was secretary and vice-president of the Royal Society, and possessed considerable church preferment, but was reduced to poverty by neglect of his affairs. He died in want, and was buried at the expense of his friends.

HARRIS, JAMES, born July 20, 1709, was the eldest son of James Harris, Esq., Salisbury, by the Lady Elizabeth Ashley Cooper, sister of Lord Shaftesbury, the author of the 'Characteristics.' He was educated at the grammar-school in his native place, and passed thence to Wadham College, Oxford. In his twenty-fifth year he lost his father, and thereby became independent in fortune. For fourteen years of his life he did little else than study the Greek and Latin authors with the greatest diligence. In 1745 he married the daughter of John Clarke, Esq., of Sandford, near Bridgewater, by whom he had five children. In 1761 he was returned M.P. for Christchurch, which seat he retained till his death. In 1762 he was appointed to the post of a lord of the Admiralty, and next year to that of a lord of the Treasury, which he held for two years, when his party went out of office. In 1774 he became secretary and comptroller to the queen. He died in 1780. The chief work of Harris is his 'Hermes, or a Philosophical Inquiry concerning Language and Universal Grammar,' a work which Lowth characterized as one of the most

beautiful pieces of analysis which had appeared since the days of Aristotle.

The real merit of this work of Harris is perhaps best expressed in the following few words from the first sentence of his sensible preface: 'The chief end proposed by the author of this treatise in making it public has been to excite his readers to curiosity and inquiry.' A careful perusal of the treatise cannot fail to make a man think more accurately.

Harris' 'Hermes' was published in 1751. Some years before, he had written three treatises, on Art, on Music, Painting, and Poetry, and on Happiness; and in 1775 he published his 'Philosophical Arrangements,' a part of a large work on the Aristotelian Logic. His last work is called 'Philological Enquiries.'

HARRIS, JAMES. [MALMESBURY.]

HARRISBURG, an important city of the United States, North America, in the county of Pennsylvania, on the Susquehanna, crossed here by a covered railway bridge, 2876 feet in length. It is situated 106 miles W.N.W. of Philadelphia, and has the usual public edifices of a large town. Population, 13,405.

HARRISON, JOHN, was born at Faulby, in Yorkshire, in 1693. Harrison early displayed an attachment to mechanical pursuits, and his attention was particularly directed to the improvement of clocks. After many failures and many minor improvements, he at length succeeded in constructing a pendulum, the excellence of which depended on the different degree in which metals are expanded or contracted by variations of temperature. In 1735 he came to London with a timepiece which he had constructed, to compete for the prizes offered by the government in 1714 in reference to the longitude. After several trials, he produced a chronometer which erred only 5.1 seconds in a voyage from England to Port Royal; this was sufficient to determine the longitude within eighteen miles; and, after twenty-two years of struggling and delays, Harrison received the prize of 20,000*l.* in 1767. Harrison introduced many and varied improvements in clocks, chronometers, and watches. He died at his house in Red Lion Square, in 1776, in his eighty-third year.

HARRISON, THOMAS, generally called 'Harrison of Chester,' although he was not a native of that city, for he was born at Wakefield in Yorkshire, in 1744. While yet little more than a mere lad, he was sent to Italy, then considered almost the only efficient school for architectural study; and during his stay at Rome, where he remained for several years, he made designs for improving and embellishing the Piazza del Popolo, which obtained for him both a gold and silver medal from Pope Ganganelli; and he was also complimented by being elected a member of the Academy of St. Luke. On his return he executed various public works at Chester, Liverpool, Manchester, Shrewsbury, and also in Scotland. Harrison died at Chester, March 29, 1829.

HARRISON, WILLIAM HENRY, President of the United States, was born in Virginia, February 9, 1773, and was educated at Hampden Sydney College, in Virginia, for the medical profession; but after the death of his father, who was governor of Virginia, he joined a force which was raised to defend the Ohio territory against the Indians; and

the next six years of his life were spent in military service. In 1797, this war having been brought to an end, he resigned his commission as lieutenant, and was appointed secretary and *ex-officio* lieutenant-governor of the north-western territory, then comprehending all the country to the north-west of the river Ohio. In 1799 he was elected a member of the territorial government. In 1801 he was appointed governor of Indiana. He greatly distinguished himself both in the war with the Indians under Tecumseh in 1811, and in that with the English in 1812 and 1813. In both these wars he held the rank of a general. In 1816 he was returned to the House of Representatives as one of the members for Ohio. In 1828 he was sent as minister to Columbia; and in 1840 he was elected president; but he died at the official residence in Washington, on the 4th of April, 1841, being the first president who had died in office.

HARROLD. [BEDFORDSHIRE.]

HARROW. [PLOUGH.]

HARROW. [MIDDLESEX.]

HARROWBY, RIGHT HON. DUDLEY RYDER, EARL OF, was born in London in 1762; and few men have occupied more important stations in the great political arena of his country. At the age of twenty-two, young Ryder represented the family borough of Tiverton in the House of Commons; and the first office conferred upon him was that of under-secretary of state for foreign affairs. Under the ministry of Pitt, in 1791, he was appointed paymaster of the forces, and vice-president of the board of trade; and in 1800 he received the treasurership of the navy. In 1804, having been called to the House of Peers on the death of his father, he was intrusted with the seals of the Foreign Office, and shortly afterwards was appointed chancellor of the Duchy of Lancaster—both of which offices he soon resigned, but still retaining his seat in the cabinet. In 1809, in consideration of his political services, he was raised to the dignity of an earl by the titles of Earl of Harrowby and Viscount Sandon. In the course of the following year his lordship published a well-written pamphlet on the necessity of augmenting the poorer church benefices, the result of which was a grant of 100,000*l.* for the relief of the poorer clergy. He also obtained the passing of an act for the better support of stipendiary curates; and it is generally considered that this 'Curates Act,' which is known by his lordship's name, has tended more than any other statute of modern times to raise the character of the church. On the formation of the Liverpool ministry, the dignified office of president of the council was conferred upon his lordship. In 1819 a committee of the Lords was formed to investigate the state of the currency, and the noble earl was placed at its head. The report which he then prepared was considered a very important document, and has often, since that period, been referred to as a work of considerable authority. It was at the mansion of his lordship, in 1820, that the assassination of the ministry, by the Cato Street gang, was to have taken place; and it was, in a great degree, owing to the prudent measures of the earl that the atrocious intention was defeated, and the conspirators brought to justice. In 1827 his lordship retired from the service of the Crown, and soon

afterwards withdrew altogether from public life. He died in 1848.

HARROWGATE. [YORKSHIRE.]

HARRY, BLIND, as he was commonly called, or *Henry the Minstrel*, lived towards the close of the fifteenth century. He was born about the year 1470, according to Wharton. The work for which Blind Harry is celebrated is a poem on the adventures of Wallace.

HARTE, WALTER, was educated at Marlborough School and Oxford. He seems to have been born about 1700, and to have graduated as M.A. in 1730. Harte published 'Poems on Several Occasions,' 1727; 'Essay on Satire,' 1730; 'Essay on Reason,' 1735, to which Pope is said to have contributed very considerably; 'Essay on Painting,' date unmentioned; 'The Amaranth,' 1767, his last work. As a poet, however, he is not distinguished from other once successful but now forgotten imitators; but he has made a valuable addition to our literature in his 'History of the Life of Gustavus Adolphus,' 2 vols. 4to., 1759; republished in 8vo., corrected and improved, in 1763. Harte left unfinished, in MS., a 'History of the Thirty Years' War.' The account of his life is soon told. He took orders, acquired reputation as a preacher, was appointed principal of St. Mary Hall, Oxford, and through the interest of Lord Chesterfield, whose son's tutor he had been, canon of Windsor. He died at Bath in 1774.

HARTFORD. [CONNECTICUT.]

HARTLEPOOL. [DURHAM.]

HARTLEY, DAVID, was born on the 30th of August, 1705, and was the son of a clergyman of Armley in Yorkshire. Having been first educated at a private school, he entered, at fifteen years of age, at Jesus College, Cambridge, and became in time a fellow of that society. Scruples which would not allow him to subscribe the Thirty-Nine Articles prevented him from afterwards entering the church, as had been originally intended; and he applied himself to the medical profession, in which he attained to considerable eminence.

He commenced the composition of the work by means of which he has become universally known, the 'Observations on Man, his Frame, his Duty, and his Expectations,' at the age of twenty-five. The fundamental idea of the work, the possibility of explaining all states of mind by association, was first suggested to him by Mr. Gay's 'Essay on the Fundamental Principle of Virtue or Morality,' prefixed to Law's translation of Archbishop King's 'Origin of Evil.' His work was published in 1748. He lived nine years after the publication.

Dr. Hartley was twice married, and had children by both marriages. He practised medicine successively at Newark, Bury St. Edmund's, in London, and at Bath, where he died on the 25th of August, 1757. He enjoyed through life the friendship of many distinguished literary men. Among these may be mentioned Bishops Law, Butler, Warburton, and Hoadley, Dr. Jortin, Young the poet, and Hooke, the author of the History of Rome.

HARTSHORN, the horn of the *Cervus Elaphus*, the common stag, which has a place in the pharmacopœia because it contains less earthy matter, and more gelatine, than other bones. It is kept in the form of shavings, of which a sufficient quantity boiled

in water yields a jelly suitable to convalescents, which may be flavoured with lemon-juice or wine, &c.; but there is no proof that it is superior to jelly made from calves' feet. It is sometimes a useful addition to milk for young children, but it possesses no alkaline properties, and the further addition of a little lime-water is often necessary to fit it for irritable stomachs.

HARTSHORN, SPIRIT OF. [AMMONIA.]

HARTZ. [GERMANY.]

HARUN-AL-RASHID. [ABBASIDES.]

HARUSPICES, a class of priests in ancient Rome, whose principal duty was to inspect the entrails of victims, and thereby foretell future events. They also interpreted various phenomena, such as lightning and earthquakes. This art, called *Haruspicina*, was derived from Etruria.

HARVARD COLLEGE, in Cambridge, Middlesex county, Massachusetts, United States, was founded in 1638, and so named in honour of the Rev. John Harvard, who gave it 700*l*. The present value of the buildings, grounds, and endowments belonging to the college is 1,613,880 dollars, and including the library and apparatus, exceeds 2,000,000 dollars. The government is vested in the president, five fellows, and a board of overseers appointed by the state legislature. The Unitarians have at present a numerical majority on the board of council, and may be said to control the institution, but do not exert any conscious denominational influence. In 1864 there were forty-four tutors, including professors of law, medicine, science, and divinity; 814 students; 152,500 volumes in the library; and the annual current expenses amounted to 130,000 dollars. The College, or University as it is sometimes termed, is a very flourishing one, and many of the most distinguished Americans have been educated in it.—(*American National Almanac*, 1866.)

HARVEST. In southern countries, where the heat and want of moisture are not too great for the growth of corn, the only care of the farmer, as to harvest, is to procure hands sufficient to reap it. The heat of the sun and air soon dry the straw and harden the grain. A spot is levelled in the field, and the corn is thrashed out immediately, either by the tread of cattle driven over it or by the flails of numerous thrashers. The corn is winnowed and stored in granaries; and the straw is reserved till winter, when it forms the chief fodder of horses and cattle. But in northern climates, where the harvest is later, and cold rains and storms are frequent in autumn, the ingenuity is often taxed to save the corn, after it has been cut, from being entirely spoiled. The reaping machines, however, now coming into pretty general use, will vastly accelerate the process of cutting, and diminish the risk from exposure of the crops to bad weather. [AGRICULTURAL IMPLEMENTS.]

It was long the custom through the whole of the north of Europe to store all the produce of the farm into barns; but the increase of the produce raised by an improved system of agriculture gave rise to the practice of stacking corn in the open air, and securing it by a covering of thatch. Formerly corn was so cut as to leave much of the straw standing on the ground; but modern farming is so conducted, that the straw is cut as near the ground

as possible. In many places it is not usual to tie up any corn into sheaves, except rye, wheat, and beans. Barley and oats are usually mown, raked into heaps, and carried into the stack or barn when dry, like hay; but this is a slovenly practice, which should not be recommended. With good tillage and proper manuring, the straw of barley and oats will be strong, and of sufficient length to require being tied up into sheaves; and much less of the grain is shaken out and lost in this way than by the usual method.

When the stack is building, the butts of the sheaves are placed outwards, and project gradually over the sides of the frame, and over one another, so as to build the stack in the form of a bowl, with a cone or pyramid over it, according as the frame is round or square; this is carefully thatched with straw, and the outer surface is cut smooth by means of shears. Various other forms of stack-building are adopted in different countries. Harvest is proverbially a joyous time, and one when hospitality is practised with more goodwill than at any other season. Harvest-home rejoicings when the last corn is carried have been observed from time immemorial; and the good old custom is again reviving on the well-conducted farms of England.

HARVEST-BUG (*Leptus autumnalis*) a species of the family *Leptidae*, or harvest-ticks, belonging to the group *Acaridae*, or mites. It lives among the grass, is exceedingly small, and causes great irritation by its bite when it gets on to the skin. In some districts it occurs in autumn almost as a plague.

HARVEST SPIDER (Lat. *Phalangium*), a genus of the *Phalangidae*, belonging to the family of the tracheal *Arachnidae*, in which the head, thorax, and abdomen are united, and the legs exceedingly long and slender. The tarsi often consist of more than fifty joints. The antennæ of the jaws are large, and furnished with a didactyle claw.

These insects are extremely voracious; and sup-



Harvest Spider.

ported on their stilt-like limbs, they stalk about among plants, in our gardens and fields, in search of insect prey. Some forms, belonging to the same family, are remarkable for the shape of their abdomens, which project into spines and angles of every description.

HARVEY, WILLIAM, was born at Folkestone, in Kent, April 1, 1578, and, after having been some years at the grammar-school of Canterbury, was admitted at Caius College, Cambridge, in the year 1593, being then in his sixteenth year. Having devoted himself to the study of logic and natural

philosophy for six years in that university, he removed to Padua, at that time a celebrated school of medicine, where he attended the lectures of Fabricius ab Aquapendente on anatomy, of Minadous on pharmacy, and of Casserius on surgery. He was admitted doctor of medicine there, and returned home at the age of twenty-four. At thirty he was elected fellow of the College of Physicians, and shortly after appointed physician to St. Bartholomew's Hospital. On the 4th of August, 1615, he was chosen by the College to deliver the Lumleian lectures on anatomy and surgery, and upon this occasion he is supposed to have first brought forward his views upon the circulation of the blood, which he afterwards more fully established, and published in 1628.

Before the time of Harvey the opinions on the circulation were numerous and inconsistent. The blood was supposed to be distributed to the various parts of the body by means of the veins, and that intended for the nutrition of the lungs by the action of the right side of the heart. According to the same doctrines the arteries were destined for the conveyance of the vital spirits, which were formed in the left side of the heart from the air and blood derived from the lungs. These vital spirits were supposed to be taken in by the arteries during their diastole, and distributed by them during their systole, whilst the vapours or fuligines, as they are called by Harvey, were returned to the lungs by the action of the left ventricle. Opinions did not agree upon the mode in which the blood found its way to the left side of the heart, for whilst some supposed that it was conveyed with the air from the lungs, others maintained that it transuded by certain imaginary pores in the septum between the ventricles. These opinions, it is evident, rested more upon imagination than any careful observation of facts. Those of Harvey, on the contrary, were drawn from the most accurate dissections of dead and living animals, and supported by arguments depending entirely upon the anatomical structure and obvious uses of the parts. The result of these observations is thus stated by him. The heart has periods of action and of rest, but in warm-blooded animals its motions are so rapid, that the different steps of them cannot be distinguished. In cold-blooded animals they are more slow, and in warm-blooded also, after the examination of its action, by opening the chest of a living animal, has been continued some time. During its action the heart is raised, and its point tilted forward so as to strike against the parietes of the chest. It contracts in every direction, but more especially on its sides; it also becomes harder, as other muscles do during their contraction. In fishes and cold-blooded animals the heart may be observed to become paler during its systole, and assume a darker colour during its diastole. If a wound be made in the ventricle, the blood is ejected from it during its contraction. From these facts Harvey concluded that the essential action of the heart is its systole, and not its diastole, as was supposed by physicians before his time, and that the result of this contraction is the expulsion of the blood into the pulmonary artery and aorta. The diastole of the arteries or pulse is synchronous with and caused by the propulsion of the blood during the systole of the

ventricle, and is a passive, and not, as was previously supposed, an active operation of the vessels. If the motions of the heart be carefully observed for some minutes, it will be seen first that the two auricles contract simultaneously, and force the blood contained in them into the ventricles; and, secondly, that the ventricles in their turn assume the same action, and propel most of the blood into the pulmonary artery and aorta, from which it is prevented from returning by the valves situated at the entrance of those vessels. He then describes the manner in which the blood passes from the right to the left side of the heart, showing how it first passes through the lungs, and passes to the left auricle and from thence to the left ventricle. In like manner he showed that the blood is propelled from the left ventricle into the arteries, and so distributed to all parts of the body. He next proceeded to give approximate calculations of the quantity of blood which passes from the veins through the heart in a given time. This he showed to be so much more than is required for the nutrition, or can be supplied to the veins by the absorption of alimentary substances, that the surplus must of necessity return through the various tissues of the body to the veins again. He then argued from the construction of the valves of the veins that the course of the blood in them must be from the smaller to the larger divisions, and thus to the heart again.

Such is a brief abstract of the principal steps in this the greatest and most original discovery in physiology, which was so directly opposed to all the previous notions of physicians that its author observed, that he feared injury to himself from the envy of some, or that he should make enemies of all. Harvey afterwards complained to one of his friends, that his practice fell off considerably after the publication of his treatise 'On the Circulation of the Blood,' and it is well known that the doctrine was not received by any physician who was more than forty years old. He subsequently published a volume entitled 'Exercitationes de Generatione,' which contains a description of the organs of generation in the common fowl, of the formation of the egg and its extrusion from the body, and of the use and nature of its various parts, as well as the changes which it undergoes during the process of incubation.

In the same treatise are also some valuable observations on the process of generation in mammalia, which were confined chiefly to the deer species, of which he was enabled to obtain numerous specimens by the liberality of Charles I., who allowed him to take them from the royal parks.

In 1623 Harvey was appointed physician extraordinary to James I., with a promise of succeeding on the first vacancy to the physicianship in ordinary, the duties of which he actually performed. He was afterwards physician to Charles I., and was in the habit of exhibiting to him and to the most enlightened persons of his court the motion of the heart and the other phenomena upon which his doctrines were founded. During the civil war he travelled with the king, and while staying for a short time in Oxford was made by him master of Merton College, and received the degree of Doctor of Medicine. He held the mastership, however, for only a few months, when Brent, who had been expelled by the king for favouring the parliamentary cause, was replaced by

that party, which had now gained the ascendancy. Soon after, his house was plundered and burned by the same party, and unfortunately several unpublished works, of which we have only notices in his other writings, were destroyed. The latter years of his life were chiefly spent at his country-house at Lambeth, or at his brother's near Richmond. In 1654 he was elected president of the College of Physicians, but in consequence of his age and infirmities he was induced to decline that honourable office. But he testified his regard for the society by presenting them with his library, and conveying over to them, during his lifetime, a farm which had been left him by his father. He died on the 3rd of June, 1657, in the eightieth year of his age, and was buried at Hempstead in Essex, where a monument was erected to his memory. The best edition of his works, which were written in correct and elegant Latin, is that published by the College of Physicians in 1 vol. 4to., in 1766, with an engraving by Hall from the portrait by Cornelius Jansen, in the college library. A life of Harvey by D. Willis, and a translation of his works, have also been published by the Sydenham Society.

HARWICH, a parliamentary and municipal borough and port in Essex, at the mouths of the Stour and Orwell. It is 70 miles from London by the Great Eastern Railway. The parliamentary and municipal bounds are coextensive, and include the parishes of St. Nicholas and Dovercourt. The area is 3306 acres, and the population, in 1861, was 5070.

The chief buildings of interest are the parish churches, town hall and sessions court, new railway hotel, custom-house, gaol, free school and almshouses, Martello tower, circular redoubt, &c. A fine esplanade extends southward from the town, from which good views of the harbour and the German Ocean may be obtained.

There are large manufactories of cement (made from stone dredged at sea off the harbour), and of artificial manures. Fishing and shipbuilding are also carried on. The harbour of Harwich is said to be the best on the east coast of England, being large enough to afford sufficient anchorage for 100 sail of the line in five fathoms of water. It has recently been made a harbour of refuge, as it is the only place between Yarmouth Roads and the Thames capable of affording shelter to vessels during easterly gales. Within the last forty years, however, the sea has made very considerable encroachments on the coast, and already undermined the battery by which the town is defended, which was erected so lately as 1820. Formerly Harwich was the ordinary port of departure from England to the Netherlands; but after the French war its trade rapidly declined, and it was for many years visited principally for sea-bathing. Recently (1864-65), however, its commerce has greatly revived, in consequence of the Great Eastern Railway Company having established a line of steamers from Harwich to Rotterdam in connection with their railway, thus materially reducing the time required for a journey from London to Holland. The experiment is considered to have been perfectly successful, and the business on the route is rapidly increasing, especially in respect to the importation of cattle. The number of vessels registered as belonging to the port in 1865 was 119 (7890 tons). The

entries in 1864 were 887 (138,241 tons), and the clearances 742 (115,298 tons). The customs revenue in 1863 was 1849*l.*; in 1864 it had increased to 2443*l.*

The borough of Harwich sends two members to the House of Commons, the number of electors being about 360. Harwich was the Saxon Harevich.

HARWOOD, REV. DR. THOMAS, perpetual curate of Hammerwich and Burntwood, and a learned scholar and divine, was born at Sheperton, Middlesex, in 1767. He was educated at Eton, and afterwards graduated as B.D. and D.D. at Emmanuel College, Cambridge. In October, 1791, he was elected head-master of the grammar school at Lichfield. In 1800 he was appointed perpetual curate of Hammerwich, and in 1828 was presented to the chapelry of Burntwood, near Lichfield. He was the author of various works, chiefly of a classical or theological character. In 1789 he published 'Annotations upon Genesis;' in 1794 two volumes of sermons; in 1797, 'Alumni Etonenses;' in 1798, 'The Sacred History of the Life of Jesus Christ, illustrative of the Harmony of the Four Evangelists;' in 1801, 'Grecian Antiquities;' in 1804, 'A Manual of Geography,' and 'The History of Lichfield;' in 1819, an edition of 'Erdeswick's Staffordshire;' and in 1826, 'Annotations upon the Liturgy.' To his various studies he devoted a long and industrious life; and independently of the works which he laid before the world, he has left a large collection of interesting criticisms connected with topography, antiquities, and general history. He died in 1843.

HASBERA, a village of Syria, 36 miles W. of Damascus, in a deep glen on a ridge of Mount Hermon. Population, 4000 Christians and 1000 Druses. A Protestant mission was established here in 1846, and in 1860 it was nearly ruined during the Druse massacre, when most of the Christians fled for shelter to Sidon and Tyre.

HASLINGDEN. [LANCASHIRE.]

HASSELQUISTIA, a genus of plants belonging to the natural order *Umbelliferae*, and to the tribe *Tordyliaceæ*. The species closely resemble those of *Tordylium*, and are regarded by some botanists as monstrous forms of this genus.

HASELT. [LINBURG.]

HASTINGS. [SUSSEX.]

HASTINGS, FRANCIS RAWDON, EARL OF MOIRA, and MARQUIS OF, was born in Ireland in 1754. On the breaking out of the American war, his lordship entered enthusiastically into the ranks of the British Army; and in 1775 embarked for the scene of action. In 1778 he was nominated adjutant-general to the British army in America, with the rank of lieutenant-colonel. Here he was engaged in most of the desperate combats which have been recorded in the history of that unfortunate struggle—as the battles of Bunker's Hill, of Camden, Hobkirk's Hill, &c. On his return to England he was created a British peer, and soon afterwards despatched to Holland with 10,000 men to aid his Royal Highness the duke of York. In 1803 his lordship was appointed commander of the forces in North Britain. Shortly afterwards he received the important office of governor-general of Bengal, and at the same time he was appointed commander-in-chief of the army in the East Indies, which he held until 1822. His next appointment, after his return

to England, was as governor of Malta, in which situation he died in 1826.

No governor-general ever held power in India for so long a time, or with more wisdom, energy, and moderation. In his civil administration he was tolerant to the prejudices of the natives, and favourable to the advancement of knowledge. Under his rule and directions the formidable contests with the Mahrattas, the Pindarees, the Nepaulese, and other hostile foes, were brought to a favourable conclusion, and the subjugation of our Indian territories consolidated.

HASTINGS, WARREN, the chief founder and organizer of the British Empire in India, was born on 6th December, 1732, and, after receiving the usual education at Westminster School, went out in 1750 as a writer in the service of the East India Company. After residing about fourteen years in India, he returned home with a moderate fortune. In 1769 he received the appointment of second in council at Madras, and in 1772 was appointed President of the Supreme Council of Bengal. His powers were enlarged by the alteration of the Indian constitution by act of Parliament, in virtue of which he became, 1st January, 1774, governor-general and supreme head of all our Indian dependencies. Affairs were at this time in great disorder, but he weathered the dangers to which the British Empire in India was exposed. Notwithstanding his services, he gave satisfaction neither to the home administration nor to the Court of Directors. The public ear was offended by rumours of cruelty, corruption, and unjust aggression; the Directors censured the lavish and corrupt expenditure, and the independence of his conduct. Repeated attempts were made to obtain his dismissal, but these were uniformly defeated by the Court of Proprietors. Thus supported, he carried matters with a high hand; neglected or positively refused to obey the orders sent by the Directors; overruled the opposition of the Council, of which a majority was, in the first instance, opposed to his views [FRANCIS, SIR PHILIP], and practically exercised an absolute and irresponsible power until February, 1785, when he resigned his office and set sail for England. On his arrival he was received at Court and elsewhere with great favour, and it was thought that rewards and honours—a peerage among them—would be lavishly conferred on him. But, by and by, instead of recompense arose a murmur about punishment—and then that celebrated indictment was prepared, that notable process begun, which afforded Burke, Fox, and Sheridan an opportunity for the display of their eloquence, but which in other respects was entirely fruitless. In the session of 1786, articles of impeachment were brought forward by Mr. Burke, charging him with the oppression and final expulsion of the rajah of Benares; the maltreatment and robbery of the Begums (or princesses) of the house of Oude; and the charges of receiving presents and conniving at unfair contracts and extravagant expenditure. The sessions of 1786–87 having been consumed in preliminary proceedings, the House of Lords assembled in Westminster Hall, February 13, 1788, to try the impeachment, and on the 15th, Mr. Burke, in the name of the Commons of England, opened the charges against the prisoner in a speech which lasted upwards of three days.

[BURKE.] He was assisted in the management of this cause by Fox, Sheridan, Grey, and others. The sessions of 1788, 1789, and 1790 were consumed in going through the case for the prosecution. In 1791 the Commons expressed their willingness to abandon some part of the charges, with the view of bringing the trial sooner to an end; and on the 2nd of June, the seventy-third day, Mr. Hastings began his defence. This was protracted until April 17, 1795, on which (the 148th) day, after a lingering trial of seven years, he was acquitted by a large majority of the House of Peers on every separate article charged against him.

Mr. Hastings attempted to refute the charges of extortion by publicly asserting, in the most solemn manner, that never at any time of his life was he worth 100,000*l*. The law-charges of his defence amounted to 76,080*l*. In March, 1796, the Company granted him an annuity of 4000*l*. for twenty-eight years and a half, and lent him 50,000*l*. for eighteen years, free of interest. He retired completely from public life, to an estate which he purchased at Daylesford in Worcestershire. He died August 22nd, 1818, having been raised to the dignity of privy-councillor not long before.

Hastings, whose enterprises were so gigantic, was small in stature, but vigorous in frame. His chief misfortune was, that born a gentleman and educated a scholar, he had to begin life as a commercial adventurer: Government was to him an audacious commercial speculation, which he strove in vain to hide by viceregal splendour.

HAT, a well-known covering for the head. Hats are made of silk, fur, wool, straw, and many other materials. The curious art of felting is believed to have been brought to Western Europe by the Crusaders. Wool was the material first used in making felt hats; but in time, as trade with America became developed, it was superseded by the fur of the beaver, and for many years, fine beaver hats, in the manufacture of which great skill and care were required, were worn by the higher and middle classes in Great Britain. About the year 1830 it was estimated that a million beavers were annually killed to supply the hat trade in Europe. This led to a great scarcity of beaver fur, and to the substitution of silk, which now forms the most important article in the manufacture of hats. The silk hat consists of a body and rim usually made of two or three layers of cotton cloth, saturated with varnishes to give the fabric stiffness, and make it waterproof. These are moulded on wooden blocks according to the fashion of the day, and then the shape is covered with lac and dammar varnish, and the fine silk plush is applied with great nicety, so as to make it adhere in every part, and to render the seam as imperceptible as possible. It is then trimmed with silk braid on the edge of the brim, and a silken band round the junction of the body with the brim, and a lining of leather and silk put in to complete the hat. Plush is largely made in England for covering silk hats; but the best, for the so-called 'Paris hats,' comes from France. Lightness, gloss, and durability, are the chief qualities of this kind of hat, but it is easily damaged, and quite unsuitable for rough wear in travelling or out of door pursuits; and hats of felted wool, of the slouch or wide-awake form, are very much worn, especially in the country.

The importation of hats into the United Kingdom in 1863 was as follows:—Of felt, 151,278, value 45,388*l*., nearly all from France and Belgium; of hair, wool, or beaver, 3053, value 1221*l*.; and of silk, 582, value 86*l*. In the same year were exported, principally to the colonies, 1,241,544 felt hats of British make, and 21,427 foreign, total value 229,865*l*.; 81,102 silk hats, value 32,464*l*., were also exported in 1863. For the trade in, and manufacture of straw hats, see STRAW PLAIT.

HATCHETINE. *Mineral Adipocere*. This substance occurs in thin flakes in the cavities of the ironstone of South Wales. It is very soft, somewhat granular in appearance; translucent; colour yellowish white or greenish; not elastic; inodorous; combustible. It melts at 170°, and is soluble in ether. It consists of C¹ H¹.

HATCHMENT, sometimes called *achievement*, is the funeral escutcheon of the higher classes generally placed in front of the house after their death, and sets forth the rank of the deceased. It is in the form of a diamond, and usually about three or four feet square; the border or framework being black, and the arms of the deceased impaled in the centre on a black ground.

HATCHWAYS are openings in the deck of a ship, leading from one deck to another, and generally used for hoisting or lowering goods. The number of hatchways varies according to the size and use of the ship, being most numerous in merchant vessels and barges.

HATHERLEIGH. [DEVONSHIRE.]

HATEMISTS, a fanatical sect of Dutch Calvinists, who flourished in the province of New Zealand, in the seventeenth century, and were so called from Pontian Van Hattem. He maintained the system of a fatal and uncontrollable necessity, and held that mankind were under no kind of obligation to obey the divine laws.

HAUBERGEON, or HAUBERK. [ARMOUR.]

HAUGHTON, WILLIAM, a dramatic writer, was probably somewhat the junior of Shakspeare. In Henslowe's Diary, under the date of November, 1597, he is called 'Young Haughton;' and his name occurs frequently in that curious record till the end of the year 1600, but not later. He wrote several plays unassisted; in others his coadjutors were Chettle, Day, and still more frequently Dekker. In 1600 there was licensed a tragedy of his, not preserved, called 'Ferrex and Porrex;' and Mr. Collier has conjectured that Haughton's 'Devil and his Dam,' described as in progress about the same time, may have been an alteration of 'Grin, the Collier of Croydon.' But the only extant plays in which Haughton was certainly concerned are two. 1. He was sole author of the lively comedy called 'Englishmen for my money; or, a Woman will have her Will,' which (under the latter title) appears in Henslowe's book in 1598. It was printed in 1616, in 1626, and 1631, and has been reprinted in a small collection called 'The Old English Drama,' 1830, 4 vols. 12mo. 2. Dekker, Haughton, and Chettle were jointly the authors of 'The Pleasant Comedie of Patient Grissill,' which was entered at Stationers' Hall in March, 1600, printed in 1603, and reprinted from a very rare copy by the Shakspeare Society in 1841.

HAUKAL, ABUL KASEM MOHAMMED IBN, a celebrated Arabic traveller and geographer. The few particulars we possess concerning his life are derived from his own work. Partly to avoid the tyranny of the reigning sultan, and to improve his own fortune by trade, he set out from Bagdad, A.H. 331 (A.D. 942-43), to visit foreign countries. He does not tell us into what countries he travelled; but we learn from his own account that he was in Mesopotamia, A.H. 358 (A.D. 968-69); in Africa, A.H. 360 (A.D. 970-71); in Sicily, A.H. 362 (A.D. 972-73); and in Mecca, A.H. 364 or 365 (A.D. 974-75 or 975-76).

Haukal's work on geography is entitled 'A Book of Roads and Kingdoms.' The description of each country is accompanied by a map.

Manuscripts of Haukal's work on geography are rarely met with even in the East. There is a copy in the Bodleian Library at Oxford, and another at Leyden. From the latter MS. Uylenbroeck has given an interesting account of the work in his 'Iracæ Persicæ Descriptio: præmissa est Dissertatio de Ibn Haukali Geographi codicis Lugduno-Batavo,' 4to., Lugd. Bat., 1822.

Ouseley published, from what he conceived to be a Persian translation of the Arabic of Haukal, a work entitled 'The Oriental Geography of Ebn Haukal, a traveller of the tenth century,' London, 1800; and De Sacy gave a further account of this work in the 'Magasin Encyclopédique,' vol. vi., pp. 32-76, 151-186, 307-333. But Uylenbroeck has shown that the Persian treatise translated by Ouseley cannot be regarded as either a translation or an abridgment of the Arabic of Haukal. He considers it probable that the Persian work was one of those which Haukal made use of in compiling his Geography, and that it was written by Ibn Khordadbeh.

HAUKSBEE, or HAWKSBE, FRANCIS, was born in the latter part of the seventeenth century. He was admitted a fellow of the Royal Society in 1705, and between 1705-11 there appeared several papers in the 'Philosophical Transactions,' giving an account of his experiments in electricity. In 1706 he recognized the electricity of glass by friction, and was thence led to the construction of the electrical machine. In 1709 he published his 'Physico-Mechanical Experiments on various Subjects, touching Light and Electricity producible on the Attrition of Bodies,' London, 4to.; and in 1731, 'Proposals for a Course of Chemical Experiments,' 4to. In the same year he published 'An Essay for introducing a Portable Laboratory.'

HAUSMANITE, a mineral found in the Hartz Mountains, near Ihlefeld, which crystallizes in octahedrons. Its colour is of a brownish black, with an imperfect metallic lustre. Its specific gravity is 4.8.

HAUTOBOIS. [OBOE.]

HAUTEFEUILLE, JEAN DE, a French mechanician, was born at Orleans, March 20, 1647. His father was a baker, but the duchess of Bouillon, to whom the young man was introduced, paid the expense of his education, and engaged him to enter into the ecclesiastical state.

The Abbé Hautefeuille devoted himself to the study of subjects connected with physical science, and to the construction or improvement of instruments; but he is distinguished chiefly by the claims

which he advanced, in 1675, to the honour of having invented a spring-balance for watches. About the same time Huyghens invented, for the like purpose, a spring, which he made of a spiral form; and it is remarkable that Dr. Hooke had, about the year 1658, invented a balance-spring for watches, but he spent several years in improving his escapement, and his watches were not made public till about the same year that the inventions of Hautefeuille and Huyghens were in use in Paris.

Hautefeuille published a method of finding the declination of a magnetic needle (1683); an account of a magnetic balance (1702); with accounts of a micrometrical microscope, and of an instrument for observing the altitudes of celestial bodies. He also published, in 1719, a work entitled 'Nouveau Système du Flux et Reflux de la Mer,' in which the phenomena of the tides are made to depend upon a particular motion which he ascribes to the earth: but the best of his works is his 'Dissertation sur la Cause de l'Echo,' which had been read before the Academy of Bordeaux in 1718, and was published in that city in 1741. He died October 18, 1724.

HAUTE SAVOIE. [SAVOIE, HAUTE.]

HAÛY, RENE'-JUST, ABBE', was born 1743, at St. Just, in the present department of Oise. He commenced his studies at the college of Navarre, to which college he was appointed professor in 1764, and subsequently also to that of the Cardinal Le Moine. He was the first to show that the structure of crystalline substances was regulated by laws as invariable as those to which organized bodies are subjected. His theory rests upon the supposition that all the crystalline forms belonging to any single species of mineral, are derivable from some one simple form which may be regarded as the type of the species. He received many scientific appointments in France. He died at Paris, June 3, 1822. Besides numerous memoirs upon mineralogy and electricity, inserted in the *Journal des Mines*, and the *Annals of the Museum of Natural History*, he has left the following works: 'An Essay on the Structure of Crystals,' 1 vol., 1784; 'Exposition of the Theory of Electricity and Magnetism,' 1 vol.; 'Treatise on Mineralogy,' 4 vols., 1822; 'Treatise on Physics,' 2 vols., 1821; 'Treatise on Crystallography,' 2 vols., 1822; and some others.

HAÛYNE. *Latialite*. This mineral occurs in rhombic dodecahedral crystals, of a bluish green colour. The massive varieties are amorphous; structure granular, compact. The composition is complex, but consists chiefly of silica, alumina, potash, lime, and sulphuric acid.

HAVAGE, an ancient and almost obsolete term, signifying race or family connections.

HAVANNAH, or HAVANA, a flourishing commercial town, with the best harbour in the West Indies, or perhaps in the world, stands on the north coast of the island of Cuba, in 23° 9' 4" N. lat., 82° 22' W. long., and in 1861 had a population of 196,847. A channel half a mile long, 350 yards broad, 8 to 10 fathoms deep, and without bar or obstruction of any sort, leads to the harbour, which is formed by a magnificent bay nearly three miles long, and half as much in width, sheltered by hills from every wind, and capable of accommodating a thousand ships of the largest size, vessels of the

greatest draught coming close up to the quays. The city is built along the entrance to, and on the west side of, the basin. In the city the streets are narrow and dirty, but in the suburbs, which are now larger than the city, they are wide and well laid out. Of late years, too, all parts of the town are much improved in cleanliness, and less unhealthy in summer than formerly. The entrance to the harbour is defended by two strong fortresses, El Morro and La Punta, and a continuous series of batteries runs along both shores. The city also, which is entered by three gates, is defended by a strong citadel; and fortifications have been erected on all the neighbouring heights. The cigars of Havannah are of world-wide celebrity. It has also manufactures of chocolate, woollen fabrics, and straw hats. Most of the mercantile nations have establishments in the city. British, Germans, Dutch, Belgians, and Americans are very numerous. The shops contain displays of the most costly articles of European manufacture. In general the houses are of only one story, but of very solid construction; the windows are unglazed, and always kept open on account of the heat of the climate. Among the finest public buildings is the cathedral, in which the remains of Columbus now lie, having been removed hither from San-Domingo in 1795. The opera-house is one of the most magnificent in the world. Other large structures, more remarkable for solidity than elegance, are the two hospitals, the residence of the Captain-General near the citadel, the naval arsenal, the post-office (correo), and the great tobacco factories. Havannah is the seat of a bishop, has a university, with medical and law schools, an ecclesiastical college, theatres, a botanic garden, museum of natural history, school of painting, dockyard, newspapers, and three fine promenades, one along the ramparts, one within the town, and a third without the walls (Paseo Extra-Muros). These walks are shaded with trees and adorned with fountains. There are railways to the places of most importance in the interior.

A glance at the map shows the great importance of Havannah in a political point of view, commanding as it does both the inlets to the Gulf of Mexico. Among the commercial cities of the western hemisphere it ranks inferior only to New York, and for a long period it engrossed the whole foreign trade of Cuba; but of late years a portion has been obtained by Matanzas, a town about 60 miles E. The principal articles of export are sugar, copper ore, coffee, raw tobacco and cigars, and molasses; other exports are mahogany, cedar, rum, cocoa, cotton, wax, hides, fruits and preserves, honey, dye-stuffs, &c. The imports are composed of flour, corn, provisions, cotton goods, wine, linen, hardware and metals, silk, spices, leather, butter, lard, cheese, fish, deals, casks, hoops, &c. The trade of Havannah extends to all countries of Europe and America, but chiefly to Spain, the United States, and England.

The chief landholders and capitalists at Havannah have for some time been engaged in considering a scheme for the gradual abolition of negro slavery. The plan is based upon the principle of the slave emancipating himself by his own labour. It seems to have been received with a considerable degree of favour, for the feeling in the island of Cuba that a change in the relations between the proprietors

and the slaves is imminent is general, and the desire seems to be as general that, whatever the change, it should be a step toward complete emancipation.

HAVANT. [HAMPSHIRE.]

HAVELOCK, GENERAL SIR HENRY, an illustrious soldier, whose skill and bravery nobly retrieved English honour in British India, was born, April 5, 1795, at Bishopwearmouth, in Durham. He was educated at the Charterhouse School, and in 1813 was entered of the Middle Temple, where his most intimate associate was the late Judge Talfourd, author of 'Ion.' His elder brother, Lieutenant-Colonel William Havelock, having distinguished himself in the Peninsular war and at Waterloo, he became in turn inspired with the military ardour of his family. A month after the battle of Waterloo he was appointed, by purchase, second lieutenant to the Rifle Brigade; and he had the good fortune, in his military training, to have the assistance of Captain, afterwards Sir H. Smith, the hero of Aliwal. Having subsequently exchanged into the 13th Light Infantry, in 1823 Havelock departed for India; and in the Burmese war, which broke out in 1824, he was appointed deputy-assistant-adjutant-general. He was present at the actions of Napadee, Patangoh, and Peghan. Being an accomplished scholar and a linguist, our hero, in 1827, published the 'History of the Ava Campaigns,' which was remarkable for the freedom of its comments on the circumstances of the war. Notwithstanding the talents he everywhere exhibited, and the learning he displayed on his passing for languages at the college of Calcutta, he remained for twenty-three years a subaltern. About this period, an army was collected for the invasion of Afghanistan. Havelock accompanied the British forces, and was present at the capture of Ghuznee and Cabul. He afterwards published a 'Narrative of the Afghan Campaign,' which was highly appreciated for its style and fidelity. On the second invasion of Afghanistan, Havelock was sent to join Sir R. Sale, at Jellalabad, and was present at the various encounters with the Ghilziees. He had also the chief direction, under General Sale, of the memorable defence of that place, of which he wrote the despatches, so highly commended by Sir G. Murray. In the crowning attack upon the forces of Akbar Khan, and their final defeat, Havelock commanded the right column, and broke the enemy's lines before the main forces of the British could enter into action. For this gallant deed he was made a Companion of the Bath, and gazetted to a brevet-majority.

The following year Sir Henry Havelock was promoted to a regimental majority, and nominated interpreter of the Persian language to the commander-in-chief, Sir Hugh Gough. In 1844 he was promoted to the rank of lieutenant-colonel, by brevet. In 1845 he was actively engaged in the war against the Seiks, and took a conspicuous part in the battles of Moodkee, Ferozeshah, and Sobraon, in which he had three horses shot under him. He was afterwards appointed deputy-adjutant-general of the Queen's troops at Bombay; but twenty-five years of ever active service beginning to make an impression on his constitution, he visited Europe for the renovation of his health. On his return to Bombay, in 1851, he was made brevet-colonel, and

appointed, through the interest of Lord Hardinge, quartermaster-general, and the adjutant-general of the Queen's troops in India. During the short war with Persia, Sir Henry had the command of the second division, and was engaged in the action of Mohammerah. In the meantime the sanguinary rebellion of the Indian Sepoys had broken out, and Havelock, on his return from the Persian campaign, was sent up to Allahabad as brigadier-general, when he was frequently engaged with the overwhelming forces of the sanguinary rebel Nana Sahib. He defeated his formidable enemy in nine pitched battles, took about one hundred pieces of cannon, recaptured Cawnpore, and rescued Lucknow and its brave defenders from the impending horrors that had been perpetrated at Delhi and Cawnpore. But at length, worn out by unceasing toil and constant exposure, he was seized with a mortal disease, and expired at Lucknow on the 25th of November, 1857.

HAVER, in Scotch law, is one who holds a deed, writing, or other document required in a cause, either for inspection or in evidence, and who is called upon to exhibit it judicially. The right of litigants to call on third parties to produce documents in their possession, is regulated by the same principles as those which compel their attendance as witnesses. No one is bound to produce a document which might injure himself; under this limitation, that either party to a cause may call upon his adversary to exhibit a writ necessary to his case, provided that writ is particularly specified or described. Parties cited as havers must either produce the documents required, or depose that they neither have them, nor have had them since the date of citation, nor have fraudulently put them away, nor know or suspect where they presently are. (Erskine, *iv.* 1, 52; *Stair iv.* 33, 2, and *iv.* 41, 5.) The method employed to compel production is by letters of incident diligence. (Shand's 'Pract.,' i. 369.)

HAVERFORDWEST. [Pembrokeshire.]

HAVER, or HAVER-DE-GRACE, LE, a large commercial town and fortified seaport in the department of Seine-Inférieure in France, stands in a low marshy spot on the southern shore of the English Channel, at the embouchure and on the right bank of the Seine, in 49° 29' N. lat., 0° 6' 33" E. long., distant by railway 134 miles from Paris, 24 W. from Rouen, and has 74,336 inhabitants. On the decline of Harfleur in the latter half of the fifteenth century, Louis XII. in 1509 laid the foundation of Havre, threw up some fortifications, and built two short jetties. His successor, François I., by the sums he expended on the town, and the great privileges he conferred upon it, is however to be looked on as the true founder of Havre. In this reign the new city was in great measure built, the harbours improved, the town-hall and the ramparts erected, and the Tower of François I., which still subsists, constructed for the defence of the harbour. In 1562 the Prince de Condé betrayed the town to Queen Elizabeth, who garrisoned it with 6000 troops under Dudley, earl of Warwick. The English were forced to capitulate in 1563, but carried away as a memorial of their occupation the archives of the town. Louis XIII. added to the fortifications, and built a citadel, which was afterwards rebuilt on a new plan by order of Cardinal Richelieu. Under Louis XIV. the extent

of the town was nearly doubled; part of the fortifications and the old gate of Ingouville were demolished, a new quarter built, and the citadel converted into an immense military quarter, which comprises an arsenal, governor's residence, ammunition stores, and large barracks, forming together a spacious and handsome square round the Place d'Armes. Other fortifications were afterwards erected, but as they became a nuisance from the obstruction they presented to the extension of the town, they have recently been demolished, and Havre has now absorbed the neighbouring communes of Ingouville and Gravelle l'Heure.

The town is entered by several gates with draw-bridges; of which the Porte-Royale, in form of a triumphal arch, is the most remarkable. The old part of the town, which is built round the harbour, presents regular but narrow streets. The wooden houses, of which it was formerly composed, have gradually given way to more solid and sightly structures. The new part is built on a regular plan; the streets are wide, cross each other at right angles, and present several handsome houses. The principal street in Havre is the Rue de Paris, which presents more commercial activity than is seen even in Paris. There are few buildings that call for special notice; besides those already mentioned may be named the church of Notre-Dame, the new city hall, built in the style of the Tuileries, the mansion-house, the custom-house, the exchange, the great tobacco factory on the Quai d'Orléans, the bonding warehouses, the public library, which contains 20,000 volumes, the theatre, and the Frascati baths on the sea-shore. Tribunals of first instance and of commerce are held in the town, which has also a chamber of commerce, a naval school of the first class, a school of applied geometry, several insurance offices, &c.

A singular local phenomenon respecting the tide, which rises at Havre to 20 and 27 feet, gives an important advantage to the harbour. It results from the position of the harbour with respect to the Seine that the tide having reached its maximum continues *full for three hours*, in consequence of the strong current of the river damming up the water in the channel formed by the jetties; and this exception to the general tidal law gives vessels leaving the harbour time to reach the sea, even against a head wind, in a single tide. The fine quays which border the docks are always lined with vessels, and present great activity of business.

The harbour of Havre is one of the most accessible in France. It is entered by a narrow channel, which is formed by two long jetties, running nearly E. and W., and built between two banks of shingle, and which, owing to the current, require little dredging. The channel leads to the outer harbour, which is occupied by a large number of coasters, and within it are capacious wet docks, capable of accommodating 500 ships. The largest is L'Eure, which contains 700,000 square feet. An immense dry dock has just (1865) been completed, to obviate the necessity of sending large steamers to Southampton for repairs.

Havre has become the Liverpool of France, as the principal site of communication with transatlantic countries. It receives three-fourths of all the cotton imported into France, ships most of the French exports to America, and, generally speaking, possesses

about a fifth of the entire trade of the country. The exports and imports together are now (1865) nearly 60,000,000*l.* per annum. The imports consist chiefly of cotton, spices, coffee, tea, sugar, timber, coal (from England), &c.; and the exports of French manufactured goods, wine, brandy, oil, jewellery, provisions, &c. It formerly had several vessels engaged in the whale fishery, but of late years this employment has been discontinued. It has direct communication with Great Britain, Holland, Hamburg, Portugal, Mexico, Brazil, United States, India, &c.

The British consul at Havre, in his report for 1865, states that, in 1864, 1106 vessels from the United Kingdom entered the port. Their cargoes consisted of coals, cotton, iron, copper, machinery, lead, petroleum, cement, general manufactured goods, &c., and their united tonnage was 305,154. He says, a revolution is slowly but surely taking place in thoughtful minds, which cannot but beneficially affect the maritime commercial relations of France, and particularly the prosperity of the port of Havre, which has so long been kept back by the differential duties levied on foreign ships frequenting it. It begins at length to be perceived by all discerning minds, that heavy taxes levied on foreign ships, and materials of which ships are built, create a monopoly in favour of French vessels which adds little to the national wealth, whilst they, by discouraging a free and profitable intercourse with foreigners, exclude the advantages which arise from free competition in trade, and hamper commercial undertakings with vexatious regulations and formalities, that prevent many foreign vessels from repeating their visits to the port. Considerations of this kind, which for some time have occupied the attention of the superior council of commerce, and indeed of the Government, have brought the council to recommend the abolition of all tonnage duties now leviable upon foreign vessels entering the ports of France, upon the ground that they are injurious to the general industry of the country, the interests of consumers, and of the mercantile marine of France.

The council adduces as a proof of the good effects that may be expected from this radical change of system, the prosperous state of trade at the port of Marseilles, since the tonnage duties levied upon foreign ships arriving there were abolished. These opinions appear to have received the sanction of the Emperor.

Havre has direct railway communication with Paris, and the continuation of the line to Strasbourg has afforded such facility of communication with Germany, that the greater part of the trade of that country with America is carried on through Havre.

The town has extensive manufactories of paper, sulphuric acid, tobacco, cotton goods, starch, lace, oil, machinery, ropes, and salt. There are also some sugar refineries, and several shipbuilding yards, which have constructed some of the best sailing vessels and swiftest steamers belonging to France.

The handsome suburb of *Ingouville* is built on a high hill overlooking the town, the harbour, and the sea, and contains many pretty country seats belonging to the merchants of the town. Havre itself lies on low ground, and has often suffered from the sea in violent hurricanes.

HAWFINCH, *Haw Grosbeak*, *Grosbeak* of the English; *Le Grosbek* and *Pinson Royal* of the French; *Frogione*, *Froccione*, *Frosone*, *Frisone*, *Friggione* of the Italians; *Kernbeisser*, *Kirsch-Kernbeisser*, *Kirschfink*, *Nussbeisser* of the Germans; *Loxia Coccothraustes* of Linnæus; *Fringilla Coccothraustes* of Temminck; *Coccothraustes vulgaris* of Brisson.

Description.—Rump, head, and cheeks red-brown; edging round the bill, space between that and the eye, a line beyond the eye and throat, deep black; a large ash-coloured collar just below the nape; back and greater part of the wings deep brown, but there is an oblique white stripe upon the wing, and beyond it a considerable space of a light whitish colour



Hawfinch (*Coccothraustes vulgaris*).

going off into chestnut; secondary quills as if cut off square at the ends, or, as Edwards says, with justice, like the figures of some of the ancient battle-axes, glossed with rich blue, less conspicuous in the female; tail feathers white within, of a blackish brown on the external barbs; lower parts of the bird vinous red; iris pale red (according to Temminck), feet and bill grayish brown. Length seven inches.

Female, generally like the male, but with the colours much less brilliant.

The young of the year before the moult are very different in their plumage from the adult birds. Throat yellow; face, cheeks, and summit of the head dirty yellowish; lower parts white, or whitish; sides marked with small brown streaks, with which all the feathers are terminated. As the young bird advances in age, some red vinous feathers appear disposed irregularly upon the belly; the upper parts are of a tarnished brown spotted with dirty yellowish; bill whitish brown, except at the point, where it is deep brown.

The Hawfinch is plentiful in some districts of France, as well as in Germany, Sweden, and parts of Russia. It is not uncommon in Italy. In our island the Hawfinch is not often to be seen, probably more on account of its reclusive habits than its actual rarity. Selby and others have remarked that this bird is only an occasional visitant, but it has been satisfactorily proved by Mr. Doubleday that it is not migratory, but remains with us during the whole year, inhabiting dense woods, and invariably perching on the topmost branches of the tallest trees: it builds, however, in dense bushes.

Hard seeds and kernels form the principal food of the Hawfinch or Grosbeak, but it feeds also on the berries of the hawthorn, whence its name.

HAWHAW, a fence or bank that interrupts an alley or walk sunk between slopes and not perceived till approached.

HAWICK. [ROXBURGHSHIRE.]

HAWK. [FALCONIDÆ.]

HAWK MOTHS (*Sphingidæ*), a family of lepidopterous insects known also by the name of the *Sphinx moths*. The body is thick and stout, the antennæ are thickened in the middle or towards the end, and terminate acutely. The wings are comparatively narrow, and traversed by strong nervures. The habits of some are nocturnal, of others diurnal. The metamorphosis is complete. The caterpillar lives on the leaves of shrubs and trees. The best known hawk moths are the Privet moth (*Sphinx ligustri*) and the Death's Head moth (*Acherontia atropos*). The genus *Deilephila*, or twilight moth, contains a number of species noted for the elegance of their forms and the beauty of their colouring.

HAWKE BAY, is the name of a provincial government of New Zealand, in the north of that island, and which, till 1858, formed part of the province of Wellington. The capital is Napier; and the extent of the territory is 2,639,200 acres, or 4122 square miles. The value of the exports is about 60,000*l.* per annum. In 1863 the population was 2,300, and 4,000 aborigines.

HAWKER. [PEDLAR.]

HAWKESWORTH, JOHN, LL.D., was a successful writer of the last century. The date of his birth (1715 or 1719) and the occupations of his early life are variously stated. In so short a notice, all that is essential to record is that he was bred to some mechanical occupation, and therefore deserves the more credit for his talent and industry in supplying the defects of a rude and illiterate education. His first appearance was as a contributor to the 'Gentleman's Magazine,' in which he succeeded Dr. Johnson as compiler of the parliamentary debates in 1744. In 1752 he undertook, assisted by Johnson, Warton, and one or two others, a series of essays, called the 'Adventurer.' They extended to the number of 140 (seventy of which are ascribed to Hawkesworth himself), and were received with great approbation. Herring, archbishop of Canterbury, was so much pleased with the work, that he procured a degree in civil law for the conductor. In 1761 he published an edition of Swift, with a life prefixed. On the return of Captain Cook from his first voyage of discovery in the South Seas, he compiled an account of the voyage in three vols. 4to., 1773 [COOK], and received for recompense the liberal sum of 6000*l.* The work, however, did not give entire satisfaction; exceptions were taken to the warmth of his descriptions of manners, and to his religious speculations. The chagrin occasioned by these censures is said to have shortened the author's life. Dr. Hawkesworth translated 'Telemachus,' and wrote 'Almorán and Hamet,' an eastern romance, which was much admired. He was a regular contributor to the 'Gentleman's Magazine.'

HAWKING. [FALCONRY.]

HAWKINS, SIR JOHN, a distinguished seaman of the reign of Elizabeth, was born in Plymouth in

1520. His youth was spent in trading to Spain, Portugal, and the Canaries. With the assistance of some merchants, he fitted out a small squadron in 1562, and obtained, partly by purchase, partly by force, a cargo of 300 negroes, whom he carried to Hispaniola, and there sold. This, we believe, was the first adventure of Englishmen in that inhuman traffic. He made a second voyage in 1564, and a third in 1567: the latter turned out unfortunately. He was attacked by the Spanish authorities in the port of S. Juan de Ulloa, and saved but two ships of his squadron, with which, after suffering great hardships, he returned to England in January, 1568. In 1588 he served as rear-admiral against the Spanish armada [ARMADA], and was rewarded with the honour of knighthood. Being sent with Frobisher in 1590 to intercept the Plate fleet and harass the trade of Spain, he failed in the first object, but succeeded in the second. In 1595 he was appointed, jointly with Drake, to command a more important expedition against the Spanish settlements in the West Indies. This enterprise proved fatal to both these hitherto successful commanders. [DRAKE.] Hawkins died November 21, 1595. Sir John Hawkins sat in Parliament for Plymouth, and founded an hospital at Chatham for poor and sick seamen.

HAWKINS, SIR JOHN, the biographer of Johnson and the historian of music, was born on the 30th March, 1719. He was articled to an attorney, and remained in the law till 1759, when he retired with a competent fortune. While in the law, he cultivated the study of music, and associated with Dr. Johnson and other literary men. Between 1759 and 1772 he served as a Middlesex magistrate; and it was for his efficiency in this office that he was knighted.

Sir John Hawkins now set seriously about finishing a work which has gained a European reputation, his 'History of Music.' He went to Oxford, and there remained some time, to examine the books, in the Bodleian and other libraries, connected with his inquiry; and he spent two or three years in similar researches in other quarters. In 1776 the work appeared, in five quarto volumes, under the title of 'A General History of the Science and Practice of Music.' The work was appreciated by learned musicians; but Dr. Burney published a similar history about the same time, smaller in bulk and more pleasing in style; and other circumstances led to a series of most virulent attacks against Hawkins and his work, so that his 'History' fell almost dead from the press.

Time, however, has done that justice to the author which his contemporaries denied him.

Sir John Hawkins afterwards published an edition of Walton's 'Angler' and a 'Life of Dr. Johnson.' He purchased and presented to the British Museum Dr. Pepusch's valuable musical library. He died in 1789, leaving behind him a high character both for moral and intellectual qualities.

HAWKSHEAD. [LANCASHIRE.]

HAWKSMOOR, NICHOLAS, who executed many buildings of note in the early part of the last century, was born in 1666, and at the age of seventeen became the pupil of Sir Christopher Wren. His style partook of the massive and heavy, combined with a certain coldness and baldness. Of this we have proof

in the church of St. George's in the East, Ratcliffe Highway, commenced by him in 1715. That of St. Mary Woolnoth, in Lombard Street, is very much better. But it is chiefly as the architect of St. George's, Bloomsbury, that Hawksmoor is entitled to notice. St. Anne's, Limehouse, is another church by him, which deserves more praise than has fallen to its share.

Among his other works were Easton Neston, in Northamptonshire, and a mausoleum at Castle Howard. He was also employed to repair the west front of Westminster Abbey. The south quadrangle and street front of Queen's College, Oxford, have by some been attributed to him, though they are generally supposed to have been the work of Wren. That he did much at All Souls' College, in the same university, is unquestionable. He died in March, 1736, at the age of seventy.

HAWKWEED (*Hieracium*), a genus of perennial plants of the natural order *Compositæ*, or composite family, to be met with in dry, hilly, or woody places, and flowering late in summer or early in autumn. Stems erect and branched. Leaves hairy or rough. The flowers are united in a common calyx, composed of imbricated leaflets. There are above thirty species of *Hieracium* found in Britain.

HAWSE-HOLES, the round holes under a ship's head through which the cables pass. The word hawse is also used to denote the space in front of a ship which lies between her bow and the anchor at which she rides.

HAWTHORN. [*CRATÆGUS*.]

HAWTHORNE, NATHANIEL, a distinguished American author, was born in 1809, at Salem, Massachusetts. He was educated at Bowdoin College, where he graduated in 1825, having for classmates the poet Longfellow and John S. C. Abbot. In 1837 he published a series of papers under the title of 'Twice Told Tales,' of which a second series appeared in 1842. In the following year he married and took up his residence at Concord, where he wrote a charming volume of tales and sketches, entitled 'Mosses from an Old Manse.' In 1846 he was appointed surveyor in the custom-house at Salem, which office he held for only three years. The following books appeared from his pen in succession:—'The Scarlet Letter;' 'The House of the Seven Gables;' 'Grandfather's Chair,' a series of puritan stories for the young; 'A Wonder Book for Boys and Girls;' 'Biographical Stories;' 'Blithedale Romance;' and 'Transformation; or, the Romance of Monte Beni,' which last is regarded by many critics as his best.

Hawthorne was a constant contributor to various reviews and magazines, and in 1852 he executed a task of political value, to himself at least, in the life of Franklin Pierce, who was then a candidate for the presidency. The United States consulship at Liverpool was bestowed upon Hawthorne when his friend was elected president, in which office he remained four years, and left as his latest literary work, 'Our Old Home,' in two volumes, containing admirable criticisms upon English life and society from an American point of view. He died in his native country, May 19, 1864. All his works are written in an exquisitely simple, easy, and graceful style, which, combined with their originality, entitle them to a high place in English literature.

HAY. [*BRECKNOCKSHIRE*.]

HAY is the name given to grass or other plants dried for the purpose of feeding cattle. In the pasture districts of England, the product of a large surface of natural grass land is thus used; but in Scotland the crop consists chiefly of artificial grasses. The plan of making hay varies in different parts, but the following is adopted on the best farms. The grass is cut with a scythe or mowing machine, then shaken and spread out by forks or a tedding machine; towards evening it is raked up into rows, to be spread out again next morning, and again raked into rows, and lastly into heaps or cocks for convenience of carrying. If the weather is favourable, the hay will be ready for the rick on the second or third day. The time required will, however, vary according to the weather, the bulk of the crop, and the quality of the land. Hay usually averages from one to two tons per acre. It should be cut when the grass is in bloom, as it then contains the greatest moisture and nutritive qualities. When left till the seed ripens, it becomes tough and dry, and loses much of its sugar, gum, and gluten. It requires to be carefully made and thoroughly dried before being ricked, as when picked up too soon it becomes over-heated, turns black, and sometimes takes fire. If put together when damp from rain or dew it speedily moulds and spoils. June is the usual month for haymaking in England, and July in Scotland.

HAYDN, JOSEPH, compiler of the 'Dictionary of Dates,' which has passed through numerous editions, and still maintains its reputation as a useful work of reference. He was also the author of 'The Book of Dignities, containing Rolls of official personages of the British Empire, &c. It was a sort of Beatson's Political Index modernized. Mr. Haydn likewise edited the last edition of Lewis' Topographical Dictionaries. He died in 1856; and a short time before his death the government assigned him a small pension of 25*l.* per annum, which is still continued to his widow.

HAYDN, JOSEPH, the renowned musician, was born at Rohrau, in Austria, on the 31st of March, 1732. While quite a child, he learned the violin and singing under a relation, and then practised in the choir of St. Stephen's at Vienna. He gradually studied composition, under circumstances of much privation, and earned a subsistence by his singing; but his soprano voice left him at the age of seventeen. Some pleasant hours with Porpora and Metastasio, a system of giving lessons, a few engagements as an orchestral performer, and an unhappy marriage, brought him down to the year 1761, when, at the age of twenty-nine, he became kapell-meister to Prince Esterhazy, and his privations were, then at an end. In the prince's palace at Eisenstadt, in Hungary, Haydn composed all the great works which he produced prior to the year 1791, and under advantages which few have possessed; he had a full and choice band, living under the same roof with him, at his command every hour in the day.

In 1791 Haydn arrived in London to fulfil an engagement, and produced during that and the following year, at 'Salomon's Concerts,' in the Hanover Square Rooms, six of his 'Twelve Grand Symphonies;' and he also published many canzonets, quartets, sonatas, &c. In 1794, during a second

visit, he produced the remaining six symphonies. His works and performances brought him large profits, as well as honours and compliments from all quarters.

In 1791 Haydn gave to the world his oratorio 'The Creation,' the greatest of his works, though composed in his sixty-fifth year. Two years after this he composed 'The Seasons.' The last productions of his genius were two sets of quartets.

Haydn retired to Vienna on a competency obtained by his professional labours, and there died on the 31st May, 1809. His works are astonishingly numerous, embracing every class. Among them are 116 symphonies, eighty-three violin quartets, sixty piano-forte sonatas, fifteen masses, four oratorios, a grand 'Te Deum,' a 'Stabat Mater,' fourteen Italian and German operas, forty-two duets and canzonets, upwards of 200 concertos and divertissements for particular instruments, &c. Many of these, but not the most valuable, were irretrievably lost in the fire which consumed the palace of his patron at Eisenstädt: the best are out of the reach of danger; they have been printed and reprinted in most of the capitals of Europe. Haydn is universally deemed one of the most original and imaginative of composers.

HAYDON, BENJAMIN ROBERT, an English historical painter of great powers and ability, but more remarkable for the vicissitudes of his life than distinguished for the excellence of his works. He was the son of a bookseller at Plymouth, where he was born, January 23, 1786, and he was educated at Plympton grammar-school. He adopted the profession of a painter contrary to the wishes of his father, who nevertheless allowed his son to visit London and enter as a student in the Royal Academy. Haydon arrived in London in 1804, and in the following year entered the Academy, where he at once formed an intimacy with his fellow-pupils, Wilkie, and Jackson the portrait-painter; his instructors and advisers were Fuseli, Northcote, and Opie. In 1807 he exhibited a picture of 'The Flight into Egypt,' which procured the painter a commission from Lord Mulgrave for his celebrated picture of 'The Murder of Dentatus,' the immediate cause of nearly all the troubles of Haydon's future life, from the dissatisfaction which he felt at the way it was hung in the Academy exhibition of 1809. Though many thought the picture well enough hung, the painter took such a different view of the matter, that he considered it a sufficient cause for a quarrel with and hostility to the Academy, which amounted almost to a monomania, and endured the whole of his life. The picture, which shows great power, is admirably engraved in wood by W. Harvey, Haydon's pupil; the painter described his subject, which is taken from Hooke's 'Roman History,' as 'the celebrated old Roman tribune Dentatus making his last desperate effort against his own soldiers, who attacked and murdered him in a narrow pass.' This was the last picture he exhibited at the Academy; henceforth he established independent exhibitions of his own, and the list shows a considerable series of great and laborious works, but which secured the painter but a very variable success in his speculations, though on the whole he had quite his share of both public and private patronage. His works all suffer from imperfect execution. Haydon was aware of this at

one time, and for a period devoted himself to the study of the Elgin marbles—then recently brought to England—and to portraiture, in order to overcome these defects, wholly without success however. The following are his principal works—In 1812, 'Macbeth;' in 1814, 'The Judgment of Solomon;' in 1820, 'Christ's entry into Jerusalem;' in 1821, 'Christ's agony in the Garden;' in 1823, 'The Raising of Lazarus;' in 1826, 'Pharaoh Dismissing the Israelites,' and 'Venus and Anchises;' in 1827, 'Alexander and Bucephalus,' and 'Fucles;' in 1828, 'The Mock Election in the King's Bench;' in 1830, 'Napoleon at St. Helena;' in 1832, 'Xenophon's first sight of the Sea, in the retreat with the Ten Thousand;' in 1834, 'The Reform Banquet;' in 1835, 'Achilles at the Court of Lycomedes discovering his Sex;' in 1836, 'Samson and Delilah;' in 1838, 'Christ blessing Little Children,' for the Liverpool Blind Asylum; in 1839, 'The Duke at Waterloo;' in 1841, 'The Anti-slavery Convention,' and 'The Maid of Saragossa;' in 1842, 'Curtius leaping into the Gulf;' in 1843, 'The Entry of the Black Prince into London with King John of France as Prisoner' (a cartoon sent to the competition at Westminster hall); in 1844, 'Alexander killing the Lion;' in 1845, 'Uriel and Satan,' and lastly, in 1846, 'The Banishment of Aristides,' and 'Nero watching the Burning of Rome,' illustrating the evils both of democracy and despotism. These two were Haydon's last works, and the disappointment he felt at the failure of their exhibition at the Egyptian Hall was the final weight which crushed him. One of the last entries in his diary is—'Tom Thumb had 12,000 people last week, B. R. Haydon 133½ (the half a little girl). Exquisite taste of the English people.' He was greatly involved in debt, and at last even his energy sunk under his accumulated difficulties, and on the 22nd of June of this year, 1846, he shot himself. One disappointment, from which he is said never to have recovered, was his failure in getting a premium in the Westminster Hall cartoon competition for the decoration of the new Houses of Parliament, an employment he had greatly desired. He was also almost always suffering under pecuniary difficulties, although his receipts were really very large compared with the average income of painters, and he had much liberal help from friends. He passed twice through the insolvent court—in 1823, only two years after his marriage, and in 1836. It is true he sometimes lost by his exhibitions, but he sometimes also gained large sums; as in 1820, when he made nearly 3000*l.* by his picture of 'Christ's entry into Jerusalem.' Latterly, he combined literature with painting; in 1840 he gave some gratuitous lectures on his art at the Ashmolean Museum, Oxford, and from this time frequently delivered these lectures; they have been published, 'Lectures on Painting and Design,' 2 vols. 8vo., London, 1844-46. He published also in 1842, 'Thoughts on the relative value of Fresco and Oil Painting, as applied to the Architectural Decorations of the Houses of Parliament.' As regards Haydon's suicide, he seems to have contemplated on this matter some years before he destroyed himself. In his diary for July 9, 1841, is the following entry—'It may be laid down that self-destruction is the physical mode of relieving a diseased brain, because the first impression on a

brain diseased, or diseased for a time, is the necessity for this horrid crime. There is no doubt of it.' His own brain was diseased in the opinion of Dr. Elliotson and Mr. W. J. Bryant, who made a post-mortem examination of his head. Some have assumed Haydon to have been a martyr to the cause of high art; but his life is a contradiction of this. He had no enemy but himself; he was the victim of the impetuosity and inordinate vanity of his own mind. As a painter, also, he was impulsive and desultory, and neglected all the most essential and common elements of excellence in his execution. He was extremely mannered and disproportioned in his forms; and with the exception of a grand style of design, and a warm and powerful colouring, we miss in his works every requisite of a fine picture. Though he numbered at one time some of our most distinguished painters among his pupils, as Sir Charles Eastlake, Sir Edwin Landseer, and George Lance the fruit-painter, he served rather as a warning to them than otherwise, showing them what to avoid rather than what to imitate; and his efforts have remained wholly without influence on the art of his time, though he was egotistical enough to consider nearly all progress to have proceeded from himself, and identified the fate of British art with that of his own efforts.

HAYESINE, or borate of lime ($\text{Ca O, B}_2 \text{O}_3 + 6 \text{H, O}$), a substance named after the mineralogist Hayes. It is found in Peru, in rounded nodules about the size of an orange. The Peruvian government prohibits its exportation; though, by secret means, considerable quantities reach this country, where it sells at about 30*l.* per ton. It is used in the arts, as a source of boracic acid in the production of borate of soda, employed in pottery and glass-making.

HAYLEY, WILLIAM, was born at Chichester in 1745, and studied at Trinity Hall, Cambridge, intending to practise as a barrister. Finding the law not to his taste, he settled on his patrimonial estate of Earham, in Sussex, in 1774. Hayley died November 20, 1820. Of his numerous poetic works, the 'Triumph of Temper,' 1781, has been the most popular. The 'Essay on Painting,' 1778, and 'Essay on History,' 1781, rank among his best productions. We may add, as the most important of his other numerous works, the 'Essay on Epic Poetry,' 1782; 'Life and Poetical Works of Milton,' 1794-99; 'Essay on Sculpture,' 1800, addressed to his friend Flaxman; 'Life of Cowper,' 1802.

HAYMAN, FRANCIS, R.A., was born at Exeter about the commencement of the eighteenth century. He was the scholar of Robert Brown, and was in early life much employed as a scene-painter by Fleetwood, the proprietor of Drury Lane theatre, and by Tyers, the proprietor of Vauxhall. He painted some historical pictures, and also made many designs for booksellers, the best of which are the illustrations to Sir Thomas Hanmer's 'Shakspeare.' He was the first librarian to the Royal Academy. He died in 1776.

HAYNAU, JULIUS JAKOB, BARON VON, was born at Cassel in 1786, entered the Austrian army in 1801, and rose through the various military grades until in 1844 he became field-marshal lieutenant. In the Italian wars of 1848-49 he was remarkable alike for military talent and for merciless

severity. When the inhabitants of Brescia rose in arms to second Charles Albert in his final struggle, Haynau marched rapidly from Perugia, and invested the town, March 30, 1849. The defence was gallant, and the punishment terrible; the whole place was given up to fire and sword; nor did Haynau shrink from owning, in his official report, that the atrocities which shocked all Europe had been committed by his order. Soon afterwards the emperor summoned him to take supreme command of the Austrian forces in Hungary. He entered Raab on June 28, occupied Szegeidin on August 2, and in another week entered Temeswar. Until June, 1850, Haynau exercised an almost absolute sway in Hungary, and his rule was a veritable 'Reign of Terror;' his atrocious treatment of the defeated Hungarians, and especially his alleged flogging of women, excited the hatred and detestation of Europe. He visited London in 1850, when the workmen at Barclay & Perkins' brewery assaulted and mobbed him, and he barely escaped with life. Few men blamed them very severely, and the British government declined to give any satisfaction for the assault. Haynau wandered over the continent, and narrowly escaped another beating at Brussels. At Paris the police protected him, but he was hated and shunned as an outcast. Returning to Germany, he died in the autumn of 1853.

HAYTI. [HISPANIOLA.]

HAZEBROUCK. [NORD.]

HAZEL. [CORYLUS; FILBERT.]

HAZLITT, WILLIAM, the son of a Unitarian minister of the same name, was born at Maidstone on the 10th of April, 1778. When he was five years old, his father transferred the scene of his ministerial exertions to America, and remained with his family in the United States for two years. On his return to England, the father became pastor of the Presbyterian congregation at Wem in Shropshire; and it is here that the work of Hazlitt's education was commenced. At the age of nine he was put to a day-school at Wem. In 1793 Hazlitt was entered as a student of the Unitarian College at Hackney, in order to be educated for his father's profession. But for this profession he had no liking; and, having from a very early age shown a taste for drawing, it was determined that he should follow the profession of a painter. He commenced with great ardour and assiduity, cultivating metaphysics in his intervals of leisure. In 1802 he visited Paris for the purpose of studying the paintings in the Louvre; and on his return to England in the next year, he made a professional tour, and painted a considerable number of portraits; but he did not persevere. His notion of success was so exalted, and his fastidiousness so great, that he could never satisfy himself, and he determined on again changing his plans.

He now proceeded, in the autumn of 1803, to the metropolis to start as a literary adventurer. He commenced his almost endless series of publications with the essay on the 'Principles of Human Action,' which was published anonymously in 1805, and was followed up quickly by other works. In 1808 he married a Miss Stoddart, the sister of Dr. (afterwards Sir John) Stoddart, and after his marriage retired into Wiltshire, where he continued without intermission his literary pursuits. In 1811 he

returned to London, and we find his residence in a house in York Street, Westminster, which had been once inhabited by Milton, and which then belonged to Bentham.

In 1813 Hazlitt delivered a course of lectures at the Russell Institution, on the history of English philosophy; and subsequently on the English poets generally, the comic poets, and the poets of the age of Elizabeth, in separate courses, at the Surrey Institution. He acted for a short time also as reporter to the *Morning Chronicle*, and, after giving it up, still wrote occasionally in that paper, and also in the *Examiner*. He was also, in the latter part of his life, a contributor to the *Edinburgh Review*, and to some smaller magazines. His life was indeed one unintermitting course of literary exertion; and his labours brought him in a considerable income, which, however, his imprudence always quickly dissipated.

In 1822 he was divorced from his wife, and two years afterwards he married a second time. He died on the 18th of September, 1830, of cholera, and was buried in the churchyard of St. Anne's, Soho, London.

Hazlitt's principal works, besides those which have been already mentioned, are the 'Round Table,' in which he was assisted by Mr. Leigh Hunt; the 'Table-talk;' the 'Plain Speaker;' the 'Characters of Shakspeare's Plays;' the 'Spirit of the Age;' his 'Political Essays,' which are collected from different newspapers and magazines, and published in one volume, with a preface by Hone; and the 'Life of Napoleon,' which Hazlitt himself looked upon as his great work, and which was his last.

The principal merits of Hazlitt as a writer are force and ingenuity of illustration, strength, terseness, and vivacity. After his death, two volumes of his 'Literary Remains' were published by his son, with a short memoir, which shows much taste and good feeling.

HEAD. [BRAIN; SKELETON.]

HEAD BOROUGH, the former name of the high constable, or head of a borough. The term is also used in Scotland to denote the borough in which the sheriff holds his court.

HEAD, INJURIES OF THE. From the many peculiar and important features which they present, injuries of the head have properly received a separate consideration in all systems of surgery; for not only is the brain so essential to life that even its least injury must be regarded as serious, but the parts around and guarding it have many peculiarities. The injuries of the head are best considered as they affect the parts inclosing the brain or the brain itself.

In mere bruises of the scalp two circumstances are worthy of notice. A vessel of some size may be burst without the skin over it being wounded, in which case a most copious effusion of blood takes place, raising up the scalp from the skull, and producing rapid swelling of the whole of the upper part of the head. It needs, however, no particular treatment; no incision should be made into it, for if cold wet cloths be diligently applied, the blood will be again rapidly absorbed.

A common superficial wound of the scalp needs no particular treatment. It should be closed with sticking-plaster after the hair around it has been

shaved off, and it should be kept cool with pledgets of lint dipped in cold water and covered with oiled silk; but to guard against mischief to the adjacent parts, the patient should avoid all stimuli, and all exertion of either body or mind, till it is completely well.

One of the most common sequels to injuries of the scalp is erysipelas of the head and face. It generally occurs in persons of an unhealthy habit, in hard drinkers, and in the full and plethoric. It commences about the third or fourth day after the injury. There is general fever, and the head and face feel very hot, and become red and swollen, appearances which increase, and, after a day or two, are accompanied with an eruption of small blisters, full of yellow fluid. There is no pain on touching the parts; but by the great swelling the eyes are often closed, and the features almost obliterated. Active reducing measures should, as a general rule, be early employed, and continued, if the disease does not yield, as far as the patient's strength will permit; and purgatives, with small doses of mercury, may be given.

Another affection which sometimes follows injuries (and especially punctured wounds) of the external coverings of the skull, is inflammation and consequent extensive suppuration in the loose tissue connecting the tendon of the muscle covering the top of the head with the pericranium. When this affection is suspected to be coming on, leeches should be put on the head in large numbers about the wound, and cold diligently applied; but if matter should form, one or more free incisions should be made through the scalp to let it out, and the part afterwards treated like a common abscess.

In cases in which the bone has been exposed, the same general and local treatment should be employed.

When the bone itself is injured, no active treatment should ever be adopted, unless there are evident signs that the brain is suffering from compression or other remediable injury.

The vessels of the dura mater may be ruptured by the jar from a blow which does not even break the skin. The blood that flows from them, accumulating between the dura mater and the skull, produces compression of the brain. The only hope in these cases is to bleed the patient largely, to check the flow of blood in the head, and, if that be not evidently beneficial, to apply the trephine wherever it is most probable that the blood may be found and removed.

Instead of blood, purulent matter may collect between the dura mater and skull, and produce equally fatal results. This is indicated by the patient (usually some considerable time after the accident) complaining of headache, restlessness, and extreme languor; he has frequent irregular shiverings, his pulse is quick and hard, and he cannot sleep; if unrelieved by treatment, all these symptoms increase, and are shortly followed by delirium, convulsions, insensibility, or paralysis, which are no distant precursors of death. A tumour forms on the part struck, and if this be opened, the pericranium will be found detached to some extent from the skull.

The brain itself may suffer injury either from blood effused in it by rupture of its vessels, from compression by fractured portions of bone being forced down

upon it, from wounds, from concussion, or from inflammation and its various effects following any of these injuries. The first does not differ in its symptoms from the cases of common apoplexy with effusion of blood [APOPLEXY], and admits of no mechanical treatment. The second class comprehends the most important injuries of the head: those of 'fracture with depression,' as they are called, and those which occasionally happen in children, in which the skull is indented without being broken. The symptoms of such an injury are insensibility, generally in direct proportion to the degree of pressure; the breathing is slow, laboured, and snoring, and at every expiration the cheeks are puffed out and elevated; the pulse is slow and irregular; the pupil widely dilated and insensible to light; the patient neither feels nor moves, and lies as if in a fatal state of apoplexy. The evident and indeed the only mode of affording relief is to remove the pressure from the brain, by exposing the fractured part of the skull by enlarging the wound in the scalp, or making a fresh one, and taking away or elevating all the portions of bone that are depressed. Such cases, and all others in which compression cannot be mechanically relieved, can only be treated like common apoplexy, by bleeding the patient, by cold sedulously applied, and by rigorous reducing measures.

The immediate consequences of wounds of the brain vary greatly, and indeed unaccountably: in some cases a very slight injury is rapidly fatal, as in those (of which many are now recorded) in which a pointed instrument has passed in through the orbit, and produced almost instant death; whilst in others, severe and extensive injuries, as from gun-shots, have been followed by serious symptoms at only a late period from their reception.

The last injury of the brain that needs particular notice is that called concussion or commotion. In its slightest degree it is merely a stunning, from which perfect recovery takes place in a few minutes; when most severe, it is rapidly fatal; but, even then, a post-mortem examination discovers no alteration whatever in the structure of the brain. One of the most interesting points in surgery is the diagnosis of concussion from compression of the brain. As the latter seldom occurs without the former (for of course a blow which would fracture or indent the skull would violently shake the brain), compression has the symptoms of concussion, with the addition of some of the most severe which we have already mentioned. In concussion the patient is insensible only to slight impressions, for if he be loudly called to, he will wake up, answer a word or two, perhaps even rationally, and then relapse into the same state. If he be severely pinched or otherwise irritated, he will withdraw the part so injured: he occasionally moves his limbs; he appears, in short, as if in a sound heavy sleep like that of a drunken man. The breathing is not stertorous, but generally quite natural; the pupil is contracted and irritable; the pulse is sometimes unaffected, but in severe cases small and weak; there is nausea or vomiting, and the extremities feel cold. If the case is about to terminate fatally, the whole body grows rapidly cold, the pulse becomes irregular and weaker, the breathing short and interrupted, and the insensibility increases. In treating cases of concussion much caution is needed:

it has not appeared that bleeding, which is the remedy popularly expected for all such accidents, has at all diminished its primary symptoms, nor has the contrary treatment by stimulants been more successful. The patient, while suffering from the immediate stunning consequences of the blow, should merely be kept quite warm in bed, and carefully watched; if the pulse grow weaker, the extremities colder, and the other symptoms of sinking seem increasing, stimulants are first called for, and should be given till he is completely roused to his former state; but if, instead of being depressed, he remain stationary, no active means of any kind should be employed.

HEAD, SIR GEORGE, deputy-knight marshal to her Majesty, was born at Higham, in Kent, in 1782, and is known as the author of various works of some literary repute; among others, his account of 'Forest Scenery and Incidents in the Wilds of North America, being a Diary of a Winter's Route from Halifax to the Canadas, during Five Months' Residence in the Woods, and the Borders of Lakes Huron and Simese.' Sir George had been engaged to superintend the commissariat duties of the British Settlement in North America for many years; and while on the Halifax station, engaged in that capacity, the above Diary was made, and published in 1829. Encouraged by the success which accompanied this work, he brought out his 'Home Tour through the Manufacturing Districts of England in the Summer of 1835;' his 'Home Tour through various Parts of the United Kingdom;' 'Memoirs of an Assistant Commissary-General;' and 'Rome, a Tour of Many Days.' He was also the translator of Cardinal Pacea's 'Historical Memoirs,' and the 'Metamorphoses of Apuleius,' which were published in 1850 and 1851. He was likewise an extensive contributor to the pages of the *Quarterly Review*; while his brother, Sir Francis Head, was the author of a very popular work known as the 'Bubbles of Nassau.' Sir George received the honour of knighthood in 1831; and died in 1855.

HEADBOROW, a term applied by the Saxons to the head of the frank-pledge in boroughs. He was the chief of the ten pledges, as the other nine, being inferior pledges, were designated *handborows*.

HEALTH, BILL OF, in Shipping, is the certificate of a consul as to the health of a crew when the ship has come from a suspected port. The names given to the documents representing the various degrees of health are a clean bill, a suspected bill, and a foul bill.

Bill of Health, in the law of Scotland, is an application made to the Prison Board by a prisoner to be allowed to live away from the prison, of course under surveillance, on account of ill-health. This is sometimes allowed both in England and Scotland, but it is only in the latter country that the petition is called a bill of health.

HEALTH, PUBLIC. [PUBLIC HEALTH.]

HEANOR. [DERBYSHIRE.]

HEARING. [EAR.]

HEARNE, THOMAS, an eminent English antiquary, was born at White Waltham, in Berkshire, in 1678, where his father was the parish clerk. In 1692, under the patronage of Francis Cherry, Esq., of that place, with whom he had till then lived as a menial servant, he was placed at the free school of

Bray, and subsequently, in 1695, at that gentleman's expense, was entered of Edmund Hall, Oxford. He became B.A. in 1699. In 1701 he received his first employ in the Bodleian Library. He was afterwards made janitor of the library, and in 1712 succeeded to the place of second librarian. In January, 1715, he was elected architypographus and esquire bedel of civil law in the University, which post he held with his under-librarianship till the month of November following, when he resigned the bedel's place, and soon afterwards his post in the Bodleian Library, on account of the oaths to the government, which he could not conscientiously take. He continued a non-juror to the last, much at the expense of his worldly interest. He died June 10, 1735.

Hearne's publications were almost exclusively printed by subscription at Oxford, and are very numerous. Among the most valuable are—an edition of Livy, 6 vols. 8vo., 1708; the 'Life of Alfred the Great,' from Sir John Spelman's MS. in the Bodleian Library, 8vo., 1710; Leland's 'Itinerary,' 9 vols. 8vo., 1710; Leland's 'Collectanea,' 6 vols. 8vo., 1715; Camden's 'Annals,' in Latin, 3 vols. 8vo., 1717; 'History and Antiquities of Glastonbury,' 8vo., 1622; 'Robert of Gloucester's Chronicle,' 2 vols. 8vo., 1724; 'Peter Langtoft's Chronicle,' 2 vols. 8vo., 1725.

HEARSAY. [EVIDENCE.]

HEARSE, a funeral carriage in or on which a corpse is borne to its last resting-place. In England it is usually a closed carriage, decorated with plumes or feathers on the top and black drapery at the sides. On the occasion of public funerals, and generally on the continent, the hearse is an open car on which is placed a bier with the coffin.

HEART is the central organ of the circulation, and by its alternate contractions and dilatations is one of the principal powers by which the blood is moved through the bodies of the higher animals.

The simplest mode by which a distribution of nutritive fluid is effected, is by means of ramifications proceeding from the stomach or intestinal canal to various parts of the body, which occurs in the polyps, infusoria, intestinal worms, echini, medusæ, and other zoophytes. In all these the digestive canal and the circulating system form but one apparatus; the food, which in the higher animals requires a complicated process of assimilation before it is fitted to move with the blood, is in them already adapted for nutrition. In most of them currents can be seen passing in opposite directions along the canals opening into the digestive cavity, exactly like those well known to exist in the stems of charæ, and probably produced by the motion of ciliæ which line the tubes, but are too minute to be discerned even with the microscope.

In the annelida the circulation is carried on by means of two large vessels which alternately contract and expand, and thus carry the circulating fluid to all parts of the body. The first indication of an organ like the heart is seen in insects, which have a large vessel running along the back, divided by numerous constrictions into a series of communicating cavities, between which there are lateral openings through which the blood is received, and which are guarded by valves to prevent the blood from flowing out. Through this, which is commonly called the dorsal

artery, but which may rather be regarded as a series of ventricles, the blood passes from behind forwards, diverging into small streams, one of which flows to each of the antennæ, feet, &c. No distinct vessels can be detected in which these minor currents may run; they seem simply to pass through the various tissues, and, having arrived at their destinations, to form there into arches, and return and empty themselves into abdominal vessels, which may be regarded as veins, and through which the blood flowing from before backwards is returned into the dorsal artery through the communications which exist between them at the posterior part. This is also the plan of the circulating system which with various modifications prevails in the arachnida and the lower crustacea.

The simplest kind of a heart, forming a defined cavity, is found in some of the larger crustacea.

In most of the mollusca the blood flowing through the branchial veins, instead of being poured directly into the ventricle, is received first into an auricle, presenting the first instance of a heart with more than one cavity. In most of the gasteropoda and pteropoda the auricle is single; in the bivalves the auricle is double.

Among vertebrate animals the simplest form of heart is found in fish. They have a single auricle which receives the blood from the trunks of the veins of the whole body, and communicates with a single ventricle, which forces the blood into an arterial trunk with a contractile bulb. From this trunk all the branchial arteries arise, and, passing on each side in arches to the gills, divide there into capillary branches. The blood thus aerated passes on, and the arches again unite into a common trunk the true aorta, which runs along the under surface of the spine, and sends the blood to all parts of the body. From these it collects again into the systemic veins, by which it is carried back to the auricle. The same type of formation is found in the reptiles which have gills.

In the air-breathing reptiles there is a single ventricle from which arises a single aortic trunk, from which proceed two pulmonary arteries, conveying that part of the blood which is to undergo respiration to the lungs, whence it is returned by pulmonary veins. From the same aortic trunk four other arteries arise, two of which, forming arches, unite to form the dorsal aorta, while the two uppermost are distributed to the head and upper extremities. From the terminations of these arteries in all parts of the body the blood is collected into large venous trunks, which open into a double auricle, from which the aerated blood from the lungs and the impure blood from the system pass separately into the common ventricle, in which they are intimately mixed.

Man, mammalia, and birds have a double circulation, to which some of the forms just described make very close approximations.

The heart of man may be taken as the type of this circulation. It is of a somewhat conical form, having its base directed backwards towards the spine, and its point forwards, downwards, and to the left side, so that at each contraction it may be felt striking between the fifth and sixth ribs, about four inches from the middle line. It rests upon the diaphragm, or muscular partition between the chest

and abdomen, and the surface upon which it lies is much flattened. It is firmly attached to the diaphragm at its right side, and behind by the inferior cava, which passes through that muscle, and above and behind it is fixed, though more loosely, to the upper and back part of the chest by the rest of its great vessels, which there pass out of the pericardium, and are united to the surrounding cellular tissue and organs. Everywhere else it is quite free and movable, though the range of its motions is limited by the pericardium, or membranous bag in which it is contained, and which closely surrounds it at all times.

To examine the interior of the heart, it should be removed from the pericardium, and an incision should be made into the front of the right or front auricle, so that an angular flap may be cut out of its walls, and the whole view of the back part and sides of its interior may be exposed. There will then be seen, behind and to the right side, two large apertures; the upper leading to the vena cava superior, through which all the blood is returned from the head and upper extremities, and the lower leading to the vena cava inferior, by which all the blood is conveyed from the abdomen and lower extremities. These apertures will be seen to be surrounded by a few muscular fibres continuous with those of the auricle itself, and that of the inferior cava is partially guarded by a thin semi-lunar membranous fold, called the Eustachian valve, varying much in size, and often much torn. The left side of the cavity, on the partition which separates it from that of the right auricle, presents an oval depression (the fossa ovalis) surrounded by an elevated border, indicating the situation of the foramen ovale, through which, during the foetal state, the blood, which was prevented by the Eustachian valve from passing into the ventricle, was conveyed directly from the right into the left auricle, and thence into the left ventricle. Lastly, at the anterior and left angle of the cavity another and the largest aperture is seen, which leads into the right ventricle, and has attached to its sides a membranous curtain, by which it is occasionally closed, and which is called the tricuspid valve.

Proceeding in the course of the circulation, a cut should be made from the right auricle through the aperture leading from it into the right ventricle, and along the front of the heart nearly to its apex, and then another from the end of the first upwards into the pulmonary artery, as it arises from the front and upper part of the ventricle. By raising the portion thus cut out, a complete view of the cavity of the right or pulmonary ventricle, and of its communication with the auricle, will be seen. The cavity of the right ventricle has a somewhat conical form, with its base uppermost, that part of its walls which is formed by the septum projecting somewhat into it. Its walls are rendered extremely irregular by prominent bands of muscular fibre. Here and there stand out short columns of muscle projecting into the interior, and pointing towards the right auricle; these are called columnæ carneæ, and they have attached to their summits fine tendinous cords (chordæ tendineæ), which pass thence to be attached to the edges of the curtain-like membrane (the tricuspid valve) which guards the orifice between the auricle and ventricle. This orifice is of a broadly oval form, surrounded by a ring of firm dense tissue,

to the whole interior circumference of which is attached the fold of membrane, strengthened by tendinous fibres, forming the valve.

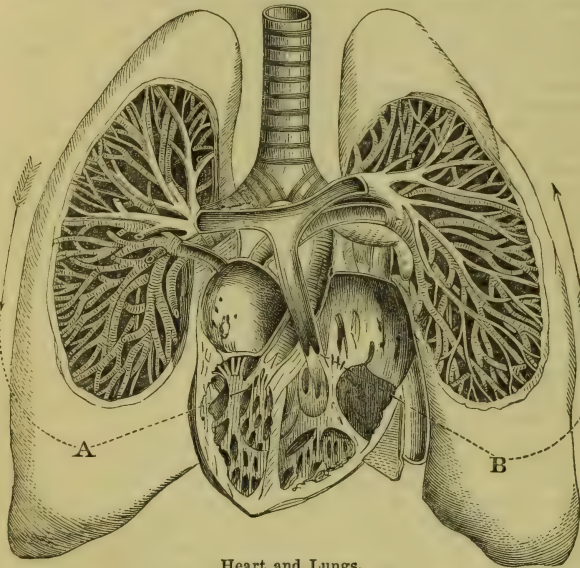
From the front and upper part of the ventricle a smooth short passage leads to the origin of the pulmonary artery, which is attached firmly to the dense ring to which many of the muscular fibres of the ventricle are affixed. At their union, and at the very orifice of the pulmonary artery, three little valves (the semi-lunar, sigmoid, or pulmonary valves) are seen, of a semi-lunar form, attached by the whole length of their convex edges to the walls of the artery, and hanging loosely in it with their free festooned edges directed upwards, inclosing behind them three small spaces, where the artery bulges somewhat outwards. These valves completely close the orifice of the artery inwards, so as to prevent any fluid from passing into the ventricle.

The left posterior or aortic ventricle and auricle differ in no important particular from the right. The walls of both cavities on the left side and all the parts contained in them are thicker and stronger than those on the right; the orifice between them is guarded by a valve which has only two principal divisions, and is therefore called the mitral valve. The aorta proceeds upwards, and to the right side, then arches backwards and to the left, and, turning over the main air-tube of the left lung, passes down along the spine, at the lower part of which it divides into two large arteries (the common iliaes) which supply the pelvis and lower extremities. From the upper part of its arch it gives off the main trunks of the head and upper extremities in three large trunks—that most to the right, called arteria innominata, is the common trunk which divides into the right carotid for the right side of the head, and the right subclavian for the right arm and side of the neck and chest. Next to it is the left carotid, and next the left subclavian, of which the distribution is similar to that of those on the right side.

During life, the blood returning from the whole body by the veins which unite to form the two venæ cavæ enters the right auricle and gradually distends it, at the same time that the blood returning from the lungs by the pulmonary veins enters the left auricle and distends it. When completely filled, a kind of vermicular motion is seen commencing at the point of each auricle, which is rapidly propagated along their walls, and simultaneously empties the contents of the one into the right, and of the other into the left ventricle. The ventricles are no sooner completely filled than they contract suddenly and with much greater force than the auricles, and propel the blood into the pulmonary artery and aorta. From the aorta the blood is propelled into the arteries, through which it is distributed to all the body, and returned by the veins; but the veins of the intestinal canal and the organs connected with it unite into a large trunk, the vena portæ, which, instead of at once entering the heart with the others, passes into the liver, and there again divides into minute capillary vessels, from which the bile is secreted, and which pass into the ultimate divisions of a series of hepatic veins, which collect into three or four large trunks which open into the vena cava inferior just before it passes through the diaphragm to enter the right auricle.

The accompanying figure represents a section of the heart and lungs. The line A crosses the left lung and enters the left side of the heart. The line B passes the right lung to the right side of the heart.

Harvey considered the heart to be the sole agent by which the circulation is effected, but it is certain that several other agents exercise auxiliary powers. That the heart has, however, an influence on all parts of the circulation, is quite evident. In the larger arteries its effect is seen in the increase of the current which it has set in motion, in exact coincidence with the contraction of the ventricles; in the smaller ones, by the same increase at a scarcely appreciable interval; in the capillaries, by the occasional pulsatile motion which may be seen in them, when, after an animal has been largely bled, its transparent parts are examined with the microscope, and this though the heart is acting very weakly. Lastly, in the veins we find its influence



Heart and Lungs.

still exerted; for if the main artery and vein in a limb be exposed and isolated, and the latter be wounded, the flow of blood from the orifice may be exactly regulated by compressing the artery, that is, by preventing, to a greater or less extent, the blood from flowing to the vein with the impulse given to it by the heart. It appears also that, in addition to propelling the blood, the heart during its expansions draws up the blood, so that it acts both as a sucking and a forcing pump.

From the heart the blood is poured into the arteries, a series of ramifying tubes through which the current is distributed, divided into a gradually increasing number of streams, which progressively diminish in size, till it arrives at a network of the most minute canals, the capillaries.

The chief property of the arteries by which they affect the circulation is their extreme elasticity. It is by this that when dilated they contract on the

blood that had been forced into them, and propel it in every direction, and that when elongated they again shorten, and that when empty they remain open and tubular. The chief effect of the action of this elasticity is the gradual conversion of the jetting pulsatile motion, which the blood receives from the forcible and successive contractions of the ventricle, into an even and steady current.

We have said that the arteries are dilated slightly by each column of blood poured out by the ventricles: from this arises their *pulse*, which may be said to be owing to the dilatation of the arteries produced by the wave which is propagated along the column of blood contained in them. The frequency of the pulse depends entirely on the number of contractions of the left ventricle in a certain time; and hence the varieties of frequent, slow, irregular, intermitting pulses are entirely referrible to the heart. The size and degree of contraction of the artery produces the fullness or smallness, the hardness or softness, and all the other characters which are determined by the touch rather than by mere counting.

From the fact that the great chemical change by which heat is developed in the animal system takes place in the capillaries, it follows that their influence on the circulation is very considerable. They form a dense network of extremely minute tubes, in which the arteries seem to terminate and the veins to arise, for their delicacy prevents the possibility of discovering any such structure as could decide to which set of vessels they belong; and indeed it is only by observing that the currents of blood-globules pass in regular directions that we can prove that they are canals with definite membranous walls. When the circulation is examined in the web of the foot of a frog, or in the transparent parts of other animals, as the fins, tails, or lungs

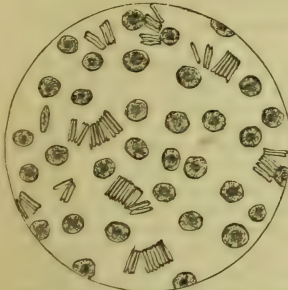
of fish, frogs, lizards, &c., we see a number of minute corpuscles coursing along in little streams, in some parts in a confused multitude, as in the vessels which are sufficiently large to admit several to pass together, at others in only a single line, where the vessel is but little larger than the corpuscle itself. The currents run generally in the same direction in the same vessels, all tending to a larger branch, which may be regarded as the commencement of a vein, and setting out from the minutest termination of the artery. The capillaries are the most delicate of all organic tissues, measuring from 1-2000 to 1-5000 of an inch in diameter; they exist in all tissues of the body, varying in arrangement only in the greater or less closeness of the network which they form, and of which the meshes are in some organs so fine as not to exceed in width the diameter of the capillaries themselves, as is the case in the iris and lungs. It is through

these vessels that all the important processes of secretion, nutrition, and absorption are effected.

These corpuscles are elongated-oval in birds and larger than in mammals. They are larger still in reptiles and in fishes, and largest in the amphibia. The blood of fishes leads the naturalist to a yet farther distinction with regard to that great class of animals. The blood corpuscles of bony fishes are roundish-oval, those of cartilaginous fishes are much larger, more distinctly oval, and bear a considerable resemblance to those of frogs. There is no perceptible difference in the general appearance of the blood discs in the different families of man.

The influence of the minutest arteries and veins, and of the capillaries, on the circulation, is best seen in the phenomena of local action, as inflammation, blushing, turgescence, &c. If the web of a frog's foot placed in a microscope be irritated, the capillaries are seen slowly contracting, so as sometimes to prevent the flow of blood through them; and if the stimulus be so great as to produce inflammation,

then they dilate, and a larger number of globules is seen passing along them with great rapidity. The same may be seen in the human eye, when particles of dust get into it. On a larger scale, one sees after a wound or other injury the parts around grow redder, and swell from the afflux of blood to its capillaries; and if the inflammation arise in a part which can be compared with another similar one, as in the hand, one feels that the pulse is fuller and stronger on the injured than on the sound side, indicating that a larger quantity of blood is passing through it. A still more evident accumulation of blood is shown in blushing, in which, from a mental impression, in an instant all the minute vessels of the face, neck, head, &c., become distended with blood. The paleness of fear is produced by the opposite condition; and we have other cases in which a decrease of the quantity of blood in a part is seen in the deficient nutrition and shrinking of parts which have become useless, as in the gills of tadpoles, the horns of deer, &c. All these circumstances are clearly sufficient to prove



Corpuscles of Human Blood.



Corpuscles of Blood of Birds.



Corpuscles of Blood of Fishes and Amphibia.

that, independent of any influence extending from the heart or arteries, there is in the very minute vessels of all parts a power by which the supply of blood passing through them may be either increased or diminished.

Following the course of the circulation, we come now to the veins, which may be regarded as the most passive of the parts engaged in it, though they are constructed so as to permit many important external agencies to act upon the motion of the blood. In addition to other peculiarities of structure, the veins have valves, very similar to those at the origins of the arteries, which are arranged in pairs, or in threes, at different distances, in the course of nearly all those veins in which the blood has to rise against the power of gravitation. Their simple use is evident: the blood, returning slowly through the capillaries, and much of the force of the heart being expended in propelling it so far, would be apt to retrograde, or remain stationary, if the weight of the whole column in the veins bore down upon the arteries, and through them on the heart. As soon, however, as a portion is raised into a vein, when it tends to return to the arteries it forces down the valves, which close the canal of the vein and support the blood above them, till another portion rising sends it onwards. Thus, while they permit the blood to pass without obstacle towards the heart, they entirely prevent it from retrograding; and if it were station-

ary, the column of blood would be like a stream branching out and divided by a number of closed locks, in which the portion of fluid between any two is prevented from exercising any influence on the portions adjacent to it.

HEART, DISEASES OF THE, may be divided into those which occur in its investing membrane, those which affect it as a whole, and those of its various parts.

1. *Pericarditis: Inflammation of the Pericardium*, resembles much, in its pathological conditions, inflammation of other serous membranes, and is induced by similar causes, as exposure to damp and cold. It of course presents peculiar symptoms, arising from the situation and nature of the individual organ; thus the patient will complain of tenderness over the region of the heart, amounting, when pressure is made, to acute lancinating pain, which prevents him from lying on the left side, and is much increased by drawing deep inspirations, or coughing, this latter symptom frequently depending on the pleura being involved in the inflammatory attack. This pain, however, is not always so severe; frequently only a sense of oppression is felt. The pulsations of the heart are frequent, sometimes regular, but at other times intermittent, and so strong as to constitute palpitations; but still, if much effusion has taken place into the pericardium, the hand when applied to the chest will have difficulty in perceiving them. The præcordial portion

of the thorax is often bulged out by the forcible action of the heart and the quantity of fluid effused into the cavity of the pericardium. This effusion varies much in quantity and consistence at different periods of the disease: thus in many cases only a little bloody serum will be found; in others, pus in large quantities, coagulated lymph, bands of fibrinous matter uniting the two layers of the serous membrane, and even cartilaginous or osseous deposits. The dull sound discovered by percussion in the præcordial region of a person in health is always, in this disease, increased in proportion to the quantity of fluid in the pericardium, and, in proportion as this fluid becomes organized, sounds will be heard by the application of the stethoscope, and often of the unassisted ear, varying in their nature according to the state of the organizing process, and resembling at one time the creaking of new leather, at another the rubbing together of paper or parchment, the noise made by a file, &c. Other sounds also are frequently heard, which depend upon the disease being accompanied by lesions within the heart itself. This disease frequently accompanies acute rheumatism, and forms one of the worst features of that very common affection.

2. Serum is sometimes found in the pericardium independent of inflammation, constituting the disease known as *hydro-pericardium*.

3. *Displacement*.—The heart is not always found in its usual situation at the time of birth, there being cases on record where it occupied the right instead of the left side of the chest, the other organs of the body presenting at the same time a relative change of position without any disturbance of their functions. It has also been found pushed out of the left into the right side of the chest by tumours, or, what is more common, by extensive effusion of fluid into the pleura of the left side of the chest.

4. *Carditis: Inflammation of the Heart*.—The proper muscular structure of the heart is not free from the attacks of inflammation; but where this disease exists there will also be found traces of it in the pericardium, or in the lining membrane of the heart, or in both; and we cannot point out symptoms of the one distinct from those of the other disease: the treatment, consequently, is similar in both.

5. *Hypertrophy of the Heart*.—Independently of any morbid process existing in itself, the muscular structure of the heart is often greatly increased in bulk, as if the nutritive process were too active in proportion to the absorbent, and new matter were deposited more rapidly than the old could be removed. From the peculiar nature of the functions of the heart, this disease becomes very important, and its effects not less dangerous than manifold. It is usually divided into three kinds: namely, simple hypertrophy, the least common, in which the parietes are thickened without any change of capacity in the cavity; eccentric or aneurismal hypertrophy, the form most frequently met with, in which the parietes are thickened and the inclosed cavity or cavities proportionally enlarged; and concentric hypertrophy, where the cavity is diminished in proportion to the thickness of the parietes. Any one of these kinds of hypertrophy may affect the parietes of either cavity of the heart, or the whole organ. The extent to which this increase of size may proceed is enormous;

hearts have been found weighing upwards of twenty ounces, whereas the average weight of a healthy heart is from seven to nine ounces. In hypertrophy the chest is often bulged out towards the left side, the sound produced by percussion more dull than in the healthy state, and the pulsations very strong; indeed the bed-clothes are often visibly raised, and the head or hand of the observer, when applied to the chest, forcibly repulsed, yet the pulsations are for the most part regular, unless palpitations be induced by over-exertion. The sounds perceived by auscultation are louder than natural. Hypertrophy of the left ventricle of the heart sometimes brings on apoplexy and hæmorrhages.

This is a disease in which great perseverance is required on the part of the patient and the practitioner, but with proper care it frequently admits of much alleviation. Rest, abstinence, sedative medicines, and more or less depletion, according to the circumstances of the case, are the most efficacious plan of treatment.

6. *Atrophy of the Heart* has also been observed accompanying a state of general debility of the system.

7. *Dilatation of the Heart*.—It has been shown that the heart may be increased or diminished in substance, or may be hypertrophied or atrophied. The whole substance of the heart, or either of its cavities singly, or the orifices of these cavities, may be dilated, the solid parietes being merely extended, without any increase of substance, and the contained cavities proportionally enlarged. As in hypertrophy so in this disease, according to its extent the shape of the heart will be much changed. The muscular parietes being thinned and feeble, the circulation of the blood will not be carried on with vigour, and the patient will be weak and unfit for exertion, easily exhausted by small losses of blood, and sometimes carried off by what under ordinary circumstances would be deemed a trifling hæmorrhage. Excessive exertions and strong passions seem to be exciting causes of this disease, and from the influence of these causes the patient should be sedulously guarded, and, at the same time, every remedy must be adopted which may contribute to equalize the circulation.

8. *Endocarditis: Inflammation of the interior lining membrane of the Heart*.—This disease is not very frequently met with uncombined with some other inflammatory disease; rheumatism, pericarditis, carditis, or inflammation of the internal coat of some of the veins will be usually found, if not to accompany, at least to have preceded it.

The principal symptoms of endocarditis are more or less fever and anxiety; some bulging of the præcordial region, if accompanied by pericarditis; an extension of the dull sound heard on percussion in the healthy state; the pulsations of the heart unusually strong, and sometimes very rapid and intermittent, repulsing the hand when applied to the chest, and producing a peculiar vibratory sensation. Upon auscultation the bellows' sound will be heard, masking one or both of the normal sounds.

The causes of this serious malady are similar to the causes of pericarditis, and the treatment must be actively antiphlogistic.

9. *Disease of the Valves*.—The internal lining membrane of the heart is often thickened, especially

at the valves; and after repeated attacks, or a long chronic form of endocarditis, the valves will not merely be thickened, but will become the seat of a variety of warty excrescences, or even cartilaginous and osseous formations of considerable size, extending into the cavities of the heart. This ossification is most frequently met with in old persons, and especially those who have been addicted to a too generous mode of living. The morbid sounds produced by these obstructions at the various orifices will resemble those of the bellows, file, or saw, according to the degree of the obstruction; and sometimes a triple or even a quadruple sound will be perceived instead of the two normal sounds. The effects of these obstructions will be sanguineous and serous congestions, oppressions of the breath, apoplectic seizures, and other symptoms of embarrassed circulation.

10. *Ruptures of the Heart.*—Ruptures are sometimes found to occur, not only in the valves and columns of muscular fibres within the heart, but also in its parietes. The effect of such injuries will depend upon their extent and situation. A valve, or one of the bundles of muscular fibre, cannot be broken through without causing much inconvenience to the free circulation of the blood; but it seldom happens that the parietes of either cavity of the heart are sufficiently injured to allow the free passage of blood into the pericardium without instant death being the consequence.

11. *Persistence of the Foramen Ovale.*—It is by no means very uncommon to meet with cases in which the opening leading from the right to the left auricle of the heart has not been properly closed up at the time of birth. According to the extent of the communication thus remaining, a greater or less proportion of venous blood will pass into the left side of the heart, and, being there mixed with red blood, circulate through the arterial system.

The symptoms of this disease are blueness of the skin, lips, and nails; a temperature of the body below that which is natural and healthy; shortness of breath, palpitations, faintings, a sense of suffocation induced by slight exertion, and sometimes a great disposition to hæmorrhage and depression from small losses of blood. This disease has, from the colour of the skin, been named 'blue disease,' 'morbus cæruleus,' or 'cyanosis.'

12. *Nervous Diseases of the Heart.*—These are met with chiefly in women suffering from anæmia, chlorosis, hysteria, and other nervous symptoms; and in men in whom a naturally nervous temperament has been rendered more irritable by the too free use of stimuli or by depressing passions. In all these cases great attention should be paid to the general health. In the cases of anæmia and hysteria, iron medicines and the shower-bath will be of the greatest service; and, as far as possible, sources of anxiety should be removed.

HEART'S-EASE, or PANSY, is the cultivated state of the plant called *Viola tricolor* by botanists, improved by crosses with *Viola altaica*, and other allied species.

Several hundreds of beautiful varieties are now common in gardens. Although they will all grow in almost any kind of soil, yet, in order to bring the finer sorts to any degree of perfection, a loam, mixed with sand, and highly manured, is absolutely neces-

sary. By proper treatment they may be had in full flower at two different seasons—from April to June, and from September until the frost destroys them.

The original species from which all these varieties sprang are easily preserved; but this is not the case with many of the finer sorts, which, as in animals and in other plants, the higher they are bred, and the finer the kinds, are in proportion difficult to keep in health. The principal causes which affect them are excessive heat in summer, and wet and cold in winter. They are, however, easily propagated, and only require to be looked over frequently, when, if any of them are found damping or decaying at the bottom of the stem, the top must be taken off, and struck. When there is danger of losing any of the sorts during winter, the best way is to strike a quantity in autumn, and to place hand-glasses over them until spring; at that time those which are alive may be soon multiplied in abundance.

Where fine large flowers are wanted, the plants should always be struck from cuttings the same season, and grown rapidly. In striking them artificial heat is altogether unnecessary, unless when the operation is performed early. All that is required for the purpose is a small hand-glass to place over the cuttings, and a mat to shade them during bright sunshine. After they are well rooted, they must be taken carefully up, and planted in a bed previously prepared for them. They will then flower in great profusion from April to June.

Varieties are obtained from seed. In order to have them fine, considerable care is requisite in selecting the seed. It must always be gathered at those seasons when the plants flower in the greatest perfection, and from the best formed and largest blossoms. They will generally be found in this state in the early part of the season, from April to June, or in autumn, after the greatest heat of summer is past; at other seasons the flowers are smaller, and it is found that this affects the seed. The seed should be sown in spring, in light soil, with the protection of a cold frame. When the plants are very young, they must be removed from the frame and planted thinly under hand-glasses, where they will remain until they are sufficiently strong to be planted out in the flower-garden. At every shifting they must have plenty of water, and be carefully shaded during bright sunshine.

HEAT. This great natural agent becomes sensible to us in the first instance by our bodily sensations, but we find afterwards its effects in the various changes which it is capable of producing on all substances. Expansion, fusion, evaporation, thermoelectric currents, and various physiological phenomena, are effects of heat, or at least accompany its absorption.

Every existing substance may be regarded as a source of heat. In this respect the sun is the most important natural source which our system possesses, its heat when condensed in the focus of a lens being exceedingly intense. When concentrated by a number of powerful lenses on one scale of a balance of extreme sensibility, no derangement of equilibrium ensues; as far, therefore, as experiment can inform us it is imponderable, and the increase or diminution of heat in any body is therefore unaccompanied by any alteration of weight.

Heat may be produced artificially by any means which propagate agitations internally in bodies: hence friction, hammering, percussion, sudden condensation, chemical combination, and electrical discharges are all proper to produce or rather to develop heat.

Heat radiates from all bodies in straight lines and in all directions, and in the law of its emanation it resembles light, its intensity diminishing in the same proportion as the sine of the angle of emanation. If we conceive two balls which are heated unequally to be inclosed by a concave surface which by any means is preserved at a uniform temperature, the radiation of heat from the warmer ball, directed on the colder, being more copious than the radiation from the latter on the former, the temperature of the hotter will sink, and of the cooler rise, in proportion to the difference of radiations; and this will continue until the temperatures become permanent, in which case the radiations are necessarily equal.

One consequence of the free radiation of heat in open space is, that its intensity must vary inversely as the square of the distance from the origin. Hence every portion of space has a determinate temperature due to the amount of radiation, not only from the sun and fixed stars, but also of the non-luminous bodies of each system.

But though the laws of the free emanation of heat and light are similar, those of their transmission through substances are very different. When a metallic body is but a little heated in a fire, we have heat unaccompanied by sensible light; and in the lunar rays the light, though originally transmitted from the sun, arrives at our planet without any sensible heat, even when collected in the focus of a burning-glass. Again, a plate of glass placed before a common fire will intercept the heat until it becomes itself sufficiently heated to radiate. When, however, the source of heat is more intense, a small portion will be directly transmitted; while for the solar rays we find the heat is transmitted as well as the light. It is still more remarkable that, when the solar rays are decomposed by transmission through a glass prism, the differently coloured rays of the spectrum have each a different intensity of heat, the least refrangible possessing the greatest portion; the greatest heat is found at the place occupied by the extreme red rays, or even a little beyond them.

Not only may radiant heat be collected in a focus by refraction through a lens, but also by reflexion from a polished concave mirror.

The power of radiating heat is certainly the most universal mode of its propagation between different particles of matter, as well as through considerable spaces. However, it is usual, for greater simplicity, to designate this propagation through solid bodies as *propagation of heat by contact*. Whichever of these two views may be adopted, we are led to important physical distinctions between different homogeneous substances, viz., their conducting powers internally and externally. Newton's formula to represent the heat communicated from one body to another of the same physical nature, when in contact, is $h(t-t')$; in which t and t' are the temperatures of the two bodies, and h is a constant, proportional to the interior conductivity of the particular substance.

A formula for the heat lost by a body of uniform temperature when subject to a current of air is $H(t-T)$, T being the temperature of the air in contact, and H a constant, depending on the exterior conductivity.

The exterior conductivity may be very different in the same body by slight alterations in the smoothness or even colour of the surface. It is by this antagonist principle that heat acquires a permanent state, corresponding to the different positions of the parts of bodies relative to the sources of heat and the dispersing surfaces.

The mathematical theory of the distribution of heat is founded on the principle that, when a body has arrived at a permanent state of temperature, the quantity of heat given out by any particle to the adjacent colder region must be equal to that received from the warmer particles near it, and conversely. For example, suppose a solid body to be contained by two parallel planes of indefinite extent, and of uniform but different temperatures. In this case, the exterior conductivity through the sides being prevented, the temperature will be uniform in any section of the body parallel to its bases, but will increase from the lower plane in an arithmetical progression to the upper. Now, suppose a thin cylindrical rod to be placed in a medium of which the temperature is constantly zero, while its extremities are maintained at constant but different temperatures; in this case, on account of the exterior conductivity, the distribution of heat will follow, at equal distances along the rod, a geometrical progression increasing from the colder extremity to the hotter.

The propagation of heat in liquids depends very little on any communication by contact. If we place a heated plate on the surface of water in a vessel, but so as not to touch the edges, a thermometer placed in the water will indicate little or no alteration of temperature; and if the bottom of a vessel of water be heated, the heat will be distributed through the liquid only by currents of particles ascending from the heated part. Little as is the conducting power of liquids, that of gases is probably much less, if any; but there would be great difficulty in establishing this experimentally. The effect of heat on gases is to increase proportionally their elasticity, and this disturbing force produces violent motions in their parts, so that the whole shortly acquires a uniform temperature, when other forces, such as gravity, are not taken into consideration.

These three modes of the propagation of heat exist in our globe, and are the cause of important phenomena in the distribution of climate.

First, the great mass of earth, considered in reference to its solid parts, has an external source of heat in radiation, principally from the sun, which compensates the radiation from the interior of the earth. If we suppose the mass of the earth to have been at any remote period at a very high temperature, the effect of the radiation of its heat through the colder surrounding space would be to cool first the superficial strata, and successively, though in a less degree, the internal strata, until a permanent state was reached, when the diminished radiation would be exactly compensated from external sources. Hence, on descending below that comparatively shallow envelope affected with diurnal or annual variations of

temperature, we ought to find a continually increasing temperature towards the centre, a result which has been verified in the mines in several countries in Europe.

The propagation of heat by motion in fluids has an immense tendency to equalize the temperatures of different latitudes; and the unequal depths of different places in the bed of the sea would, from the same cause, produce currents warmer than the adjacent water. The elasticity acquired by portions of the air in contact with the warmer regions of the globe destroys the equilibrium of that fluid, and generates winds of which the heat is communicated to the districts traversed, while the counter-currents, or cold winds, rush forward to occupy the abandoned spaces. [TRADE WINDS.]

Chemical Agency of Heat.—The agency of heat in promoting chemical action is important and extensive; in some cases no combination can take place without it, and in others it greatly facilitates chemical combination, while in some instances it decomposes compound bodies, and resolves them either into simpler or elementary forms of matter. In the solution of salt in water, an increase of heat, by increasing the affinity between the solid and the liquid, increases the solvent power. Many gases, on the contrary, are more soluble in cold than in hot water. In the case of oxygen and hydrogen, and in many similar cases, heat has no effect on the mixture until it actually produces combination, with change of state. The action of oxygen upon metals very greatly depends upon the degree of heat.

Lavoisier invented an instrument called the calorimeter for estimating the amount of heat evolved during chemical combinations. It is figured on the Plate, fig. 15. It consists of two metallic vessels, A B C D, A' B' C' D', one contained within the other, and kept separate by small pieces of wood or glass. The space between is filled with broken ice. This, melting and constantly renewed, keeps the interior vessel at zero. Within this is another vessel, A'' B'' C'' D'', separated from the middle one by ice. Any body of higher temperature introduced into the innermost vessel will be cooled and will communicate its heat to the water, which will show the amount evolved.

Count Rumford's calorimeter (fig. 16) consists of a vessel of sheet copper, with a worm tube in the interior, making three revolutions. This tube introduces the heating gas. Bodies burned at the mouth below, send up their gases through the tube, and the heat communicated to the water will raise its temperature. Fig. 17 is a small pump used with this, when ether or alcohol is to be burned. The liquid is introduced at A and burned at B.

There are some gaseous compounds which can scarcely be produced by the direct action of heat on their elements: thus oxygen and nitrogen do not unite, even when strongly heated, so as to form nitrous acid or any other compound; but the heat which accompanies the electrical spark seems capable of producing this effect. There are a few cases in which heat by direct action, and without the aid of any intervening affinity, is capable of decomposing compounds.

Heat has also great power in modifying as well as in causing chemical action, and different degrees of it produce very opposite effects in some cases. If

we heat mercury to about its boiling point, exposed to the air, it becomes peroxide; but if we expose this product to a higher temperature than was required for its formation, it is then again resolved into metallic mercury and oxygen gas.

The dilatation of substances by heat is nearly proportional to the increase of temperature, except when they are about to change their physical or chemical states; thus water near the freezing point expands when the temperature is diminished, which is probably owing to the different arrangement assumed by its constituent particles preparatory to crystallization. In gases the law is very simple; their expansion (even when containing vapour) is 0.375 of their volume at the freezing point, when their temperature is raised to the boiling point; and is equable during the interval.

Elastic vapours mixed with air add to its elastic force. Let fig. 13 represent a common condenser gauge formed of a bent tube, open at one end and closed at the other, containing some mercury. Moisten the interior of the tube with water and observe the tension, then place the instrument in warm water and again observe the tension; it will be seen that the increase is greater than it would be with dry air or gas only. An instrument called cryophorus, invented by Dr. Wollaston, is represented at fig. 14. Two glass balls communicating by a tube inclose a small quantity of water. This is made to boil, and the open end is hermetically sealed. When one of the balls is placed in a freezing mixture, and the water is brought into the other, the vapour is condensed, and thus the vacuum draws the evaporation so rapidly from the water as to produce freezing of it in the ball.

The following table gives the dilatation of a unit length of different solids from the freezing to the boiling point, and is a mean taken from several observers:—

Glass tube, . . .	00083	Copper, . . .	0017
Crown glass, . . .	00089	Brass, . . .	0018
Platinum, . . .	00093	Silver, . . .	0020
Palladium, . . .	001	Tin, . . .	0022
Cast Iron, . . .	0011	Pewter, . . .	0023
Steel, . . .	0012	Grain Tin, . . .	0025
Do. tempered, . . .	0013	Lead, . . .	0028
Gold, . . .	0015	Zinc, . . .	0030

A simple means of observing the expansion of a liquid by heat is seen at fig. 1. A flask is filled with a liquid and held over a lamp. So soon as the temperature begins to increase, the liquid will rise above the point A. The dilatation of gases or air is seen in fig. 2. A common phial, with a glass tube passing through the cork, has a small quantity of coloured fluid at the bottom, into which the end of the tube reaches. When heated over a lamp, the air expands and forces the fluid up the tube. This and fig. 3 are different forms of the air thermometer. Fig. 4 is the tube and bulb of the common thermometer. The freezing point is determined by immersing the thermometer in the water of melting ice, and the boiling point by immersing it in boiling water where the steam is excluded from the glass, as in the instrument shown in fig. 5, 00 being an aperture for the escape of the steam. Plates of different metals of unequal expansibility are some-

times used together as compensation balances for chronometers (fig. 6) and as thermometers (fig. 7). For meteorological purposes, in which it is desirable to have the changes of temperature registered, an instrument such as that represented in fig. 8 is used, or such as those shown in figs. 9, 10, and 11. The two last represent an instrument constructed by Gay-Lussac. Within a large tube, C D, is a small one, B H, the former being filled with mercury from F to E. Suppose the bulb, A, and the tube, C D, filled with salt-water at 20°. Should the temperature now be lessened the mercury would enter at B and fall to A, and the remainder poured into the graduated tube, G, would indicate the depression of temperature. Fig. 12 represents another instrument called the differential thermometer, used for the same purpose.

Instruments have been invented for observing the amount of heat bodies give out in cooling. One of these is represented in fig. 18; M M' M'' M''', is a large thin copper balloon immersed in a trough of water, and kept there by the cross beams, R R', R R'. A thermometer inclosed in a hollow tube, S T, is passed by means of a long neck through a cork in the opening of the balloon. Fig. 19 shows the bulb of the instrument when being heated, the plates A A' screening the plate A B from the heat. A tube, D E F, passes from the top of S T, where there is a stopcock, to the plate of an air-pump, H K. From r' to m is a tube containing muriate of lime, over which the gas passes by way of the bent tube, m n p r s, into the glass air-holder, v, where the observations are made. Cooling takes place generally by radiation. Experiments on the radiation of heat are made by the apparatus represented in fig. 20, which consists of two concave mirrors of polished tin twelve feet apart. In the focus of one is the bulb of a thermometer, and in the focus of the other a ball of hot iron. The thermometer in the focus may be compared with another at the same distance from the hot ball without the focus, and it will be found to stand much higher. Fig. 21 is another instrument used for the same purpose. It is a square tin canister filled with hot water, having its four sides coated with different substances with their respectively different powers of radiation.

HEAT, ANIMAL. The conversion of the food of man and the higher animals into nutriment for the body is attended with changes which produce an evolution of heat which constantly maintains the temperature of an animal at a point above or below, according to circumstances, the temperature of the medium in which it exists. The degree of heat possessed by animals not gifted with the power of locomotion is very small above that of surrounding media, and in this respect resembles the heat given off by plants. [HEAT OF VEGETABLES.] In proportion as animals possess the power of locomotion, they evolve heat from their bodies. This arises from the fact, that where the muscular system is most exercised there is greatest demand made upon the nutritive processes going on in the system. We should therefore expect to find that the quantity of heat developed in the invertebrate animals was less than that in the vertebrate class. This fact has been recorded by many observers, as, for instance, by John Hunter, in the Annelida, and by Newport, in the Insecta.

Amongst the vertebrate animals, fishes and rep-

tiles have the lowest temperature. Dr. Davy, John Hunter, and others, have found that fishes have a temperature of from 0.7° to 2.7° above the surrounding medium.

In man the temperature of the accessible parts of the body, as the mouth, axilla, &c., is usually between 97.7° and 98.6°. The human blood is found to have a temperature in health varying from 100.6° to 101.75°; in disease it rises to 106° or 109°. In healthy persons the temperature is said to attain its maximum during the day, and to fall from 1.8° to 2.7° during sleep. Dr. Davy has also found that the temperature of the interior of the body is 2.7° to 3.6° higher in tropical than in temperate climates. Most of the mammalia have a higher temperature than man, and birds develop a greater quantity of heat than any other class of animals. This arises from the nutritive changes going on in the bird in order to support the enormous muscular power which it is compelled to exert during flight.

There is now no question that the cause of animal heat is the chemical changes which are going on in the nutrient fluid of the body. During the act of respiration a large quantity of oxygen gas is taken into the lungs, which is absorbed by the blood. In this fluid it meets the various compounds of carbon which have been taken in with the food; and the consequence is a union of the oxygen with the carbon, and the formation of carbonic acid gas, which gas is given out when the blood again reaches the lungs during expiration. When carbon and oxygen unite out of the body, heat is the result, and the same thing occurs when they unite in the body; and it is through the medium of this change that the bodies of animals are raised to a given temperature by the circulation of the blood through the system. It has been calculated that there is more oxygen absorbed than is given out of the system in the form of carbonic acid gas; it is probable that this enters into combination with hydrogen and compounds of hydrogen, nitrogen, and carbon, and thus contributes to the raising of the animal heat.

This theory of animal heat explains many well-known phenomena; as, for instance, the slight independent warmth of the fœtus, and of those young animals which are born in an imperfectly developed condition. The low temperature of persons with *morbus ceruleus* [HEART, DISEASES OF], where the blood is only imperfectly oxygenated, and the cold experienced by aged and debilitated persons in whom a small quantity of blood circulates slowly; as also the increased temperature observed in persons labouring under attacks of inflammatory disease, where the blood circulates rapidly—are confirmatory facts. The phenomena exhibited by the *hibernation* of animals are explained by this theory.

HEAT OF VEGETABLES. Whenever oxygen combines with carbon to form carbonic acid, an extrication of heat takes place, however minute the amount. Such a combination occurs much more extensively during the germination of seeds and the impregnation of flowers than at any other time. At the first of these periods extrication of heat takes place to a considerable amount, as is remarked in the germination of barley heaped in rooms, previously to being manufactured into malt; in the latter it also occurs, but in consequence of flowers not being con-

fined in close cases, the heat is lost as soon as it is disengaged, and never accumulates, except in a few special instances. It is, however, only when large quantities of flowers expand within close cases that this phenomenon is particularly remarkable. Accordingly, in the spathe of araceous plants it has been remarked at its greatest intensity. Lamarck, Senebier, and De Candolle found the flowers of *Arum maculatum*, between three and seven o'clock in the afternoon, as much as 7° Réaumur warmer than the external air. Schultz found a difference of 4° to 5° between the heat of the spathe of *Canadium pinnatifidum* and the surrounding air at six to seven o'clock P.M. Hubert and Bory de St. Vincent assert that at sunrise the spathe of *Arum cordifolium* acquires in the Isle of France an elevation of 30° Réaumur above the atmosphere. Finally, Messrs. Vrolik and Vriese at Amsterdam, and Adolphe Brongniart at Paris, have confirmed the fact by new observations in the hothouses of those cities. It has also been found that in winter plants have a higher temperature than the surrounding atmosphere, and in summer a lower one.

Hence it appears that plants not only have, under all circumstances, a temperature different from that of the external air, being warmer in winter and cooler in summer, but that under particular circumstances the heat of certain parts is elevated in a very remarkable degree. We know that heat is necessary for germination and for vegetable impregnation. May we not therefore conclude that nature has given to plants the power of extricating for themselves an additional supply of caloric at these important periods?

HEATH. [CALLUNA; ERICA.]

HEATH-COCK. [BLACK-COCK.]

HEATHCOAT, JOHN, was born in 1784 at Long Whatton in Leicestershire. His father, a small farmer, apprenticed him at an early age to a framesmith, with whom he acquired a practical knowledge of the mechanism of the stocking frame and warp machines. By the application of a clever apparatus to one of these machines, mits of a lace-like appearance were produced, which first suggested to the ingenious inventor the idea of making lace by machinery. Having completed the term of his apprenticeship, he commenced business on his own account as a "setter up" of hosiery and warp frames in Nottingham, where in his leisure hours he pursued with untiring energy the design of constructing a machine that should simultaneously do the work of the pillow, of the multitudinous pins, threads, &c. This great conception, after wondrous efforts, was at length successfully perfected. Reward followed quickly on success: the first square yard of plain net was sold at 5*l*. For the last twenty-five years the average price has been 5*d*. per yard. In 1816 the factory in which Mr. Heathcoat's business was carried on at Loughborough was attacked by the Luddites and the lace frames destroyed. This disaster led to the removal of the manufacture to Tiverton. On the passing of the reform bill Mr. Heathcoat was returned as member for that borough, and continued until within two years of his death in the regular discharge of his parliamentary duties. At the age of seventy-seven, January 18, 1861, after repeated attacks of paralysis, he died at his seat, Bolham House, Tiverton.

HEATING APPARATUS. [VENTILATION.]

HEAVEN. This word was used of old, and is still used in popular physical science, to signify the firmament or vault of heaven. The Bible speaks (Gen. vii. 11) of the 'windows of heaven.' In theology, however, it refers to the scene or place or condition of eternal life; to that portion of infinite space where the Deity is supposed specially to dwell, and which he has from the beginning of time pre-ordained for the inheritance of the good after death.

All religions teach the eternal and imperishable nature of the human spirit, and the continued existence of souls after death, and even the heathen, when weeping over the corpse of one he loves, does not fail to lift his tearful eyes to the home beyond the grave. Of course, among the different nations the most contradictory ideas prevail; some believe that in the next world the soul will live in a state of sensual bliss, in the midst of lovely groves and gardens, where are spread richly-decked boards, at which they may feast whenever they please. Others believe that the soul sleeps in the grave until the great day of judgment, when the dead shall arise and receive their reward. Others, again, think that the spirits of the departed roam about in some paradise, where their greatest happiness consists in recounting the deeds performed by them in their former existence; while others hold that before the soul is admitted into heaven it must undergo a period of probation, during which it will be cleansed from all earthly wishes, cares, and impurities, in order that it may ultimately enjoy unmixed and eternal bliss. The Elysian Fields of the Greeks and Romans, and the Elysium of classical mythology, is, in all essential respects, the natural equivalent of the heaven of the just. The Mohammedans hold the notion of seven heavens, rising one above the other according to degrees of dignity and glory. Each race and nation forms to itself its own ideal of enjoyment, and calls it heaven. Speculations on the subject are, however, vain and profane; human language has no words to express the eternal life, and the things of earth offer no analogy to it. Even biblical revelation is almost silent on this subject, and St. Paul deprecates the vain endeavours of inquisitive minds to pry into it.

Christians generally believe the word to signify the abode of the Most High, and the special seat of his glory, in which the angels minister to him, and the saints live in everlasting bliss and perfect happiness. Many controversies have arisen as to the precise time of the spirits entering paradise—whether immediately after death or only after the general resurrection.

HEBE, in Greek literature, the Goddess of Youth and the cupbearer of Olympus, a daughter of Jupiter and Juno, who gave her as a wife to Hercules in reward for his achievements.

HEBER, REGINALD, second bishop of Calcutta, was born April 21, 1783, at Malpas in Cheshire, of which place his father was for many years co-rector. He gave early indications of his poetical talents, and at seven years old he had translated Phædrus into English verse. At eight he was sent to the grammar-school of Hawkhurst under Dr. Kent, and in his thirteenth year he was placed in the school of a clergyman, near London. He remained here about

three years, and in November, 1800, was entered at Brasenose College, Oxford. In his first year at the university he gained the prize for Latin verse. In the spring of 1803 he wrote his prize poem, 'Palestine,' which has obtained a permanent place in English literature. In 1804 he became a fellow of All Souls. The year after he had taken his degree he gained the Bachelors' prize for an English prose essay on the 'Sense of Honour.' About the middle of 1805, in company with his friend Mr. John Thornton, he set out on a continental tour, and returned to England in October, 1806. In 1807, before he had obtained his degree of M.A., he took orders, and was instituted by his brother Richard to the family living of Hodnet. In April, 1809, he married Amelia, youngest daughter of Dr. Shipley, dean of St. Asaph. While discharging the duties of his parish with much earnestness, he was ardently attached to the pursuits of literature. He was a frequent contributor to the *Quarterly Review* from its commencement. In 1812 he commenced the preparation of a 'Dictionary of the Bible,' but other duties compelled him to suspend this work, and no part of it was ever published. In the same year he published a small volume of 'Poems and Translations for Weekly Church Service.' The composition of his 'Hymns,' with a view of improving the psalmody and devotional poetry used in churches, was also a favourite recreation. His political views were those of the High Church and Tory party, but devoid of all bitterness. In 1815 he was appointed Bampton lecturer, and the subject he selected was 'The Personality and Office of the Christian Comforter.' In 1817 Dr. Luxmore, the bishop of St. Asaph, appointed Heber to a stall in that cathedral. In 1819 he edited the works of Bishop Jeremy Taylor. His other works consist of 'Parish Sermons,' preached at Hodnet, and Sermons preached in India. In April, 1822, he was elected preacher of Lincoln's Inn. At the end of that year his friend and connection, the Right Hon. Charles W. Williams Wynn, who was at the time president of the Board of Control, offered him the vacant see of Calcutta, which he accepted after two refusals. He embarked for his diocese, June 16, 1823, and on the 15th of June, 1824, began his visitation. The Journal which he kept during his visitation, and which has been published in three octavo volumes, shows the extent of his observations. On the 3rd of April, 1826, after investigating the state of the mission at Trichinopoly, he retired to use a cold bath, in which he was found dead about half an hour afterwards. Within less than three weeks he would have completed his forty-third year.

HEBERDEN, WILLIAM, M.D., was born in London in 1710. In 1724 he was sent to St. John's College, Cambridge, of which, six years afterwards, he was elected a fellow. He studied medicine in Cambridge and London, and after taking his degree practised as a physician, and delivered an annual course of lectures on materia medica in the University of Cambridge. In 1746 he was elected a fellow of the Royal College of Physicians, and soon after left Cambridge, and commenced practising in London, where he at once met with the greatest success, and obtained the highest reputation. In 1750 he was elected a fellow of the Royal Society, and in 1778 an associate of the Royal Society of Medicine in Paris.

After thirty years' extensive practice, finding his health declining, he gradually withdrew himself from his profession to retirement at Windsor, where he died in 1801.

HEBRADENDRON, a genus of the natural family of *Guttifera*, established for the Gamboge Tree of Ceylon.

The gamboge of Siam is in cylinders, either solid or hollow, usually called *pipes*: it is supposed to have this form from being so rolled, or from being poured into the hollow of bamboos.

The Ceylon gamboge is usually considered inferior to that sent from Siam. No doubt, however, some of very excellent quality is produced in Ceylon by the tree which has been called *Hebradendron cambogioides*. Dr. Graham ascribes its inferiority to want of care in preparing the article for market.

The *H. cambogioides* forms a moderate-sized tree. The gamboge oozes out in a semi-liquid state, but hardens on exposure to the air, and is scraped off by the collectors next morning. This tree is found in various parts of Ceylon. Its favourite abode seems to be low sandy ground, but it is also found 100 miles inland, at so high an elevation as 2000 feet above the sea.

HEBREW LANGUAGE forms a branch of that extensive family of languages which are known by the name of Semitic; a name which is derived from the real or supposed descent of the people who speak those languages from Shem, the son of Noah. The Semitic languages may be divided into three branches: the Arabic, to which the Ethiopic is closely allied; the Aramæan, consisting of two dialects—the Babylonian or East Aramæan (sometimes but erroneously called Chaldee), and the Syriac or West Aramæan; and the Hebrew, to which the Phœnician and Punic are closely related. Of these languages the Arabic is the most copious, and the Aramæan the poorest and least developed; the Hebrew holds an intermediate rank between these, being more perfect than the Aramæan, and inferior to the Arabic.

The Hebrew language derived its name from the Hebrews, who date their origin from Abraham, who is called 'the Hebrew' in Gen. xiv. 13. The etymology of this word is doubtful.

The Hebrew language appears to have been formed in Palestine by a union of the ancient Aramæan, which was brought by the Abrahmites from Mesopotamia, with the Phœnician or Canaanitish, the language of the original inhabitants of the country. That the Phœnician and Hebrew languages were very closely allied is evident from the Phœnician names of persons and places, and from the specimens of the Phœnician language which we possess in coins and inscriptions. The long settlement of the Hebrews in Egypt, and their forty years' wandering in the wilderness, must have had an important influence upon their language; but the number of Egyptian words received into it appears to have been small.

Many critics have divided the history of the language into four periods:—I. From Abraham to Moses. II. From Moses to Solomon. III. From Solomon to the Babylonish captivity. IV. From the Babylonish captivity to its final extinction as a spoken language. But there are in reality only two periods in which any difference can be traced in the language; the first extending from the time of Moses

to the reign of Hezekiah, and the second from the reign of Hezekiah to its final extinction as a spoken language. The language in which the Pentateuch is written differs so little from that of David, Solomon, and Isaiah, who lived many centuries after the time of Moses, that many critics, supposing it impossible that a language should have remained stationary for so many centuries, have maintained that none of the books of the Old Testament were written previous to the time of David and Solomon. It is not very easy to disprove this opinion; but the remarks of Ewald on this subject appear worthy of attention. He observes in his 'Hebrew Grammar' § 7 (Eng. trans.), that 'the Hebrew language in the first four books of the Pentateuch, which contain records of unquestionable antiquity, partly by Moses or from his time, appears already, a few minutæ excepted, fully developed.'

The conquests of the Assyrians and Chaldeans from about B.C. 720 tended to introduce the Aramæan language into Palestine. The Aramæan colonies (2 Kings xvii. 24), which were planted in the kingdom of Israel to supply the place of the Israelites who had been carried into Assyria by Salmanser, must have caused the spread of the Aramæan language in the northern parts of Palestine even before the destruction of the kingdom of Judah. The long residence of the Jews in Babylon after the destruction of Jerusalem by Nebuchadnezzar caused the extinction of the Hebrew as a spoken language, at least among the common people. After their return to Judea, according to the edict of Cyrus, it appears, from a passage in Nehemiah (viii. 8), that the common people did not understand the Scriptures when read to them in the Hebrew language. But Hebrew continued to be spoken by the upper classes for a considerable time after the Babylonish captivity. The prophecies of Haggai, Zechariah, and Malachi, who lived in the latter part of the sixth century B.C., are written in tolerably pure Hebrew. The inscriptions of the coins of the Maccabees are in Hebrew; and the Hebrew language does not appear to have been discontinued in writing and conversation among the upper classes till the century preceding the birth of Christ.

But the Hebrew, from the period of its extinction as a spoken language, has been always more or less cultivated by the Jews. After the destruction of Jerusalem by the Romans, numerous schools were established by the Jews, in which their language and literature were taught. Of these schools the most celebrated were those of Tiberias and Babylon. The Mishna, which contains the traditions of the Jews and interpretations of the Scriptures, is supposed to have been compiled in the latter part of the second or the beginning of the third century, by Rabbi Jehuda. The Mishna was considered from this period one of the principal works of Hebrew literature, and the Rabbis of Tiberias and Babylon wrote numerous commentaries upon it. These commentaries were at length collected into two separate works, which were entitled the Jerusalem and Babylonian Talmuds.

The Christians gave very little attention to the Hebrew language before the Reformation. The publications of the Buxtorfs in the seventeenth century tended to diffuse the language among Christians.

The Grammar of Schultens, which appeared in 1731, and which may still be consulted with great advantage by Hebrew scholars, contained a much clearer development of the principles of the language than the Buxtorfs had given. His knowledge of Arabic enabled him to compare the forms of that language with the Hebrew, and thus to draw the attention of scholars to the important fact that the study of the cognate languages is necessary to obtain an accurate knowledge of Hebrew. But the publications of Gesenius and Ewald in the present century, have done more to facilitate the acquisition of the language than the works of all preceding writers.

Few literary subjects have occasioned greater discussion than the letters, vowels, points, and accents of the Hebrew language. But with regard to the letters, it appears probable that the present square characters in which Hebrew is written were not employed previous to the Babylonish captivity, but that the Phœnician letters were used, which are still preserved with a slight alteration in the Samaritan alphabet. According to the Jewish tradition, the present square characters, which belong to the East Aramæan language, were first introduced by Ezra when he revised the canon of Scripture; but they could not have been universally adopted till a later period, since the Samaritan Pentateuch, which was not introduced into Samaria till after the Babylonish captivity, was written in the ancient character, and the Asmonæans, in the second century before Christ, have also used the same character on their coins.

It is a characteristic of the Hebrew language, according to the system of most modern Hebrew grammars, that the alphabet consists only of consonants, and that the vowels are expressed by means of small points placed above and below the letters. The antiquity of these points has occasioned great controversy among the learned. It appears certain, from many circumstances, that the Hebrew letters were originally written without points. The best arguments on both sides of the question are given in Buxtorf's 'Tiberias, sive Commentarius Masorethicus,' 4to., 1620, in which the antiquity of the points is maintained, and in Capellus' 'Arcanum Punctuationis revelatum,' 4to., 1624, in which their antiquity is denied.

HEBREWS. [Jews.]

HEBREWS, EPISTLE TO THE, a book of the New Testament. There has been much controversy as to whether this book is an epistle or a dissertation; as to the persons to whom it was addressed; and by whom and in what language it was written. It is not necessary to enter into the details of these controversies, and we shall only state the prevailing opinions. The allusions to particular circumstances (v. 11; vi. 9, 10; x. 32, 34; xiii. 19, 22, 23) tend to prove it to be an epistle. The general opinion respecting the persons to whom this epistle was addressed, is that they were the Jewish converts in Jerusalem or Palestine generally. This opinion, as Michaelis has shown, is supported by the contents of the book itself. Concerning the language in which it was written critics have been much divided, some supposing that it was written in Greek, and others that it was written in Hebrew and translated into Greek.

The author of this epistle is equally uncertain. The general voice of tradition assigns it to the Apostle

Paul, but it has also been ascribed to Barnabas, to Luke, to Silas, and to Apollos. In the first ages of the church it appears to have been generally considered as a production of the Apostle Paul. The chief objections against the Pauline origin of the epistle are drawn from the absence of the usual address at the beginning, the superiority of the style to that of Paul's acknowledged epistles, and the resemblance between its style and that of the Alexandrine school. The points above stated are discussed with great ability and candour by Professor Moses Stuart ('Commentary on the Hebrews') in favour of the Pauline origin of the epistle, and Professor Bleek ('Brief an die Hebräer') on the other side. The opinions which assign the authorship to Barnabas, Apollos, Luke, and Silas rest on very slight grounds.

The date depends partly on the settlement of the former question. If Paul was the author, it was probably written during his first imprisonment at Rome, and immediately before he was released (see xiii. 18, 19, 23). Accordingly, most critics refer it to A.D. 61 or 62. In warmth of feeling, elegance of language, and force of argument, this epistle yields to no book of the New Testament.

HEBRIDES, or *Western Islands*, are scattered in the Atlantic Sea, along the western coast of Scotland, between 55° 35' and 59° N. lat., and 5° and 8° W. long. They amount to nearly 200, of which 70 are permanently inhabited. They are usually divided into the Inner Hebrides and Outer Hebrides. The Inner Hebrides consist of the islands nearest the mainland, including, besides those in the Frith of Clyde, Skye, Mull, Islay, Jura, Coll, Rum, Tiree, &c. The Outer Hebrides, popularly called the Long Island, consist of the range of islands stretching in a continuous E.N.E. and S.S.W. direction from Barra Head to the Butt of Lewis. The principal islands in the range are Barra, North and South Uist, Benbecula, and the districts of Harris and Lewis, which two form together one long island. The surface of these islands varies considerably. Some of the larger islands are mountainous, especially those which approach the mainland, such as Arran, Jura, Mull, and Skye, in which the elevated masses rise to the height of 2000 or 3000 feet and more above the sea. The others are in general only hilly, the most elevated parts not exceeding 1500 feet; and in some are not more than from 300 to 500 feet. The rivers are small but numerous, and abound in salmon, trout, and eels; many contain also several other kinds of fish. Some of the islands abound in lakes. Bute and Islay, and also several districts in the island of Skye, are considered fertile. A comparatively small portion of the surface of the whole is under cultivation. The whole area of the islands comprehends 1,592,000 acres, of which mountains, morasses, lakes, and unproductive soil have been computed to occupy 600,000, pasture 700,000, and arable land only 180,000 acres. There are no natural woods on the islands, but several thousand acres have been planted.

Owing to the Gulf Stream the climate is upon the whole mild. Frost and snow are almost unknown in the smaller isles, and they seldom prevail in the larger to any considerable degree.

The great mass of the population resides within a mile of the sea-shore. From their language and

customs it is evident that they are of the same stock with the inhabitants of Ireland and of the Highlands of Scotland.

The people are generally in the greatest poverty, four-fifths subsisting almost wholly on potatoes and fish. The introduction of steam navigation has contributed very much to the improvement of the Inner Hebrides. The herring fishery, formerly an important resource of the people, has greatly declined, as has also the manufacture of kelp, of which, at the beginning of the present century, nearly 6000 tons were produced, fetching sometimes 20*l.* per ton. Except some productions of cotton stuffs at Rothesay, distilling in Islay, and boat-building at Tobermory and Stornoway, the manufactures are insignificant and wholly domestic. The most profitable branch of industry is the rearing of cattle and sheep: the stock of each is estimated at 120,000. The imports are iron, groceries, salt, oatmeal, and peat-fuel in some of the islands; the principal articles of export being live stock, ponies, kelp, wool, cod, ling, herrings, limestone, and slate.

The greater number of the islands are destitute of surgeons, or even of inns, and there is no printing press or newspaper, though a few years ago six branch banks had been established in the Hebrides, which are divided into twenty-six parishes. Most of the inhabitants are Roman Catholics, especially in the outer Hebrides. These islands were ruled mostly by sovereigns of Norwegian descent from the ninth century to 1264, when they were annexed to the crown of Scotland.

The principal towns are Stornoway, a small port in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute.

As in the mainland portion of the Highlands, many large estates have passed from the old families into the hands of opulent modern proprietors, by whom extensive improvements have been effected.

The Hebrides belong politically to four Scotch counties. Those of them which lie in the Frith of Clyde, between the peninsula of Cantire and the coast of Ayrshire, constitute a county by themselves. [BUTESHIRE.] All the other southern Hebrides, together with the islands of Muck, Rum, and Canna, which are included in the Northern Hebrides, are annexed to the county of Argyle. [ARGYLESHIRE.] The Long Island, except Lewis, constitutes a part of Inverness-shire. Lewis is a part of Ross-shire; and Skye belongs to Inverness.

HEBRON (literally 'alliance'), the name of a city belonging to the territory anciently assigned to the tribe of Judah. Its original name was *Kiryath-arba*, or the city of Arba the father of Anak (see Gen. xxiii. 2; Josh. xiv. 15). It is one of the most ancient cities of the world. Thus the sacred historian says of the Israelites—'They came to Hebron, where Ahiman, Sheshai, and Talmi, the children of Anak, were. Now Hebron was built seven years before Zoan in Egypt' (Numb. xiii. 22). Zoan, or Tanis, was the ancient capital of Lower Egypt. After the conquest of Palestine, Hebron became one of the cities of refuge (Joshua *passim*). Before the accession of the ten tribes to the rule of David, he occupied Hebron as a royal city. Hebron is situated in a deep, narrow, but very fruitful valley, and is even now a place of importance in Palestine. Its

present inhabitants are described as wild and lawless.

HECATÆUS of Milētus, was one of the earliest Greek prose writers. He was present at the deliberation of the Ionians (B.C. 501), and attempted to dissuade them from revolting against the Persian king. (Herod., v. 36.) He is also mentioned by Herodotus (v. 125) as being alive at the time of the flight of Aristāgoras, B.C. 497.

His works, which consisted of histories, genealogies, and geographical pieces, were held in considerable esteem by the ancients. Herodotus (vi. 137) quotes one of his historical works.

The fragments of the writings of Hecatæus have been published by Creuzer in his 'Historicorum Græcorum Antiquissimorum Fragmenta,' 8vo., Heidelberg, 1806, and by Klausen, 'Hecatæi Milesii Fragmenta,' 8vo., Berlin, 1831.

HECATE, one of the ancient Greek divinities, the daughter of the Titan Perseus and Asteria, according to Hesiod ('Theog.,' 411). Her attributes correspond in most respects with those of Artemis; and it has therefore been conjectured that she may originally have been the same as Artemis.

HECATE'SIA, a festival celebrated by the Greeks, and more especially by the Athenians, in honour of Hecate. The numerous statues erected in honour of this goddess were termed *Hecatææ*.

HECATOMB, a Greek word signifying the sacrifice of a large number of victims, usually one hundred. Strictly speaking, the sacrifice should consist of 100 bulls, but inferior animals were often substituted. In the time of Homer it was usual only to burn the legs, fat, and intestines of the animal, the rest being eaten at the feast which succeeded the hecatomb. Hence in Athens this was the most popular form of sacrifice, as it was supposed not only to please the gods, but it likewise fed both priests and people.

HECLA. [ICELAND.]

HECTARE, the principal land measure of the French, which consists of a square of 100 mètres on every side, equal to 2 acres, 1 rood, 35 square poles, and 11½ square yards, English.

HECTOLITRE, a French measure of capacity for liquids containing 100 litres, equal to a tenth of a cubic mètrè, or twenty-two imperial gallons.

HECTOR, the greatest of the Trojan heroes who figure in our accounts of the Trojan War. He was the son of Priam and Hecuba, and married to Andromache. The poet of the 'Iliad' describes him not only as a bold and gallant warrior, but as a hero ennobled by all the more tender and humane virtues. The most tender passage in the 'Iliad' is that in which Hector (vi. 369, &c.), before going to battle, takes leave of his wife and child. He finally fell by the hand of Achilles, and the body was given up by the conqueror to his father Priam. The remains of Hector were buried at Troy, where funeral sacrifices were offered to him as a hero.

HE'DERA, a genus of araliaceous plants, consisting of nearly fifty species, inhabiting chiefly the warmer parts of the world, is interesting to Europeans as containing, among others, the common ivy, with its numerous varieties. This plant, the *Hedera helix* of botanists, does not exactly represent the habit of the genus, for many of the exotic species,

instead of being creepers, adhering to other plants, or to rocks and walls by their sucker-like roots, are trees of considerable size.

HEDGE, one of the most lasting and effectual of fences. Hedges are made of various kinds of shrubs and trees, trained so as to throw out numerous branches along the stem from the surface of the earth upwards; this is done by judicious pruning when they are young. The head being cut off and the side branches shortened, numerous smaller branches spring out, which are shortened in their turn, and form a very compact mass, consisting of the ends of stumps and branches pointing in every direction. Hedges in Britain are generally formed of hawthorn. [CRATÆGUS.] Other shrubs are cultivated with it in order to fill up the blanks at the lower parts of high hawthorn hedges. Beech is also extensively used. Those shrubs which are of a thorny nature are best adapted for hedges. Holly is on this account much in use for gardens and pleasure grounds. Ornamental hedges are sometimes made of lime, yew, box, thorn, hornbeam, elder, sweetbriar, and privet, but they are of little use as fences.

There is a method of repairing hedges which is called *plashing*. It consists in cutting half through some of the stems near the ground, and then bending the upper parts down in a horizontal or oblique position, keeping them so by means of hooked sticks driven into the bank. Thus a live hedge is made, which fills up the gaps in the same manner as a dead hedge would have done, and the bent stems soon throw out shoots. But this should only be done when the stems are young. [FENCES.]

HEDGE-SPARROW, or HEDGE-CHANTER (*Accentor modularis*), the name of a very common and well known species of bird of the family *Sylviadeæ*, or Warblers. It is a gentle and familiar bird, having, to use the words of Gilbert White, 'a delicate song.' It is one of the earliest of our nesting birds. The eggs, four or five in number, are of a greenish colour. The birds rear two broods in a season. The Alpine accentor (*A. alpinus*) is a native of the south of Europe. It has occasionally been met with in Britain.

HEDGEHOG (*Erinaceus*, Linn.), has the body covered with sharp strong prickles instead of hairs. The skin of the back is furnished with muscles so arranged that the animal, on bending its head and pressing its limbs upon the belly, can close itself up like a purse, and present on every part its spines to the enemy. The tail is very short. All the feet have five toes. In the upper jaw there are six incisors, of which the middle ones are the largest; in the lower, two incisors; on each side three false molars; three molars with bristling points; and a little tuberculous molar. The genus *Erinaceus* may be regarded as typical of the order Insectivora. It is spread over Europe, Asia, and Africa.

Example, the common Hedgehog (*Erinaceus Europæus*), the *Riccio* of the Italians, *Erizo* of the Spanish, *L'Hérisson* of the French, *Igel* of the Germans, *Hedgehog* and *Urchin* of the English, *Echinus terrestris* of Gesner, *Echinus (Erinaceus) terrestris* of Ray, and *Acanthion vulgaris* of Klein. There can be little doubt that it is the *Echinus* (Εχίνος) of Aristotle.

The hedgehog is too well known to need here any

explicit details. It is insectivorous, but also devours slugs, frogs, small snakes, and eggs, being therefore mischievous in game preserves. It is plantigrade; inhabits copses, woods, and thick hedgerows; is nocturnal; and hibernates. The female makes a nest, and produces in summer from two to four young, blind at their birth, with the soft rudiments of the prickles only just apparent. On the continent in many places the flesh of this animal is eaten. The Romans used its prickly skin for hackling hemp.

HEDY'SARUM, a genus of plants belonging to the natural order *Leguminosæ*. The species are herbs or under-shrubs. *H. coronarium*, French honeysuckle, is a native of Spain and Italy. It has deep red or white flowers. In Calabria this plant grows wild in great abundance, and horses and mules are fed with it. It grows well in our gardens, but probably would not make a good field crop. *H. fruticosum* is a native of Siberia in sandy places. It has a pale purple flower, and is a very handsome plant. Horses eat it with avidity, and it may be made useful in fixing sand, in which it grows readily. *H. Mackenzii* is a native of arctic America, about the Saskatchewan. The flowers are large and of a red colour. This was described as a liquorice plant by Sir A. Mackenzie, and named after him. The whole plant has a sweet taste. *H. lineare* is used in Cochinchina as a stomachic, and *H. alpinum* is used in Siberia for the same purpose. The *H. sennoides* of Willdenow, now *Ornocarpum sennoides*, has a root which is used in India as a tonic and stimulant. The *H. alhagi* of Linnæus is the *Alhagi maurorum* of recent writers. It is a spiny shrub, and from its branches exudes a sweet substance like manna. *H. tuberosum* of Roxburgh, *Pueraria tuberosa* of De Candolle, grows in the Circar Mountains, Hindustan.

HEEM, JAN DAVITZE DE, one of the most distinguished of the Dutch fruit and flower painters, was born at Utrecht about 1600, and died at Antwerp in 1674. His son, Kornelis, or Cornelius, was likewise an excellent painter in the same department.

HEEMSKERK, MARTEN, a celebrated Dutch painter, was born at Heemskerk, near Haarlem, in 1498: he was the son of a peasant farmer, Jacob Willemsze Van Veen, but he is known only by the name of his birthplace. Marten was employed by his father in common farm labour, which was particularly distasteful to him. He had given evidence of a talent for the art of design, and he fled to Delft, obtained admission into the house of a painter of the name of Jan Lucas, and he too became a painter. He studied afterwards with Jan Schoorel, at Haarlem, and his earliest works of distinction were painted in the style of that master. He painted for some years at Haarlem with great success. In Rome he distinguished himself as an imitator of Michael Angelo: the jealousy of the Italians, however, forced him to return to his own country. There are scarcely any works by Heemskerk now at Haarlem. He died very rich, and, though twice married, childless, at Haarlem, in 1674. The engravings after his works, by various masters, amount to many hundreds.

HEERE, LUCAS DE, a distinguished painter and poet, was born at Ghent in 1534. His father, Jan de Heere, was a good sculptor, and his mother

excelled in miniature painting. Lucas was placed with Francis Floris, after he had made sufficient progress with his father to benefit by the instruction of Floris. He painted in France; and visited England in the reign of Queen Elizabeth, whom he painted several times.

The principal of Lucas' poetical works was the 'Garden of Poetry'—'Boomgaard der Poësië': he commenced also, in verse, the 'Lives of the Painters,' but this has been lost. He died at Ghent in 1584.

HEEREN, ARNOLD HERMANN LUDWIG, was born at Arbergen, a village near Bremen, on the 25th of October, 1760. His father, who was pastor at Arbergen, gave him his first instruction in religion, Latin, and mathematics. In the autumn of 1779 he went to the University of Göttingen, when he attended Heyne's philological lectures. However, he soon felt that philology, in the narrower sense of the term, was not his vocation, for the things about which he read in the ancients interested him more than the languages themselves. In 1784 Heeren took his degree of doctor in philosophy. In the year following he formed the plan of a new edition of the 'Eclogæ' of Stobæus. He had commenced giving lectures at Göttingen as private teacher, but the opposition between his actual pursuits and what he felt to be his vocation became more and more painfully felt, his spirits began to fail, and his health also began to sink. He resolved to visit Italy, and principally Rome. One of the main objects of this journey was to collate the various MSS. of Stobæus. His stay in many of the principal towns of Germany, France, and Italy, was of great advantage to him. The future historian became acquainted with the world at large; he saw with his own eyes some of the countries to whose history a great part of his future life was to be devoted. On his return to Göttingen in 1787, he was appointed professor extraordinary in the philosophical faculty, and henceforth his life flowed undisturbed by any changes of fortune. Being possessed of wealth, he was enabled to continue his philological and historical studies without anxious cares. In 1796 he married a daughter of Heyne, who remained his devoted and sympathizing companion throughout his life. In 1799 he was appointed ordinary professor of history, as the successor of Gatterer. His reputation as a scholar and historian was already established, for the first two volumes of his Stobæus had appeared in 1792 and 1794 (the third and last was published in 1801). In 1793 and 1796 he had published the first two volumes of his 'Ideen über die Politik, den Verkehr, und den Handel der vornehmsten Völker der alten Welt' (the third and fourth volumes appeared in 1812 and 1815), which is his principal work, and the one on the completion of which he looked as the main object of his life. A fifth edition, in 5 vols., appeared in 1824, &c. In 1799 he published the first edition of his manual of ancient history ('Handbuch der Geschichte der Staaten des Alterthums'). A fifth appeared in 1826. In addition to these works, which followed one another in rapid succession, he had for some years been editing, conjointly with his friend Tychsen, a journal on ancient literature and art (*Bibliothek der alten Literatur und Kunst*), and had written a great variety of essays for other

periodicals, and for the *Transactions of the Royal Society of Göttingen*. His activity was astonishing; and, in addition to all this, he began about the year 1800 to study the history of the middle ages and of modern times, and also lectured upon these subjects. A great work of his, relating to the history of modern times, bears the title of 'Handbuch der Geschichte des Europäischen Staatensystems und seiner Kolonien,' Göttingen, 1809: a fourth edition appeared in 1822. A work on the influence of the Crusades ('*Sur l'Influence des Croisades*,' Paris, 1808) was crowned by the Academy of Inscriptions. A collection of his minor historical works, in 3 vols. ('*Kleine Historische Schriften*'), appeared from 1803 to 1808, and another, embracing all his historical works, in 15 vols., from 1821 to 1826. Most of his works have been translated into English and Dutch. On the death of Eichhorn, in 1827, he undertook the editorship of the *Göttingische Gelehrten Anzeigen*.

In 1827 or 1828 Heeren, in conjunction with Ukert, formed the plan of editing a series of works, containing the histories of the states of Europe. The whole is not yet completed; but among these works there are some of the highest eminence, such as Lappenberg's 'History of England,' and Geijer's 'History of Sweden.' Heeren died at Göttingen on the 6th of March, 1842.

The great merits of Heeren's works, especially of those relating to antiquity, are these: they are usually the result of a diligent study of the ancient writers themselves, and represent the nations in their political and commercial relations in a very lively manner. His works are written in a clear style, and the influence which they have exercised is very considerable.

HEGEL, GEORG WILHELM FRIEDRICH, was born at Stuttgart on the 27th of August, 1770, and was educated at the gymnasium of his native city. At the age of eighteen he proceeded to Tübingen to join the classes of theology and philosophy, where he had for his class-fellow the illustrious Schelling. Dissatisfied with the prevailing system of metaphysics, Hegel sought to supply its deficiencies by the works of Plato, Spinoza, and Kant; and, in the conviction that a truly philosophical comprehension can only be educed by an enlarged and diversified inquiry, he combined with a knowledge of philosophy a profound acquaintance with the natural and political sciences. Upon being admitted to the degree of doctor in philosophy, he accepted an engagement as private tutor, in which capacity he lived for some years, first in Switzerland, and afterwards at Frankfort-on-the-Main, until, on the death of his father in 1800, he was enabled, by the inheritance of a small patrimony, to devote himself without restraint to the study of philosophy. He accordingly proceeded to Jena, where Schelling was teaching his system of *Absolute Identity*, and of which Hegel was at this period one of the warmest partisans. Here he wrote his first philosophical work, entitled 'On the Difference of the Systems of Fichte and Schelling;' which treatise, notwithstanding the sincerity with which Hegel then advocated the views of the latter, contained the germ of that dissent which was afterwards expanded into a peculiar theory. He was also associated with Schelling in conducting the 'Critical Journal of Philosophy;' and among the

most important of the articles contributed by him is that 'On Faith and Science.' In 1806, when Schelling went to Würzburg, Hegel was appointed to supply his place as lecturer; and now for the first time he openly avowed his dissatisfaction with the system of Schelling. The difference between the ideas of the master and disciple was marked still more strongly in the 'Phenomenology of Mind,' which was published at Bamberg, whither Hegel had retired after the battle of Jena. This work contains an account of the several grades of development through which the 'self,' or 'ego,' proceeds; first of all, from consciousness into self-consciousness; next, into reflecting and active reason, from which it becomes philosophical reason, self-cognizant and self-analyzing, until at last, rising to the notion of God, it manifests itself in a religious form.

During his retirement at Bamberg, Hegel conducted the political journal of that town with great ability, and with honesty and candour. In 1808 he was called to preside over the gymnasium of Nürnberg. The benefit of the reforms he effected, both in the discipline and the studies of the school, are still gratefully noticed at the annual commemoration. In 1812 he published his 'Logic,' which was designed, with the 'Phenomenology,' to complete the whole body of science. Hegel employs the term logic in a very extended sense. The general merits of this work were admitted, and acknowledged by the offer of a professorship at Heidelberg. His first course of lectures was attended by a numerous and distinguished class, attracted by the originality of his views, notwithstanding the great obscurity of his style. By the publication of the 'Encyclopædia of Philosophical Sciences,' in 1817, his reputation as a philosopher was established, and Hegel was invited by the Prussian government to fill the chair at Berlin, which had remained vacant since the death of Fichte, in 1814. He successively published the 'Philosophy of Jurisprudence,' two new editions of the 'Encyclopædia;' the first volume of the second edition of his 'Logic;' and several articles in the 'Annals of Scientific Criticism,' which he had established as an organ of his system, and of its application to every branch of art and science. He fell a victim on the 14th November, 1831, to cholera, and was, in compliance with his express desire, buried by the side of Fichte. A life of Hegel has been written by his disciple Rosenkranz, of Königsberg; and a complete collection of his works was published in eighteen volumes at Berlin, 1832-41.

HEGESIAS (*Ἡγεσίας*), a Greek rhetorician and historian, was a native of Magnesia, and lived about the time of the historian Timæus, that is, about B. C. 250. Respecting his life no particulars are known, and his works are lost. He wrote a history of Alexander the Great.

HEGESIAS, the *Cyrenaic Philosopher*, lived somewhat earlier, in the reign of Ptolemæus Philadelphus. His doctrines in the main points agreed with Aristippus, the founder of the Cyrenaic school, who maintained that pleasure was the great object of man's life; but Hegesias and his school denied that kindness, friendship, and benevolence had any independent existence, but that they arise and disappear with our feeling of the want of them. Happiness is a thing impossible to attain, for our

body is subject to many sufferings, and the soul suffers with it. Life and death are equally desirable. Nothing is by nature either agreeable or disagreeable, but becomes so through the circumstances in which a man lives. A wise person therefore looks upon life with indifference, and regards nothing and nobody so much as himself, reducing everything to his own convenience.

HEGIRA, or HEDJRAH, the commencement of the Mohammedan era. It signalizes the flight of Mohammed from Mecca to Medina in the year 622. His life was in danger at the former place, and at the latter he found so much help in waging war with his adversaries that the rise of Mohammedanism was said to date from the time of his leaving Mecca. The Moslem calendar therefore dates from the middle of July, 622, but being a lunar year, it is shorter than ours by ten days, twenty-one hours, and fourteen seconds; consequently the year 1282 of the era of the Hegira began on May 27, 1865.

HEIDELBERG, a city in the Baden circle of Lower Rhine, is situated in one of the most beautiful parts of Germany, on the left bank of the Neckar, in $49^{\circ} 24' N.$ lat., and $8^{\circ} 41' E.$ long., on the Baden and Main-Neckar Railway, 32 miles N.N.E. of Carlsruhe. At the last census the population was 16,288, mostly Protestants. The town is between the river and the mountains which here form the eastern boundary of the valley of the Rhine. From one of these mountains, called Königstuhl (2000 feet high), on the summit of which a lofty tower has been erected, there is a magnificent view of the most beautiful scenery in Germany. The castle, which was the elector palatine's residence, stands on the lower parts of the Königstuhl; it has remained a ruin, but a magnificent one, since 1764, when it was struck by lightning and rendered wholly uninhabitable. In the cellar under it is the celebrated Heidelberg tun, which contains 800 hogsheads, but has not been filled since 1769. The town is chiefly celebrated for its university, which was founded in 1386, and is the oldest in Germany. The university buildings, no way remarkable, stand in a small square in the centre of the town. In a separate building is the university library, which contains 200,000 volumes, and several rare manuscripts. The university is well attended, has forty-five professors, seventy-eight teachers, and an income of 4000*l.*, besides fees. There is also a college for junior students, numerous government elementary schools, botanic gardens, and a museum.

The streets of the town are narrow and gloomy. Among the more remarkable buildings are—the church, dedicated to the Holy Ghost; the interior of which is divided by a partition into two parts, respectively used for Protestant and Catholic worship; the church of St. Peter, the oldest in the town, and memorably connected with Jerome of Prague, who nailed to its door a summary of the reformed doctrine which he preached to a multitude in the churchyard; the Museum Club; the Zum-Ritter Inn, which has a richly decorated façade, and is surmounted by the figure of a knight; and the stone bridge over the Neckar, on which is a statue of the Palatine Karl Theodor. The chief trade of the town is in tobacco and oil; there are breweries and tobacco factories. Wax-lights, leather,

and musical instruments, are also manufactured. The cheapness of living, and the beautiful situation of the town, have caused many foreigners to settle there. Heidelberg was the residence of the electors palatine from the time of Ruprecht I. till 1720, when the electors removed to Mannheim.

HEIGHTS, MEASUREMENT OF. There are three distinct ways by which a height may be measured. The first is by the observed angular elevation of an object, with a measured base [ALTI-TUDE; TRIGONOMETRY]; the second is by means of a spirit-level [LEVELLING]; and the third, which we propose here to describe more particularly, is accomplished by means of the barometer. [BAROMETER.]

If we ascend with a barometer through any height, the weight of the column of air which presses on the instrument is diminished, and the counterpoise, namely, the column of mercury under the vacuum, must diminish likewise; that is, the mercury must fall. Now, if the temperature and force of gravity at the higher and lower station were the same in all places and at all times, one formula would always serve, the height of the barometer remaining the same at the same height above the sea. Even as it is, the mean height of the barometer at the two places, when known, could be made to determine their relative heights. But when only one or two observations can be made at each place, the differences of temperature, &c., must be noted and allowed for.

If the temperature were unaltered during the ascent, and the force of gravity also remained uniform, the *logarithms* of the atmospheric pressures corresponding to different altitudes would *decrease* in arithmetical proportion as the altitudes themselves *increase* in arithmetical proportion; and this would lead to an equation of the form

$$z = c (\log. h - \log. h');$$

where z is the difference of altitudes at two stations, and h and h' the heights of the mercury at the lower and upper stations. This is proved in almost every elementary work on pneumatics.

For very rough estimates of the height z , c is made equal to 10,000 fathoms; and, using the value

of z so found, the term $\frac{n z}{435}$ is then *added to or sub-*

tracted from that value, in order to obtain one more correct: here n denotes the number of degrees of Fahrenheit's thermometer by which the mean temperature of the air *exceeds or falls short of* 31° .

We now proceed to describe a formula for the determination of heights, which is a transformation of the one given in Poisson's 'Traité de Mécanique' (ed. 1833): it supposes that the air intermediate between the higher and lower stations may be treated as if it had throughout the mean between the temperature of the two stations.

Let h and h' be the heights of the barometer at the lower and upper stations; t and t' the temperatures of the air; T and T' those of the mercury (ascertained by a thermometer whose bulb is in the cistern); r the radius of the earth, supposed to be 6,366,198 metres or 6,962,283 yards; and λ the latitude of the place. All the temperatures are in degrees of Fahrenheit. Let

$$k = h \left(1 + \frac{T - T'}{9990} \right)$$

$$c = \frac{20053.95}{1 - 0.002588 \cos. 2\lambda} \left(1 + \frac{t + t' - 64.}{900} \right)$$

$$z = c (\log. h - \log. k).$$

Then z itself is a near approximation to the number of yards in the difference of level between the two stations (for mètres use 18337.46 instead of 20053.95); but if a more exact one be required, it may be found by calculating (using z itself as just found)

$$c \left(\log. h - \log. k + 2 \log. \left(1 + \frac{z}{r} \right) \right) \left(1 + \frac{z}{r} \right).$$

When the lower station is at a great distance from the higher on the earth's surface, then five-eighths of $\frac{z}{r}$ should be used instead of $\frac{z}{r}$ in the last formula.

The preceding is the most accurate formula which the present state of science will allow to be given, and there is reason to suppose that the constant 20053.95 could not be altered by a single unit with any increase of correctness. The following formula, however, is sufficient for ordinary purposes:—

$$20115 \left(1 + \frac{t + t' - 64}{900} \right) (\log. h - \log. k);$$

in which the constant 20115 is that determined by a considerable number of comparisons of theory with trigonometrical observation made by M. Ramond in the Pyrenees. A nearly similar formula has been given by M. Lindenau, with his 'Barometric Tables,' Gotha, 1809.

HEILBRONN. [NECKAR-KREIS.]

HEIR, by the law of England, is he who succeeds by right of blood to the real property or lands, tenements, and hereditaments of the deceased owner, designated by the correlative term of ancestor, not given away from him by will. The English law which determines the succession to personal property, when uncontrolled by local custom, is contained in the Statutes of Distributions (22 and 23 Car. II. c. 10; 29 Car. II. c. 3; and 1 Jac. II. c. 17), which are founded upon the provisions of the civil law. The persons so entitled are not called heirs, but next of kin.

The several rules of descent which regulate the right to succeed to real property spring from the system of feudal tenures, but have been somewhat modified by the recent statute of 3 and 4 Will. IV. c. 106. [DESCENT; FEUDAL SYSTEM.]

Heir, in Scotch law, is a flexible term, and may be applied either to the heir-at-law, or to the heir by destination. It may denote the party who takes the moveable estate, as well as the heir who succeeds to the heritable property. No nomination to be the testator's heir will confer upon the person so appointed any right of succession.

In Roman law, the heir was he who succeeded to the *persona* or whole civil rights of his ancestor. (Dig. L. 17, 128.) There was no distinction between personal and real property acknowledged by that law; and heirs succeeded to both indifferently in certain

proportions, varying in accordance with their relationship to the deceased.

HEIR-APPARENT, in English law, is he whose right of inheritance is indefeasible, as being the eldest son, provided he outlives his ancestor. In Scotch law, he who, after the death of his ancestor, is entitled to enter upon the inheritance, is thus styled before his actual entry.

Heir-*Presumptive*, by the law of England, is he who, if his ancestor should die immediately, would, in the present circumstances, be his heir, but whose right of inheritance may be defeated by the birth of some nearer heir. The eldest brother or nephew of a man who has no children is heir-presumptive. Properly speaking, this term does not occur in Scotch law.

HEIR-LOOMS are such goods and personal chattels as, contrary to the nature of chattels, go to the heir by special custom along with the inheritance, and not to the executor of the last proprietor.

[CHATELS; HEIRSHIP MOVEABLES.]

HEIR-PORTIONER. [HEIRRESS.]

HEIRESS, is a female heir where there are no male heirs to succeed. When there are several sisters equally entitled to property they are called co-heiresses or, legally speaking, co-parceners, in England, and heirs-portioners in Scotland.

Peerages, dignities, and titles of honour descend to the eldest heir-portioner, unless she is excluded from their enjoyment; and she has also right to the mansion-house of a country estate, without making compensation for it to her sisters, but not to a house in town.

HEIRSHIP MOVEABLES, in the law of Scotland, are articles belonging to a deceased proprietor who was a baron, prelate, or burgess, and to which his heir is entitled, though excluded from any share of his ancestor's moveable succession, that he may not enter to his predecessor's dwelling-house quite dismantled by his executors. The heir succeeds without service, but should he die without getting possession they go to the heir of the original proprietor. A list of the articles which form the subjects of heirship is given in the appendix to Sir Thomas Hope's "Minor Practicks," p. 538. They embrace the best articles of furniture in every house belonging to the deceased, articles of farm stock not raised or fed for sale, and generally the best of such subjects as may be necessary to set agoing his establishment. They are the same as heir-looms in English law. [HEIR-LOOMS.]

HEJAZ. [ARABIA.]

HELDER, a fortified maritime town of the Netherlands, in the province of North Holland, at its northern extremity, 41 miles N.N.W. of Amsterdam, with which it communicates by the Helder Canal, 50 miles long, 125 feet broad, and 21 feet deep, enabling ships of large burthen to avoid the navigation of the Zuyder Zee. The town is separated from the island of Texel by the Mars-diep, two miles across. The number of inhabitants in 1862 was 14,751, with a garrison of 9000 men. Near here Van Tromp was killed in action, in 1653. The place was taken by the British, under Abercrombie, in 1799.

HELENA, ST., an island in the Atlantic Ocean, 1200 miles west of the coast of Benguela in South Africa, and 850 from the island of Ascension, the nearest land. Seen at a distance, it appears like a lofty mass of barren rocks rising in a pyramidal

form; on a nearer approach, rugged and almost perpendicular cliffs, from 600 to 1200 feet high, are seen encompassing the island all round, broken through in several places by deep chasms which open to the sea-shore. One of the principal of these openings is called James' Valley, on the north-west coast of the island, and at the opening of it to the sea is James' Town, the only town and port of the island, which is defended by strong batteries, and is the residence of the authorities. James' Town is in $15^{\circ} 55'$ S. lat., and $5^{\circ} 49'$ W. long. It has an excellent harbour, a handsome church, and several good official residences. Ascending James' Valley, we arrive at the plain or table-land of Longwood, situated in the eastern part of the island, and consisting of 1500 acres of fine land, nearly 2000 feet above the sea, sloping gently towards the south-east. Longwood House was the place of Napoleon's confinement and death. It is now in ruins. His remains lay in Geranium Valley till their removal to Paris in 1840; a willow marks the site of the grave. In the centre of the island rises Diana's Peak, 2693 feet high. The circumference of the island is about twenty-eight miles. The population is 7000, of whom one-half are whites. The climate of St. Helena is one of the healthiest under the tropics, and is found beneficial to invalids from India, and even from Europe. Viewed from the sea, the island appears barren; but the interior is covered with a rich verdure, and is watered by abundant springs. Horned cattle, sheep, and goats feed on the rich pastures. The base of the island appears to be basalt, and lava and scorix are found scattered about the surface.

The island was discovered by the Portuguese on St. Helena's day (hence its name) 22nd of May, 1502. It was afterwards taken possession of by the Dutch, who abandoned it in 1651 for the Cape of Good Hope. The English East India Company then took possession of it, and it became a place of call for their ships between India and Europe. It was made over to the British Crown in 1833. It is still visited by ships returning from India for fresh provisions and water.

The exports from St. Helena to the United Kingdom in 1863 were valued at 16,255*l*, and consisted chiefly of cotton, sperm-oil, and sheep-skins. The imports in the same year amounted to 39,550*l*, being principally apparel, haberdashery, leather manufactures, and provisions.

HELEPOLIS, a ponderous movable machine, used by the ancients for besieging towns, forts, &c. It consisted of numerous stories, whose dimensions gradually lessened as they ascended. In each compartment were bodies of soldiers, who discharged their missiles through small openings, previous to making the general assault on the besieged place; while the machine was pushed forward on castors by the strongest men of the whole army.

HELGOLAND, or HELIGOLAND, an island in the German Ocean, about 35 miles from the mouth of the Elbe, consists of a high cliff and a low land united by a rocky isthmus 500 paces in length. The highest part of the cliff rises almost perpendicularly about 200 feet above the sea. The ascent to it is by a flight of 180 steps. The summit is a tolerably level plain about 4200 paces in circumference. The low land, which is almost uninhabited, has two

good harbours. The circumference of the whole island does not exceed three miles. In former ages it was of much greater extent; but the action of the sea is constantly diminishing it, and thus sandbanks are formed all round it. The inhabitants, at the last census 2230 in number, live on the cliff. They are descended from the Frieslanders, and subsist chiefly by fishing, and by acting as pilots. The English took the island from the Danes in 1807, and it was formally ceded to them in 1814. They have erected four batteries and a lighthouse on the cliff, and have a garrison and a governor, but do not interfere with the internal government. The island has of late been much frequented as a watering place. It is of some importance in war time, and is retained by this country at a cost of about 1000*l*. per annum.

HELIACAL ($\%_{\lambda} \iota \epsilon \sigma$, 'the sun'), a term applied to the rising of a star, when it takes place just before that of the sun. If we suppose a star not very far from the sun's orbit, then, as the sun approaches that star, it will become for a season permanently invisible, for it will rise after the sun, and set after it also, the heavens remaining too light in the quarter of sunset to permit the star to be seen. But as soon as the orbital motion of the sun has carried it past the star, the latter will begin to rise first, and in process of time will rise so much before the sun as to become visible just before daylight. In this case it is said to rise heliacally: thus a star sets heliacally before its season of disappearance, and rises heliacally after its reappearance. The successive heliacal risings of stars thus form a continued warning of the seasons, and were used for this purpose among some ancient nations. But since the precession of the equinoxes slowly changes the offices of different stars with respect to the seasons, an ancient record of the time of the year when a given star rose heliacally would enable us to make a rough guess at the number of centuries elapsed since the time of the observation. Upon such a basis Newton rested a great part of his system of chronology, taking the descriptions of the heliacal risings of stars from Hesiod.

HELIAEA, amongst the Athenians, a court of justice, which was next in importance to the Areopagus. It was generally composed of 500 members; and sometimes, in important cases, of more. The judges, in awarding their verdict, made use of black and white beans, which were cast into two distinct urns, and the suffrages numbered before a presiding magistrate, the majority of white beans being equivalent to an acquittal.

HELIANTHEMUM, a genus of plants belonging to the natural order *Cistaceæ* or *Cistaceæ*. There are about 150 species enumerated, which are distributed in various parts of the world: they are chiefly found in the south of Europe, the north of Africa, and a few species in America. *H. guttatum* is an erect herbaceous plant. The flowers are yellow, with a deep red spot at the base of each petal. It is a native of France, Italy, Spain, Portugal, and Turkey. *H. canum*, the hoary sun-rose, has small yellow flowers. It is a native of the south of France and Germany, and rarely found in Britain. *H. vulgare*, the common rock-rose, is a native of Europe, and is found in Britain in dry hilly pastures.

There is a very beautiful variety with double pale yellow flowers, which is much cultivated by florists.

The stamens, if touched in the sunshine, spread slowly, and lie down upon the petals.

Almost all the species of *Helianthemum* are elegant plants, hardy, and easily cultivated.

HELICIDÆ, or *Helix* Family, the general name by which the land Shell-snails are distinguished. This group constitutes part of the 'Pulmonés Terrestres' of Cuvier, the first division of his order *Gasteropoda*. Cuvier divides his Pulmonés, or air-breathing slugs and snails, into the following sections:—

1. *Les Pulmonés Terrestres*—containing the Slugs (*Limacés*), divided into several genera; the Escargots (*Helix*) of which the common Garden-snail is an example, divided into several genera; the Nonpareilles (*Clausilia*); and Agatines (*Achatina*).

2. *Les Pulmonés Aquatiques*—including Les Onchidiées (*Onchidium*), shell-less; Les Planorbis (*Planorbis*); Les Limnées (*Limnæus*); Les Physes (*Physa*); Les Auricules (*Auricula*); and Les Melampes (*Conorulus*).

It is not necessary, in this work, to enter into an analysis of the systems of Lamarck, De Blainville, Rang, and Férussac, nor into the minutæ of genera or species. It will be sufficient to give the following arrangement, by Mr. Gray:—

Terrestrial.

Tentacles retractile. Eyes pedicellate.

Gasteropodous . . . *Limacidae*.

Trachelipodous . . . *Helicidae*.

Aquatic.

Tentacles contractile. Eyes sessile.

Trachelipodous (Mantle thick-edged) *Auriculidae*.

" (Mantle thin-edged) *Limnæadæ*.

Gasteropodous (Mantle shield-like) *Onchidiadæ*.

Cuvier observes that 'the Pulmonifera are distinguished from other molluscs; that they respire the elastic air by means of an orifice under the edge of the mantle, which they dilate or contract at pleasure; they have therefore no branchiæ, but only a network of pulmonary vessels which spreads itself upon the walls, and principally upon the ceiling of the respiratory cavity; some are terrestrial, others live in the water, but are obliged to come from time to time to the surface, and open the orifice of their respiratory cavity in order to respire. All these animals are hermaphrodites. Almost all the terrestrial pulmonifera have four tentacles; two or three only, of small size, do not exhibit the inferior pair.'

Under the *Helicidæ* are comprehended the genera *Helix*, *Carcocolla*, *Vitrina*, *Anostoma*, *Helicina*, *Bulinus*, *Pupa*, *Clausilia*, *Achatina*, *Auricula*, *Cyclostoma*, *Pedipes*, *Chondrus*, *Succinea*, &c. In *Auricula* and *Cyclostoma* the tentacles are only two.

Having thus endeavoured to explain the position of the *Helicidæ*, of which the large Garden-snail (*Helix aspersa*) is an example, we may proceed to give a brief and general outline of the more important parts of their organic economy as seen in the restricted genus *Helix*.

Nutrient Organs.—The mouth is transverse, and a portion of it is destined to perform the office of teeth. The margin of the upper lip is dentated, and of a horny texture, of a dark colour and arched form; the lower lip is divided by a vertical fissure. The salivary glands are of a conglomerate structure, and lie on the parietes of the stomach.

Respiratory System.—The pulmonary sac receives the air by an anterior orifice on the right side of the neck; and the reticulation of the pulmonary artery, or continuation of the veins of the body, ramifies on its roof.

Brain, Nervous System, and Senses.—A ganglion well developed, situated above the œsophagus, of a transverse shape, supplies the antennæ and the eyes with nerves; this ganglion forms a ring, completed by a larger ganglion below the œsophagus, from which numerous nerves radiate to supply the body. A small ganglion is formed on the nerve which supplies the heart and respiratory apparatus. The sense of touch resides especially in the ventral disc or foot, and in the lower tentacles.

The eyes are situated on the side of the posterior tentacles or horns, at their extremity. In this position, though destitute of appropriate muscles, the eyes have the advantage of all the mobility with which the tentacle itself is endowed; and by the admirable construction of the same part, they are defended from external injury by being retracted and inverted, together with the extremity on which they are supported, within the cavity of the tentacle, as in a sheath.

The taste appears to be sufficiently acute, nor is the sense of smell absent, though we know not by what particular organ it is exercised. Slugs and snails are attracted towards their favourite food, as is well known to the gardener.

No organs of hearing have been detected, nor do they appear to enjoy this sense.

Reproduction.—Shell-snails are hermaphrodites, but fecundate each other by mutual union. The situation of the reproductive organs is at the anterior orifice of the neck. Most are oviparous, but some are viviparous. The shells, as a general rule, are either round and enveloped in a skin, as in the common garden-snail, or oval and inclosed in a hard calcareous shell, as in *Achatina* and *Bulinus* (or *Bulinus*). [BULINUS.]

Power of Repairing Injuries.—The power which snails, in common with other testaceous molluscs, possess of repairing their shells, is known to most observers, and requires no comment; but the extent to which these animals will repair lesions of the soft parts, and even reproduce some of the principal ones after they have been deprived of them, is deserving of notice. The works of Schoeffer, Spallanzani, Bonnet, and others, bear testimony to the wonderful *vis vitæ* in these animals, and its energy in replacing parts, the deprivation of some of which must, it might have been previously thought, have been followed by immediate death. Spallanzani cut off one of a snail's horns: it began to bud again in about twenty-five days, and continued to grow till it was equal in length to the other. He removed part of the head: in course of time the part was renewed. Not that this was always the case in those instances where the entire head had been taken off; but even in these instances the snail often recovered, and at the end of a few months appeared with a new head in all respects equal to the old one. The whole of Spallanzani's experiments have been confirmed by Gerardi and others.

Hybernation.—In our temperate climate, as soon as the chills of autumn are felt, the shell-snails begin

to withdraw to winter quarters and prepare for their annual repose. They either burrow into the earth, attach themselves to sheltered crevices in walls, congregate under accumulations of garden-pots in the gardener's tool-house, or in corners of the garden, under the roots of hedgerow-trees, under the moss of banks, and in various other places of refuge. By means of the secreted mucus they adhere to whatever object they fix upon for attachment, and, besides this, throw a temporary operculum like a drum-head over the mouth of their shell. This operculum consists of several layers, with air between each; and this air, on the reviviscence of the snail in spring, as layer after layer is broken down, serves the necessities of the pulmonic system, till the last layer (or that first formed) is demolished.

Geographical Distribution and Habits.—The *Helicidae* are most widely diffused over the surface of the earth; scarcely any countries but those where the climate is surpassingly rigorous are without some species of the family. Many of the shells are strikingly beautiful in form and colour, and these are mostly the inhabitants of intertropical countries. Some of the genera (*Achatina*, for instance) attain a very large size, and lay eggs in proportion. *Helix aspersa*, the common garden-snail, is distributed over a large portion of the globe. It is found, for instance, at the foot of Chimborazo, in the forests of Guyana and Brazil, and on all the coasts of the Mediterranean in Europe, Asia, and Africa. *Helix pomatia* has been naturalized with us. The first importation is attributed by some to Sir Kenelm Digby. Merrett mentions it as a British inhabitant before his time. A moist and rather warm state of the atmosphere seems most congenial to this family. To avoid much dry heat, they get under stones, under old trunks of trees, leaves, &c., &c., and some of the species will burrow into the earth for protection against it. A shower will bring them forth in such numbers sometimes, the smaller species especially, as to induce the belief in some cases that it has been raining snails. Most of the species hibernate.

Utility to Man.—The *Helicidae*, from their voracity, are very injurious to the agriculturist and horticulturist; but there can be no doubt that the larger species are good food. We know that they were a favourite dish with the Romans, who had their *cochlearia*, where they were regularly fattened with new wine boiled down and meal (*sapa et furre*, &c.) (Pliny, 'Hist.' lib. ix., c. 56.) *Helix pomatia* is used as food in many parts of Europe during Lent, and the snails are kept in an *escargotoire* (snailery), which is generally a large place boarded in, having the floor covered half a foot deep with herbs, where the animals fatten. Many are familiar with the passage referred to in Pliny, who, on the authority of Varro, relates the incredible size to which the art of fattening had brought the snails. [See Plate 'Helix,' for several representative forms of *Helicidae*.]

Fossil Helicidae.—Fossil species of *Helicidae* number between fifty and sixty species, which occur only in the Tertiary.

HELICTIS, Mr. Gray's name for a genus of quadrupeds which inhabit eastern Asia, and has the general appearance and colouring of *Mydatis*, combined with a dentition resembling that of *Gulo* or *Mustela*, but differing from both the latter genera in the large

internal central lobe of the upper carnivorous tooth. The genus is thus characterized by Mr. Gray:—

Incisors, $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{5-6}{5-6}$.

Head elongated. Feet short; soles of the feet nearly naked to the heel; toes 5—5; claws strong, the anterior ones long and compressed. Tail cylindrical and moderate.

Mr. Gray exhibited to the Zoological Society one species, *Helictis moschata*, the entire length of which was twenty-three and a half inches, of which the tail measured eight. Inhabits China, and smells strongly of musk. For further particulars see 'Zool. Proc.' 1831.

HELIER, ST. [**JERSEY.**]

HELIGOLAND. [**HELGOLAND.**]

HELIOCENTRIC (having the sun as centre), a term applied to the place of a planet, as seen from the centre of the sun, in opposition to its *geocentric* place, as seen from the centre of the earth.

HELIODORUS was born at Emesa in Syria, in the fourth century of the Christian era. He was bishop of Tricca in Thessaly. He wrote in his youth a romance in the Greek language entitled 'Ethiopia,' which contains an account of the wonderful adventures of two lovers, Chariclea, the daughter of Hydaspes, king of Ethiopia, and Theagenes, a noble Thessalian. The work of Heliodorus served as a kind of model to the subsequent Greek writers of romance. The best edition is by Coray, 2 vols. 8vo., Paris, 1804. The 'Ethiopia' has been translated into most modern European languages. There is an English translation by Underdown, 1587 4to.; and by others.

HELIOGABALUS. [**ELAGABALUS.**]

HELIO/METER (ἥλιος, 'the sun,' and μέτρον, 'measure') is the name given by M. Bouguer to a micrometer invented by himself about 1745, by means of which the diameter of the sun, or any other heavenly body, may be measured with considerable accuracy. The name is also given to the equatorially mounted micrometer executed at Munich in 1829 for the Königsberg Observatory. [**MICROMETER.**]

HELIO/POLIS. [**BAALBEC.**]

HELIO/PORA, a genus of stony Polyparia, established by De Blainville, from observations of MM. Quoy and Gaimard on a recent species called by Lamarck *Pocillopora cœrulea*.

Generic Character.—Animals short and cylindrical, provided with a simple circle of thick tentacula, fifteen or sixteen in number, contained in vertical or diverging cylindrical cells; cells immersed, internally crenulated by imperfect radiating lamellæ, united into a calcareous mass, which is regularly porous in the intervals of the cells. The coral is found attached to various bodies. Three recent species are mentioned by De Blainville, all from warm seas. One of the fossil species (*Heliopora porosa*, De Blainville; *H. interstincta*, Bronn) abounds in strata of the Silurian system; others occur in the chalk and in tertiary deposits.

HE/LIOSCOPE (a Greek term signifying literally 'sun-observer') is a kind of telescope adapted for making observations upon the sun without the eye being injured by the intense brightness of the solar

rays. A coloured glass placed before the lens nearest to the eye, in a telescope, has long been the means used to prevent such injury.

HELIOSTAT (ἥλιος, 'the sun,' and the root *στα*, *sta*, 'to put or place') is the name given to an instrument employed in making optical experiments on the physical properties of light. The instrument consists of a plane metallic mirror, from the back of which projects a rod perpendicularly to its plane. The extremity of the rod is connected with the index of a clock, the plane of whose face is parallel to the equator; and as the index is turned by the wheel-work, the motion of the rod causes the mirror to turn about a vertical axis, and also about a horizontal axis, so that a pencil of the sun's light reflected from the mirror is always in the same position. (Biot's *Physique Experimentale*.)

HELIOTROPE (Gr. *helios*, 'the sun,' and *trepho*, 'to turn'), a silicious mineral of a deep green colour, and sometimes variegated with blood-red spots, whence it is known as the Bloodstone.

HELIOTROPICUM, a genus of plants belonging to the natural order *Ehretiaceae*. *H. Peruvianum*, Peruvian heliotrope or turnsole, is a shrub, growing one or two feet high, and is much cultivated on account of the scent of its flowers, which resembles very much that of the vanilla. It is a native of Peru. *H. Europæum*, the European turnsole or heliotrope, is a native of the south of Europe and the regions of the Caucasus. The flowers are sweet-scented. *H. villosum* is a native of Greece and of the islands of the Archipelago. It has large white corollas with a yellow throat.

Upwards of eighty species of this genus have been enumerated. Some of them are consumed in large quantities by perfumers for the sake of their volatile oil. They are astringent and also mucilaginous, and poultices made of the leaves have been applied to cancerous and scrofulous sores.

HELL (Greek, *Hades*; Heb. *Sheol*; German, *Hölle*). In theology this word refers to the scene or place or condition of punishment of the wicked after death. Nearly all religions, ancient and modern, hold the belief in hell, though they differ as to the place, nature, and duration of it. The belief in the eternity of the punishments of hell has been the common doctrine of both the Eastern and Western Churches; but since the time of Origen there have been some who taught that the duration is proportioned to the guilt, and that the infliction is remedial, only to last till its purifying effect is attained. Certain passages of Scripture, if taken literally, will not allow of this interpretation (Matt. xviii. 8; xxv. 41 and 46; Mark ix. 43; Luke iii. 17; 2 Thess. i. 9), but many attempt to explain these passages in such a way as to accord with this view.

Both the above-mentioned churches also agree that the punishment of hell includes not only material pain, but also the remorseful consciousness of having forfeited the presence of God and the happiness of heaven.

The word hell is sometimes applied in Scripture to the grave.

HELL, MAXIMILIAN, a distinguished astronomer and member of the order of Jesuits, was born May 15, 1720, at Schemnitz in Hungary, and manifested, at an early age, a decided taste for the study

of natural philosophy and astronomy. At twenty-five years of age he was employed as an assistant in an observatory belonging to the Jesuits at Vienna, and he was at the same time keeper of the museum of experimental philosophy which had just then been formed in that city. After residing some years in Hungary and Transylvania, he returned, in 1758, to Vienna, where he was established in an observatory which had been built in conformity to his own directions; and he held the appointment during the remainder of his life.

Through the mediation of Count Bachoff, who was sent from Copenhagen for the purpose of making the proposal, he accepted an invitation from the court of Denmark to undertake a journey to Wardhuys in Lapland, in order to observe there the transit of Venus over the sun's disc. Accordingly, he set out from Vienna in 1768; and, after staying a short time at Copenhagen, he proceeded to the place of his destination: he was absent about two years and a half on that mission, when, having fully succeeded in its object, he returned to Vienna. Besides observing the transit, Hell took advantage of his residence in Lapland to study the geography, the natural history, and the climate of the country; the history, language, and religion of the people, with the state of the arts among them. He made also numerous observations on terrestrial magnetism, on the phenomena of the tides and winds, and on the variations of the barometrical column; and he measured the heights of the principal mountains.

The principal work published by this astronomer was a series of Ephemerides in thirty-five volumes 8vo., the collection being entitled 'Ephemerides anni 1757—1791 ad Meridianum Vindobonensem Calculis definitæ.' He published an edition of the Solar Tables of La Caille, and the Lunar Tables of Mayer, with supplements: he also published his celestial observations in Lapland, under the title 'De Transitu Veneris ante discum Solis die 3 Junii, 1769, Wardohusii observato,' 1770; and a work entitled 'De Parallaxi Solis ex Observationibus Transitus Veneris, anni 1769,' 1773.

Hell died at Vienna, April 14, 1792.

HELLANICUS, one of the early Greek prose writers, was born at Mitylène in the island of Lesbos, B.C. 496. He wrote several historical works, which are frequently quoted by ancient writers. Hellanicus is mentioned by Thucydides (i. 97). The fragments of Hellanicus were published by Sturz, 8vo., Leipzig, 1787; 2nd edition, 1826.

HELLEBORE, WHITE. [*VERATRUM ALBUM*.]

HELLEBORUS, a genus of exogenous plants belonging to the natural order *Ranunculaceae*. The most remarkable species is that which produced the black hellebore, a dangerous acrid poison, much used by the ancient Greek physicians in mania, epilepsy, and dropsy.

Helleborus orientalis has been substituted in the Pharmacopœia for the *Helleborus niger*, from a belief that it is more powerful. It is a perennial species, growing in mountainous places in the East. The root, which is the part employed, is black: it is extremely acrid. It is to be regretted that many other roots, especially those of *Actæa spicata* and *Adonis vernalis* are often intentionally or accidentally sold instead of the root of *Helleborus niger*. These

may be discriminated by physical characters (particularly the internal structure) and by chemical tests.

Like most ranunculaceous plants, hellebore occasions rubefaction and inflammation of any surface with which it is brought in contact. When taken into the stomach in a moderate dose, it gently stimulates it and the other viscera of the abdomen; but in large doses it is a fatal poison.

HELLENES. [GREECE.]

HELLENIST, is a Jew who uses the Greek language, and in other forms allies himself to the Greek nation. Hellenes is the name of the real Greeks, and the term Hellenist was given to those Jews who by birth or residence, and by adopting the manners and customs of Greece, were looked upon as Greeks. Soon after the commencement of the Christian era, the Jews were dispersed all over the Roman empire; but it was to those settled in Alexandria that the term Hellenist chiefly applies. Here the Hellenistic philosophy had its rise, and the dialect of Greek called Hellenistic, in which the Septuagint is written, was formed.

HELLESPOINT. [DARDANELLES.]

HELM, the steering apparatus of a ship, consisting of the rudder, the tiller, and the wheel. The rudder is the part acting directly on the water, and serves to govern the ship's motion; for, on being turned so that its plane is in a position oblique to the plane of the masts and keel, the reaction of the water against it, as the ship advances, being resolved in a direction perpendicular to the last-mentioned plane, becomes a force which causes a ship to turn upon a line passing through its centre of gravity. The tiller is a lever, formed into a handle, for multiplying the power exerted on the rudder. The wheel moves the long end of the tiller from side to side of the vessel, by means of ropes or chains, still further multiplying the power of the leverage. In small vessels and barges the wheel is dispensed with, and the tiller used without its assistance.

HELMET, an ancient armour of defence for the head, still worn by the officers and soldiers of some of our cavalry regiments. As a part of defensive armour, the helmet is of high antiquity; some sort of covering of this description for the head appears to have been worn by the warriors of every country. Helmets were found even among the inhabitants of the South Sea Islands when discovered by Captain Cook.

It does not appear that the Greek or Roman helmet usually protected the face. Among the varieties which had separate names we find the *Chapelle de Fer*, the *Bacinet*, the *Burgonet*, the *Castle*, the *Hufen*, the *Morion*, the *Salade*, and the *Skull*. These were almost invariably of steel. There was also the *Jousting Helmet*, used in tournaments, which was sometimes of leather.

Firemen of the present day wear a heavy head-piece of leather and brass, to protect them as far as possible from falling ruins at conflagrations; and the police of London have recently (1865) been supplied with a somewhat similar covering for the head. In India, and other hot climates, helmets of white felt, with the additional screen of rolls of white linen, are constantly worn by military men, to protect them from the rays of the sun.

As ornaments over the shield or coat of arms,

helmets are still used in heraldry. The full-faced helmet with six bars, all of gold, damasked, is for the sovereign and princes of the blood; the full-faced helmet of steel, for marquises and dukes; earls, viscounts, and barons have a profile or side-standing helmet of steel ornamented with bars; the full-faced helmet of steel, with the visor or beaver open, is for baronets and knights; the profile helmet, steel, with the visor closed, for an esquire.

HELMONT, VAN. [CHEMISTRY.]

HELMSTEDT. [BRUNSWICK.]

HELOISE. [ABELARD.]

HELOPIDÆ (Leach), a family of coleopterous insects of the section *Heteromera* and sub-section *Stenelytra*. Head short, obtusely terminated anteriorly; mandibles notched at the apex; antennæ placed near the eyes, generally filiform, or nearly so, or slightly thickened at the apex, where the joints are short; the basal joint of the antennæ hidden above by a projected margin of the head; the third joint long; terminal joint of the maxillary palpi large and securiform; eyes emarginated anteriorly; legs moderate; the penultimate joint of the tarsi generally simple or but slightly emarginated; claws simple; body usually convex, and of an oval form.

The larvæ of these insects live in rotten wood, upon which they feed; they are of a cylindrical form, hard to the touch, and have six small legs, attached two to each of the thoracic segments. The perfect insects are, like the larvæ, also found in rotten wood, or under the bark of trees; they are rather slow in their movements, and generally adorned with metallic colours.

HELOSCIA'DIUM, a genus of plants belonging to the natural order *Umbelliferae*, and to the tribe *Ammineæ*. There are three British species of this genus, *H. nodiflorum*, *H. repens*, and *H. inundatum*. The first is a native of brooks and ditches, and is frequently mistaken for the water-cress. The second is a rare plant in Great Britain. The last species is found in ponds.

HELOSTOMA, a genus of fishes, of the family *Spirobranchide*, with ovate bodies, the ventral fins rounded, and the mouth small, and very retractile.

HELOTES, a genus of fishes, of the family *Percidæ*, with fusiform body, small mouth, and obtuse snout.

HELOTS. [SPARTA.]

HELSINGFORS. [FINLAND.]

HELSTON. [CORNWALL.]

HELVELLA. [HYMENOMYCETES.]

HELVELLYN. [CUMBERLAND.]

HELVETIC ALPS. [ALPS.]

HELVETII, a race which formerly inhabited a part of Europe corresponding to modern Switzerland. We learn from Cæsar that they had twelve towns and 400 modern villages, all of which they burned in the year 58 B.C., previous to their attempted invasion of Southern Gaul, to prevent which Cæsar had to destroy the bridge at Geneva, and to build a long wall along the Rhone. Failing to pass this barrier, the Helvetii took another route, but were met and repulsed, two-thirds of their number being slaughtered, and the remainder obliged to return to their own country, and subject themselves to the Romans. After the death of Nero they gradually became extinct as a race.

HELVETIUS, CLAUDE-ADRIEN, was born at Paris in January, 1715, and was educated at the Jesuits' College of Louis le Grand. Having passed through a course of legal study, Helvetius obtained the lucrative appointment of *fermier-général*, through the influence of the queen, Marie Leczinsky, to whom his father was physician. But disgusted with the oppressive nature of its duties, he resigned this situation, and purchased that of chamberlain to the queen's household. At this period Helvetius led a disorderly life; and vanity was a conspicuous feature in his character. But Helvetius was as kind-hearted as he was vain, and an act of beneficence was as dear to him for its own sake as the applause which he courted so eagerly.

In 1751 Helvetius married the beautiful and accomplished daughter of the Comte de Ligneville. From this time he lived chiefly in retirement at Voré, enjoying with his wife and children the pleasures of domestic life, and ameliorating the condition of his tenants and vassals. In 1758 he published the treatise 'De l'Esprit,' which was denounced by the court and the Jesuits as dangerous to society and to religion. To regain the favour of the court, Helvetius published three letters of apology. Notwithstanding his confession of a Christian faith, and his disclaimer of all opinions inconsistent with its spirit, the doctors of the Sorbonne drew up a formal condemnation of the work; and it was publicly burned, according to a decree of the parliament of Paris. The style of the work is vicious and declamatory, but the argument is well sustained, and enforced by great felicity and copiousness of illustration. In 1764 Helvetius visited England. He died at Paris, 26th December, 1771, leaving behind him a work entitled 'De l'Homme, de ses Facultés et de son Education,' which was published the same year at London by Prince Gallitzin. This treatise, which may be considered as a continuation of and commentary upon his earlier philosophical work, is vastly superior to it in style.

HELVIN, a crystallized mineral, of which the primary form is a cube, and the colour a greenish yellow. It consists chiefly of silica, protoxide of manganese, and sulphuret of manganese.

HELVOETSLUYS. [HOLLAND.]

HEMANS, FELICIA DOROTHEA, was born September 25, 1794, at Liverpool, where her father, whose name was Browne, was engaged in mercantile pursuits. He was a native of Ireland; her mother was an Englishwoman, but was descended from a Venetian family, through her father, who was the commercial agent at Liverpool for the Venetian government. About the year 1800 Mr. Browne, in consequence of the failure of a mercantile concern, removed his family from Liverpool to an old mansion, spacious and solitary, called Grwyeh, not far from Abergelge, in Denbighshire, North Wales. Mr. Browne died not long afterwards. Felicia Browne began to write poetry before she was nine years of age. Her first volume of poems was published in 1808, and contains some verses written by her as early as 1803 or 1804. A harsh review of this little volume affected her so much that she was confined to her bed for several days. Her second volume, 'The Domestic Affections,' was published in 1812.

In 1812 Miss Browne became the wife of Captain

Hemans, of the 4th regiment. His constitution had suffered so severely in the retreat upon Corunna, and subsequently by fever caught in the disastrous Walcheren expedition, that he felt it necessary, a few years after their marriage, to exchange his native climate for that of Italy. This at least is the motive assigned for his leaving his wife; but their union, it is said, was not happy, and this separation, which took place just before the birth of her fifth son, closed it for ever. Mrs. Hemans, with her five sons, went to reside with her mother, then living at Bronwylfa, near St. Asaph, in North Wales.

Mrs. Hemans now resumed her literary and poetical pursuits with increased ardour. She studied the Latin, Italian, Spanish, Portuguese, and German languages. She made some translations from Horace, Herrera, and Camöens, and contributed a series of papers on Foreign Literature to the *Edinburgh Magazine*. 'The Restoration of the Works of Art to Italy' was published in 1815; 'Tales and Historic Scenes,' in 1819; and, about the same time, 'The Septic,' a didactic poem, in heroic rhyme; and 'Modern Greece,' in ten-line stanzas. Her poem of 'Dartmoor' obtained the prize from the Royal Society of Literature in 1821. Her tragedy, 'The Vespers of Palermo,' was represented at Covent Garden Theatre, London, in 1823. It was unsuccessful there, but was afterwards better received at Edinburgh, when Sir Walter Scott wrote an epilogue for it. 'The Siege of Valencia,' 'The Last Constantine,' and other Poems, were published in 1823.

In 1825 Mrs. Hemans removed, with her mother, her sister, and her two sons, to Rhyllon, near St. Asaph. Her sister had returned, in 1821, from Germany, where one of her brothers was attached to the Vienna embassy, bringing with her a fresh supply of German books, and Mrs. Hemans' delight in German literature may be dated from that time. Her 'Lays of many Lands,' most of which appeared in the *New Monthly Magazine*, then edited by Thomas Campbell, were suggested by Herder's 'Stimmen der Völker in Liedern,' and, preceded by 'The Forest Sanctuary,' formed her next volume, published in 1827, which was followed, in 1828, by the 'Records of Woman.'

In the autumn of 1828 Mrs. Hemans established herself at the village of Wavertree, near Liverpool, and in 1830 she published 'The Songs of the Affections.'

In the spring of 1831 Mrs. Hemans left England for Dublin, where she took lodgings. Her health, from the time of her leaving England, became rapidly worse.

The latter months of 1833 were busily spent in arranging and preparing for publication the three collections of her poems which were published in the spring and summer of 1834; 'Hymns for Childhood,' 'National Lyrics and Songs for Music,' and 'Scenes and Hymns of Life.'

In August, 1834, Mrs. Hemans was attacked with scarlet fever, and, when imperfectly recovered, caught a cold; ague was superinduced, and never left her till it was subdued by her last fatal malady, dropsy. On the 26th of April, 1835, Mrs. Hemans dictated her last poetical effort, the 'Sabbath Sonnet.' She continued to sink gradually till May 12 of the same year, when she died. She was buried in St. Anne's

Church, Dawson Street, Dublin. A volume of 'Poetical Remains' was published after her death.

HEMATIN, the colouring matter of the *Hæmatoxylon campechianum*, or logwood. It appears in small crystalline laminae of a reddish colour. It is decomposed by heat, and is soluble in water, where its colour changes to orange and yellow.

HEMATOSIN, the red colouring matter of the blood. It has not, however, been obtained in a perfectly pure state, owing to the difficulty of separating it from other substances, and to the facility with which it undergoes change. A peculiarity of hematosin is its containing oxide of iron, which does not occur in other parts of the animal system. The hematosin of bullocks' blood, but not quite pure, for the reasons already stated, analyzed by Mulder, yielded the following ingredients:—

Carbon, ...	66.49
Azote, ...	10.54
Hydrogen, ...	5.30
Oxygen, ...	11.01
Iron, ...	6.66

100.

HEMEL HEMPSTEAD. [HERTFORDSHIRE.]

HEMERALOPIA, a word which is now used to signify 'night-blindness,' though in fact it means 'day-seeing,' being similarly formed to the genuine Greek word 'nyctalopia' (νυκταλωπία), which means 'night-seeing.'

Night-blindness is a common disease amongst seamen in the East and West Indies, the Mediterranean, and in all hot countries, and affects in a slighter degree soldiers and the natives in the same parts of the globe. To persons affected by it all objects appear at sunset as if covered with an ash-coloured veil, which becomes gradually denser, and at last involves them in complete darkness. In slight cases they can see by bright candle-light or by moon-light; but after the disease has lasted a few days, even the largest objects are invisible after sunset, and the patients have to grope their way even where the moon or candle is shining brightly. The pupils are generally dilated, and at night cannot be made to contract even by a brilliant light.

The disease will generally disappear, though it may exist for weeks or months. The most successful treatment is the repeated application of small blisters to the temples.

Nyctalopia, night-vision, or day-blindness, probably never occurs as a separate disease. It is often a symptom of scrofulous ophthalmia and other diseases, where the eye is so irritable that the stimulus of daylight cannot be borne, as well as of those conditions in which great dilatation of the pupil is requisite for vision, as in incipient cataract, or opacity of the centre of the lens or its capsule.

HEMEROBAPTISTS (Gr. *hemera*, 'a day,' and *bapto*, 'to wash'), an ancient Jewish sect, mentioned by Epiphanius, who were so called from their washing and bathing every day in all seasons. Like the Sadducees they denied the resurrection of the dead; but in other points they held nearly the same opinions as the scribes and Pharisees.

HEMEROBIUS, a genus of insects of the order *Neuroptera* and section *Planipennes*. The genus, as

established by Linnæus, has been dismembered by subsequent entomologists, and is now equivalent to a family distinguished by the filiform antennæ and by the number (four) of the palpi of the insects included in it. They have soft slender bodies, much exceeded in length by the large reticulated wings, which, when the animal is at rest, are deflexed. Their eyes are globular and vividly metallic. The larvæ are ferocious in habit, and prey upon plant lice, seizing them with their powerful jaws, and sucking them to death. When full grown, they spin, and envelope themselves in a silken cocoon. The eggs of *Hemerobii* are deposited on plants, and are pedunculated, so as to resemble fungi, for which they have sometimes been mistaken. These insects range from Europe to Australia, and there are many species natives of the British Isles.

HEMEROCAL/LEÆ (Gr. *hemera*, 'a day,' and *kalos*, 'beautiful'), a tribe of *Liliaceæ*, or Day-lilies, with campanulate corollas, and assimilating in many respects to the *Tulipeæ*, or Tulips.

HEMI ('half'), a Greek particle, is very generally used as a prefix in the composition of words connected with natural science, and is usually found expressive of the form or nature of the object to be described; as *Hemicircus* (half-hawk), a genus of birds of the horned owl kind, and of the family *Strigidæ*; *Hemicycla* (half-round), a genus of *Helicina*, or land-snails, with a discoid shell, and four whorls; *Hemidactylos* (half-fingered), a genus of Saurian reptiles, of the family *Iguanidæ*, and belonging to the flat-toed lizards; *Hemidon* (half-toothed), a genus of *Mollusca*, of the family *Unionidæ*, and belonging to the *Anadonts*, in which the shell is ovate; *Hemifusus* (half-spindle), a genus of *Mollusca* of the family *Turbinellidæ*, and belonging to the *Fusina*, or Spindle shells, in which the shell is unequal or half-fusiform; *Hemilepidotus* (half-scaled), a genus of fishes of the family *Cottidæ*; *Hemilophus* (half-crested), a genus of birds of the family *Picidæ*, and belonging to the *Picina*, or Woodpeckers; *Hemionite* (a mule or half ass), a genus of *Ferns*, of the order *Polypodiaceæ*; *Hemipeplus* (half-veiled), a genus of coleopterous insects, of the family *Melasma*; *Hemipodius* (half-footed), a genus of birds of the Grouse kind, and of the family *Tetronidæ*; *Hemirhamphus* (half-snouted), a genus of fishes of the family *Salmonidæ*, and belonging to the Flying fishes, in which the upper jaw is long, and the lower one short; *Hemisinus* (half-channelled), a genus of *Mollusca*, of the family *Turbidæ*; *Hemisphæra* (half a globe), in astronomy and geography, one half of the mundane sphere, the equator dividing it (north and south) into two equal parts; *Hemirochus* (half-topped), a genus of *Mollusca*, the shells of which have convex whorls and conic spires.

HEMICARDIUM (Gr. *hemi*, 'half,' and *kardia*, 'heart'), a sub-genus of *Mollusca*, of the family *Tellinidæ*, and sub-family *Venerinæ*. The shell is half heart-shaped (whence its name), and the anterior side abruptly truncated.

HEMICIDARIS, a genus of fossil *Echinodermata*, from the oolite.

HEMIOPIA (from *ἡμί*, 'half,' and *ὄψις*, 'the eye') is a disease in which the patient sees only a part of the object he looks at; the middle of it, or its circumference, or its upper or lower part, or

more commonly one lateral half, being completely obscured.

HEMIPNEUSTES, a genus of fossil *Echinodermata*, from the chalk marl.

HEMIPTERA (from *hēmi*, 'half,' and *ptērōn*, 'a wing'), one of the orders of the class *Insecta*.

The order *Hemiptera*, according to the twelfth edition of the 'Systema Naturæ' of Linnæus, contains insects which agree in having incomplete metamorphoses (i.e., the larva and pupa both possess the power of locomotion, and bear a great resemblance to the perfect insect), and also in having the superior wings generally coriaceous, and the inferior membranous. Thus Linnæus included in this order the Cockroaches, Locusts, Grasshoppers, Bugs, Cicadæ, &c. The last-mentioned insects, the Bugs and Cicadæ, however, differ very materially from the former, inasmuch as they possess a suctorial instead of a masticatory mouth; and as these latter characters have been considered of great importance by all the more modern entomologists, the term *Hemiptera* has been restricted to such insects as have imperfect metamorphoses and a suctorial mouth.

This definition will include the Linnæan genera *Fulgoria*, *Cicada*, *Notonecta*, *Nepa*, *Cimex*, *Aphis*, *Chermes*, *Coccus*, and *Thrips*, and these, with the addition of the genus *Pulex*, constitute the order to which Fabricius applies the name of *Ryngota*. Without the last-mentioned genus they constitute the order *Hemiptera*, according to Latreille, Burmeister, and most of the foreign entomologists; and the orders *Hemiptera* and *Homoptera*, according to Leach, Stephens, MacLeay, and several other British authors.

The *Hemiptera* are divided by Latreille into two sections; to the first he applies the name of *Heteroptera*, and to the second that of *Homoptera*. The *Heteroptera* are characterized by having the rostrum attached to the fore part of the head; the elytra coriaceous with the extremity membranous, folding one over the other when at rest; and the first segment of the trunk (or the prothorax) the largest, and forming the most conspicuous part of the thorax. The second section, *Homoptera* (which by many of the English entomologists is regarded as an order), is distinguished by the proboscis being attached to the lower portion of the head, near the chest; the elytra almost always of a uniform coriaceous texture, with their inner margin straight and contiguous; the three segments of the thorax are united in a mass, and the first is frequently shorter than the second. All the insects of this section feed exclusively on vegetable juices. [HOMOPTERA.] We shall at present confine our remarks to the first section, or to the true hemipterous insects, or *Heteroptera*.

The *Heteroptera* are divided by Latreille into two families; the first, or the *Geocorisæ*, are characterized as having the antennæ free, longer than the head, and inserted between the eyes and near their anterior margin. The tarsi are three-jointed, but the first joint is sometimes very short. The second family, to which the name of *Hydrocorisæ* is applied, have the antennæ inclosed and hidden in a groove beneath the eye; the tarsi have but two distinct joints, and the eyes are generally very large.

The species of the family *Geocorisæ* are for the most part found on the leaves of trees or small plants;

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some there are which do not quit the ground, and there are others which live upon the surface of the water. The genera *Hydrometra*, *Gerris*, and *Velia*, afford examples of this last mode of life.

The insects belonging to the second family (*Hydrocorisæ*) live, as their name implies, in the water, and they prey upon other insects.

The two families which have just been characterized are by most entomologists regarded as sections or subsections rather than families; the latter is in fact an aberrant group, the former containing by far the greater portion of the species. Regarding them therefore as sections, they may be divided into the following families:—

Geocorisæ.

- | | |
|-------------------------|---------------------|
| Family 1. Scutelleridæ. | Family 5. Cimicidæ. |
| 2. Pentatomidæ. | 6. Reduviidæ. |
| 3. Coreidæ. | 7. Hydrometridæ. |
| 4. Acanthiidæ. | |

Hydrocorisæ.

- | | |
|-------------------|------------------------|
| Family 1. Nepidæ. | Family 2. Notonectidæ. |
|-------------------|------------------------|

HEMISPHERE, the half of a sphere. [SPHERE.]

HEMITONE, an interval in ancient music, the ratio of which is $\frac{243}{256}$.

HEMI'TRYPA, a genus of fossil *Polypiarina*, in the limestone of Devonshire, allied to *Fenestella*. (Phillips.)

HEMLING, HANS. [MEMLING.]

HEMLOCK. [CONIUM MACULATUM.]

HEMP, a genus of plants, the botanical name of which is *Cannabis*. It is a native of Asia, but is now naturalized in Europe and America. It varies in height from four to twenty feet, and is an elegant plant. The flowers are small and numerous, and of a yellow-green colour. Hemp is cultivated chiefly for its fibre, and the seed is sown at a season when the plants are likely to grow very rapidly, in order to form long fibres. When a fine fibre is required, the crop is sown thick and pulled up immediately after flowering; but it is generally left till the seed is ripe, and the fibre has become coarser. The finer kinds of hemp are used for making cloth, to which flax is more applicable, and the coarser for sail-cloth, canvas, ropes, &c. The dressing of hemp is very similar to that of flax. [FLAX.]

The seed of hemp is used for feeding birds, and for expressing an oil much used in Russia for burning in lamps, and in this country for making paint.

A beverage of intoxicating properties is extracted from hemp in India, and called Hashish. A medicine known as Indian hemp or bhang is another preparation from this plant, and is used in a similar manner to opium, without its unpleasant effects.

In the year 1864 the imports of all kinds of hemp into the United Kingdom amounted to 1,010,688 cwts., of the value of 1,745,353*l*. Of this quantity 540,093 cwts. came from Russia, 183,943 cwts. from the Philippine Islands, 157,299 cwts. from Austria, 75,522 cwts. from British India, and the remainder from other countries. In the same year 2,047,287 cwts. of jute and other vegetable substances of the nature of hemp, value 2,230,326*l*., were imported. The exports of hemp from the United Kingdom in 1864 amounted to 82,318 cwts., and of jute and other vegetable substances of a simi-

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lar character, to 273,223 cwt., the largest quantities being sent to France, Belgium, United States, and British North America. [CANNABIS.]

HEMSTERHUYS, TIBERIUS, son of a French physician, was born at Groningen in 1685. In 1720 he succeeded Lambert Bos at Franeker as professor of Greek, and in 1740 removed to Leyden, where he was also professor of the same language. He contributed greatly to the revival of the study of the Greek language in Holland. He died 7th April, 1766. Among the works of Hemsterhuys are—the latter part of the edition of ‘Pollux’ by Lederlin, 1706; ‘Latin Orations,’ published by Valckenaer, 1784; and an edition of Lucian, 3 vols. 4to., which was completed by Reitz.

HE'NAULT, CHARLES JEAN, born at Paris in 1685, was the son of a fermier-général. He showed at an early age a taste for literature, and wrote several poems. Being made intendant-général of the queen's household, he became a great favourite. He was also appointed president of the Court of Enquêtes. In 1723 he was made a member of the French Academy. At the age of fifty he withdrew from the fashionable world, and gave himself up entirely to study and devotion; but his devotion was free from moroseness or superstition. He died at Paris in 1770. The work for which Henault is best known is his ‘Abrégé Chronologique de l'Histoire de France,’ which is a very good model of works of that kind. He wrote also ‘Histoire Critique de l'Etablissement des François dans les Gaules,’ and several dramatic works collected under the title of ‘Pièces de Théâtre,’ 1 vol. 8vo., 1770.

HENBANE. [HYOSCYAMUS.]

HENDERSON, THOMAS, was the son of a respectable tradesman at Dundee, where he was born, December 28, 1798. After an education such as his native town could afford, he was apprenticed to a writer (or attorney) for six years. At the end of this term he was sent to Edinburgh, at the age of twenty-one, to complete his legal instruction. He was then successively secretary to the celebrated Judge John Clerk of Eldin, the earl of Lauderdale, and the Lord-advocate Jeffrey; and in these employments he continued till 1831.

During his residence at Dundee he acquired a taste for practical astronomy, as well as for the history and literature of that science; and in 1824 he began to communicate with Dr. Thomas Young, then superintendent of the ‘Nautical Almanac,’ whom he assisted both by methods and calculations. On the death of Mr. Fallows, the Admiralty, in 1831, proposed to Mr. Henderson to succeed him in the charge of the observatory at the Cape of Good Hope, and the offer was accepted.

After vigorous application to his duties for little more than a year, he found his health and spirits give way, and he returned to Scotland in 1833, with a rich store of observations, the reduction of which he imposed upon himself as a voluntary duty; among these were the observations on α^1 and α^2 Centauri, which were made with a view of determining the effect of parallax in right ascension and declination. On the recommendation of the Astronomical Society of London, to whom Lord Melbourne applied for advice, Mr. Henderson was ap-

pointed the first astronomer royal for Scotland. Here he pursued his observations and researches till his death, which took place suddenly on the 23rd of November, 1844.

HENDRED, EAST. [BERKSHIRE.]

HENGIST and HORSÁ. These heroes are generally believed to have been the leaders of the first Anglo-Saxon invaders of ancient Britain in the fifth century; but modern historians throw discredit on this account, and believe that the invasion took place much earlier than the fifth century, and that the names Hengist and Horsa are only legendary. [SAXONS.]

HENLÉY-IN-ARDEN. [WARWICKSHIRE.]

HENLEY-ON-THAMES. [OXFORDSHIRE.]

HENNA. [LAWSONIA.]

HENNEBON. [MORBIHAN.]

HENRI I. of France, son of King Robert, succeeded his father in July 1031, being then about twenty-seven years of age. Henri's younger brother Robert, supported by his mother and the counts of Champagne and Flanders, contended with him for the throne; but peace was made by Henri giving to Robert the duchy of Burgundy. Henri married, in 1044, Anna, daughter of Jaroslav, duke of Russia, by whom he had several sons, the eldest of whom, Philip, was crowned at Rheims in 1059, at seven years of age, by order of his father, who died in the following year, leaving Philip I. under the guardianship of Baldwin, earl of Flanders.

HENRI II., born in 1518, succeeded his father Francis I. in 1547. In 1550 he concluded the war which was then pending with England, which gave up to him Boulogne for the sum of 400,000 crowns. In 1552 Henri assisted Maurice, elector of Saxony, and Albert, marquis of Brandenburg, who had united for the defence of the religious and civil liberties of Germany against Charles V.

After the abdication of Charles V. the war continued between Philip II. and Henri, whose troops, under the command of the Constable Montmorency, were defeated by the Spaniards at the battle of St. Quentin in 1557. The French arms were likewise unsuccessful on the side of Italy, where the duke of Alba commanded the Spaniards. The war ended in 1559, by the peace of Câteau-Cambresis, by which Calais, which had been taken the year before by the duke of Guise, remained in the hands of the French. At the same time a double marriage was concluded between Elizabeth, Henri's daughter, and Philip II. of Spain; and between Margaret, Henri's sister, and the duke of Savoy. The festivals given on this occasion had a tragical end. Henri was accidentally wounded at a tournament by the count of Montgomery, with the shaft of his broken spear, which struck the king on the right eye. Henri died shortly after, July 10, 1559.

HENRI III., born at Fontainebleau, in 1551, was the third son of Henri II. In 1573 he was elected king of Poland and the successor of Sigismund Augustus. Henri was crowned at Cracow; but a few months after, upon hearing of the death of his brother, Charles IX., he quitted Poland and returned to France, where he assumed the title of Henri III. His reign was a reign of unworthy favourites. When Paris revolted in favour of the Guises, Henri had recourse to assassination, and

caused the duke of Guise and his brother the cardinal to be murdered. Most of the towns in France rebelled; the Parliament of Paris instituted his trial; and the pope excommunicated him. In this emergency his generous enemy, Henri of Navarre, joined him with his army, repulsed the duke of Mayenne, the leader of the League, and the two kings laid siege to Paris. During this siege a fanatical Dominican monk, named Jacques Clément, excited by the declamations of the Ligueurs, assassinated Henri III. at St. Cloud, August 2, 1589. He left no issue, and in him terminated the dynasty of Valois, which had reigned in France since the accession of Philip VI. in 1328.

HENRI IV., king of France and of Navarre, was born at Pau in the Béarn, the 15th December, 1553. His father, Antoine de Bourbon, married Jeanne d'Albret, only daughter and heiress of Henri d'Albret, king of Navarre, after whose death, in 1555, Antoine became king of Navarre in right of his wife. In 1569 Henri was acknowledged at La Rochelle as the leader of the Calvinists. After the peace of 1570 he was invited to the French court, and two years after he married Margaret, sister of Charles IX. By the death of his mother in June, 1572, he became king of Navarre. At the massacre of the St. Barthélemy, which followed close upon his marriage, Henri's life was spared on condition of his becoming a Roman Catholic; but in 1576 he put himself again at the head of the Calvinists, and began a series of hazardous and hard-fought campaigns. Henri III., before he expired, named the king of Navarre as his successor. Henri, however, was opposed, and was obliged to raise the siege of the capital.

At last, in 1593, Henri began negotiations with several of the leaders of the League, and was induced to make a public profession of the Roman Catholic faith at St. Denis, on the 25th of July of that year. In March, 1594, Paris opened its gates to him, and Rouen and other cities followed the example. The peace of Vervins, concluded in 1598, put an end to the interference of Spain in the affairs of France.

The king applied himself to reform the administration of justice, to restore order in the finances, and to promote industry and commerce. He embellished Paris, and founded the hospital of La Charité Chrétienne for invalid officers and soldiers; he added to the collection in the royal library, and encouraged and rewarded men of learning.

By the Edict of Nantes, promulgated in 1598, Henri gave what he thought a full redress of the grievances under which his Protestant subjects laboured; and such it would have proved, had not the king's intentions been frustrated in great measure by the intolerance of parliaments and courts of justice. He was assassinated by Ravaillac, May 14, 1610, and was succeeded by his son Louis XIII., under the guardianship of Mary de Medici.

HENRICHEMENT. [CHIEF.]

HENRY I., king of England, surnamed Beauclerc, was the fourth and youngest son of William the Conqueror, and was born in 1068 at Selby in Yorkshire. The eldest son, Robert, was not favoured by his father, and succeeded him in the dukedom of Normandy, while the Conqueror, at his death in 1087, expressed his wish that his third son, William, should

be his successor in England, and only left Henry a legacy of 5000*l.* of silver. With 3000*l.* of this, however, Henry soon after obtained, from the facility of his brother Robert, the whole of the district of Cotentin, comprehending nearly a third of Normandy. When Robert and William, after having been at war in Normandy, made peace, they turned their united arms against Henry, who was compelled to evacuate even his last stronghold, the fortress built on the lofty rock of St. Michael, after which he wandered about for some two years in a state of nearly complete destitution. At length, on the invitation of the inhabitants of the town of Domfront, he assumed the government of that place; and it would appear that from this point of support he gradually raised himself to the repossession of nearly all the territory that he had lost. He also became reconciled to William, and was in England and in the New Forest with that king when he came by his death (2nd August, 1100). He was crowned on August 3, in Westminster Abbey. The next day he published a charter confirming the rights and liberties both of the church and of the nation, and promising the restoration of the laws of the Confessor, with only such alterations as had been made in them by his father. Henry from the first put forward his English birth as one of his chief claims to acceptance with his subjects; and he hastened to strengthen this title by his marriage with Maud, or Matilda, daughter of Malcolm, king of Scotland, and niece of Edgar Atheling.

The history of the reign opens with the contest between Henry and his elder brother Robert for the crown, which resulted in an agreement that Henry should retain England, and Robert Normandy, with the proviso that, if either died without legitimate issue, the survivor should be heir.

Henry, however, found excuses for breaking the agreement, and levied war upon his brother, the result of which was the utter ruin of Robert and his cause. He himself was taken prisoner, with 400 of his knights, and condemned by his brother to confinement for life. According to Matthew Paris, an unsuccessful attempt which he soon after made to effect his escape was diabolically punished by the extinction of his sight; and in this state the prince survived for twenty-eight years, dying in Cardiff Castle, at the age of eighty, in February, 1135, not quite twelve months before the death of Henry. Henry was, without opposition, acknowledged their duke by the Norman barons.

The next six or seven years passed without any events of much moment. In 1113, however, Henry was attacked in Normandy by Louis VI. of France, and Fulk, earl of Anjou, in support of the interests of William, styled Fitz-Robert, the son of Duke Robert. The war lasted about two years, and was on the whole adverse to Henry. It was followed by other contests which were not finally settled until 1120.

Immediately after the peace Henry's brightest hopes were dissipated by the frightful calamity of the loss, on the 25th of November, of the ship in which his son, who had been affianced to Matilda, daughter to the Earl of Anjou, had embarked at Harfleur for England: with the exception of one individual, a butcher of Rouen, all on board perished,

to the number of nearly 300 persons. Henry is said never to have been known to smile after this event. Two years before this he had lost his consort; and a daughter, Matilda, married in 1114 to the Emperor Henry V., was now his only legitimate progeny. In the hope of male offspring, he (February 2, 1121) espoused the young and beautiful Adelais, or Alice, daughter of Geoffrey, duke of Louvaine.

When four or five years of his second marriage had passed without producing any issue, Henry determined upon securing the succession to his dominions for his daughter, who had become a widow in 1125. On Christmas day, 1126, she was unanimously declared his heir, in a great council of the lords spiritual and temporal assembled at Windsor Castle. The following year she was married to Geoffrey, surnamed Plantagenet, the son of Fulk, earl of Anjou, to whom, although only a boy of sixteen, his father had resigned that earldom on his departure for the Holy Land, where he was a few years afterwards elected king of Jerusalem. It was not, however, till March, 1133, that Henry's longings were gratified by the birth of Matilda's first child, Henry, styled Fitz-Empress, afterwards Henry II. Henry I. died at Rouen on 1st December, 1135. He had completed the sixty-seventh year of his age and the thirty-fifth of his reign.

HENRY II., surnamed Fitz-Empress, was the eldest son of Geoffrey Plantagenet (so named from a sprig of broom—in Latin, *planta genista*—in French, *plante genêt*—which he used to wear in his cap), earl of Anjou, and Matilda. [HENRY I.] He was born at Le Mans, in March, 1133. In the struggle between Stephen and Matilda for the English crown [STEPHEN], Matilda's husband, Geoffrey, had, by the year 1141, reduced nearly the whole of Normandy, and his son Henry was, in 1150, formally invested with that dukedom by Louis VII. of France, the portion of the country called the Vexin being ceded to Louis as the price of his consent to such arrangement. By the death of his father, 10th September, 1151, Henry became earl of Anjou, Touraine, and Maine. On Whitsunday of the year following, within six weeks after she had been divorced from her first husband, King Louis of France, he married Eleanor, in her own right countess of Poitou and duchess of Guienne or Aquitaine, an alliance which made him master of all the western coast of France, with the exception only of Brittany, from the Somme to the Pyrenees. Soon after this, Henry sailed for England at the head of a small but well-appointed force. He and Stephen came in sight of each other at Wallingford, and in an interview which they had there, standing on opposite sides of the Thames, agreed to a truce. The death of Eustace, Stephen's eldest son, having removed the chief obstacle to a permanent arrangement between the two competitors, the death of Stephen, October 25, 1154, made Henry king of England without opposition.

His first proceedings were strikingly indicative of the system of combined energy and policy which continued to characterize his government. He dismissed the foreign troops which Stephen had brought into the kingdom, razed to the ground nearly all the numerous castles that had been erected throughout the country by the barons in the preceding twenty years of anarchy, and resumed with remorseless

determination all the lands that had been alienated from the crown since the death of Henry I., the grants only excepted that had been made to the church and to William, the second son of Stephen.

His presence was now called for across the seas by the attempt of his younger brother Geoffrey to wrest from him his paternal inheritance of Anjou, Touraine, and Maine. After a very short contest Geoffrey was forced to give up his claim in exchange for a pension, but he died about a year afterwards, in 1158. Partly by force, partly by management, Henry succeeded in acquiring possession of the whole of Brittany, the only portion of territory that was wanting to complete his sovereignty over all the western coast of France. Henry had already recovered from the young Malcolm IV. of Scotland the northern counties which had been taken possession of by his predecessor David I., and had driven back the Welsh from those parts of the English territory which they had seized during the reign of Stephen. His next attempt was upon the earldom of Toulouse, which he claimed in right of his wife Eleanor, whose grandfather William, duke of Aquitaine, had married Philippa, the only child of William, fourth earl of Toulouse. He was here opposed both by Raymond de St. Gilles, the descendant of a brother of Earl William, and by Louis, king of France. The contest which ensued was suspended by a peace in May, 1160, by which Henry was allowed to retain a few places he had conquered in Toulouse; and although the war soon broke out anew, it was after a few months put an end to by a second peace, concluded in 1162 by the mediation of Pope Alexander III.

The history of the reign of Henry II. for the next eight years is principally that of his contest with the archbishop of Canterbury. [BECKET.]

Meanwhile two formidable insurrections of the Welsh in 1163 and 1165 had been repressed. In 1166 a revolt of the people of Brittany against their duke, Conan, afforded Henry a pretext for assuming to himself the direct administration of affairs in the name of his son Geoffrey and Conan's daughter Constantia, between whom, young as they both still were, the marriage ceremony was now solemnized for the sake of this arrangement. On the 10th of September, 1167, Henry's mother, the ex-empress Matilda, died at Rouen. Some further hostilities in which he now became involved with the French king were, before producing any important result, terminated by a new peace concluded at Montmirail, 6th January, 1169. By this treaty it was arranged that Henry, the king of England's eldest son, should do homage to Louis for the earldoms of Anjou and Maine, and that his second son Richard should in like manner hold the duchy of Aquitaine of the French king, and espouse Adelais, or Alice, the youngest daughter of Louis. But the greatest event which divided the manifold activity of Henry with the affairs of Becket was the conquest of Ireland, which was begun in 1169 by a body of private adventurers, headed by Richard de Clare, earl of Pembroke, the celebrated Strongbow, and completed by Henry in person, who crossed over from Milford to Waterford with a powerful armament, 18th October, 1171, and a protracted struggle ensued between the people and their invaders; but the acquisition of Ireland was finally sealed by a formal treaty concluded in 1175 with

Roderick O'Connor, considered the head king of the country, in which he consented to become Henry's liegeman, and to pay an annual tribute.

Much of the remaining portion of Henry's life and reign presents an involved and deplorable scene of family discord and contention. His eldest son Henry had been, as heir-apparent, crowned in Westminster Abbey on Sunday, 15th of June, 1170. On this account, at the instigation, it is said, of King Louis, the prince advanced the pretension that he had become entitled actually to share the royal power with his father, and he demanded that Henry should resign to him either England or Normandy. His refusal was speedily followed (in March, 1173) by the flight first of the prince, and then of his younger brothers Richard and Geoffrey, to the French court. About the same time Queen Eleanor also left her husband to associate herself openly with the rebellion of her sons, of which she had in fact been the prime mover. She was also making her way for the French court when she was caught dressed in man's clothes and brought back to Henry, during the rest of whose life she remained in confinement. The cause of young Henry was supported not only by Louis, but also by William of Scotland, and by some of the most powerful both of the Norman and the English barons. The war continued for about two years, during which the most important event that happened was the capture of King William of Scotland at Alnwick Castle, 12th July, 1174. Soon after this, Henry, who had throughout decidedly the best of the contest, assented to the petition of his sons for a peace. In December, 1174, a treaty with Scotland had been signed, by which the Scots agreed to make acknowledgment of the feudal dependence of their crown on that of England, in return for the liberation of King William. In 1183 another outbreak of the fierce and turbulent spirit of the princes led the way to a new succession of family wars. After deserting his father and his youngest brother alternately about half a dozen times, Prince Henry was suddenly taken ill, and died at Château-Martel, 11th June, 1183, in the twenty-seventh year of his age; and Geoffrey was, in August, 1186, thrown from his horse at a tournament, and so severely injured that he died in a few days after. Richard, after unsuccessfully attempting to excite a new revolt in Aquitaine, was compelled to throw himself upon his father's clemency. A project of a new crusade at the call of Pope Clement III., in the beginning of 1188, for a moment united Henry and Philip, the new king of France. The impetuous Richard actually took the cross; but before the end of the same year the unhappy father saw his son again bearing arms against him in alliance with the French king. The pretext on the part of Philip and of Richard for this new war was Henry's refusal to deliver up the Princess Alice, the sister of the former, and the affianced bride of the latter, whose person as well as part of her dowry he had for many years had in his possession. Henry's spirit seems to have given way at last, and he sued for peace, which was granted on terms very humiliating to the king. Henry was stretched on a sick-bed when the treaty was read to him; but when he found in the list of those that had deserted him to join Richard, his youngest and favourite son John, the discovery appears to have broken his heart; he

turned himself to the wall, saying that all his interest in the world was over. He was soon after removed to Chinon, on the Loire; and there, after a few days more of suffering, he died, 6th July, 1189, in the fifty-seventh year of his age and thirty-fifth of his reign. He was buried in the choir of the abbey of Fontevraud.

The government of England during this reign was still nearly as despotic in principle as in the days of the Conqueror and his sons, but the more advanced social condition of the country and the firmer establishment of the new dynasty combined with the temper of the king to render it much less oppressive in practice.

HENRY III., surnamed of Winchester, was the eldest son of King John by his queen, Isabella of Angoulême, and was born 1st October, 1206. His father having died 18th October, 1216, the boy was, chiefly through the influence of the earl of Pembroke, acknowledged heir to the throne, and on the 28th was crowned in the abbey-church of St. Peter at Gloucester, by the papal legate, Gualo. His reign is reckoned from that day.

On the 11th November following, Pembroke was appointed protector or governor of the king and kingdom. After his death the administration fell into the hands of Hubert de Burgh. In 1222 Henry had been declared of age to exercise at least certain of the functions of government; but his feeble character was already become sufficiently apparent, and this formality gave him no real power. De Burgh conducted the government with ability and success, though in a spirit of severity which could not fail to make him many enemies. A growing opposition to De Burgh was at length headed by Richard, earl of Cornwall, the king's brother, and the consequence was the sudden expulsion of that minister from all his offices, and his consignment to prison, with the loss of all his honours and estates, in the latter part of the year 1232. Des Roches, the bishop of Winchester, who had retired from the country, returned, and was now placed at the head of affairs; but a confederacy of the laity and the clergy, with Edmund, archbishop of Canterbury, at its head, compelled his dismissal. The archbishop now became chief minister. In 1236 Henry, being now in his thirtieth year, married Eleanor, the daughter of Raymond, count of Provence. In the midst of contests between the crown and the nobility, whose meetings for deliberation on national affairs were now commonly called parliaments, a renewal of active hostilities with France was brought about through a private resentment of Henry's mother, Isabella, who, after the death of John, had returned, and had been remarried to Hugh, count of La Marche. Henry sailed for the continent; but, after being beaten by Louis in a succession of actions, he was glad to get home again, with the loss of army, money, baggage, and everything. A new truce for five years was then agreed to between the two countries.

The contest with the crown ended for the present in an attempt on the part of Henry to govern by the prerogative. The exorbitant extent to which Henry carried his exactions raised a spirit of resistance, which broke out into open revolt. What is called by most of the old chroniclers 'the mad Parliament' assembled at Oxford, June 11, 1258, and placed the

whole authority of the state in the hands of a committee of government, consisting of twelve persons appointed by the barons and as many by the king. The leader of the barons on this occasion was the famous Simon de Montfort, who was a Frenchman by birth, but who in right of his mother had succeeded to the English earldom of Leicester, and had married Eleanor, countess-dowager of Pembroke, a sister of King Henry. He and his friends soon contrived to monopolize the whole power of the committee. The quarrels of the adverse factions enabled Henry, in the beginning of 1261, to throw off their authority, and although the parliamentary party was on this occasion joined by Prince Edward, it was for the present effectually put down, De Montfort himself being obliged to take refuge in France. After a temporary restoration of De Montfort to power, we soon find the contending parties in open warfare, and on May 14, 1264, the forces of the barons, led by De Montfort, and those of the royalists, commanded by the king in person and by his son Edward, met at Lewes in Sussex, where the former gained a complete victory, both Henry and his son being taken prisoners. Prince Edward contrived to make his escape from Dover Castle, and to join the earl of Gloucester, who had now deserted the interest of De Montfort, at Ludlow, in Shropshire. On the 4th of August the two parties again encountered at Evesham; and the result was the defeat of the baronial forces with immense slaughter—De Montfort himself and his son Henry being both in the number of the slain. A final arrangement with the De Montfort party was at last effected in a parliament which met at Marlborough on the 18th of November, 1267. Henry's son Edward set out for the Holy Land in July, 1270, from which he had not returned when Henry died at Westminster, November 16, 1272, in the sixty-seventh year of his age and the fifty-seventh of his reign.

The reign of Henry III. is memorable as affording us the first distinct example of a parliament constituted, as at present, of representatives. Our statute law also begins with this reign.

HENRY IV., surnamed Bolingbroke, was the eldest son of John of Gaunt, duke of Lancaster, the fourth son of Edward III. His mother was the Lady Blanch, younger daughter and eventually heiress of Henry Plantagenet, duke of Lancaster, who was grandson of Edmund, second son of King Henry III. He was born at Bolingbroke in Lincolnshire in 1366. In 1397 he was created Duke of Hereford, having married Mary, daughter and coheir of Humphrey de Bohun, the last earl of Hereford.

The first occasion on which he appears in English history is as one of the lords associated with Thomas, duke of Gloucester, the uncle of Richard II., in the insurrection of 1387; and ten years after we find him accusing the duke of Norfolk, who was also concerned in the rebellion, of having spoken disrespectfully of the king, by expressing his opinion that, although Richard had received them into his favour, he still cherished a determination of revenge. It was determined that the charge should be brought before a high court of chivalry. That court assembled at Windsor on the 29th of April, 1398, and awarded that wager of battle should be joined between the two dukes at Coventry on the 16th of September. When

the day arrived, and the combatants were on the point of advancing to the encounter, the king, who presided, suddenly threw down his warder, and so arrested them both where they stood. Norfolk was ordered to go on a pilgrimage to the Holy Land, and was banished from England for life; Hereford was also sentenced to quit the kingdom within four months, and to remain abroad for the next ten years. He retired to Paris, and while he was resident in that city his father, the duke of Lancaster, died, February 3, 1399, on which Richard immediately seized his estates, on the pretence that the banishment of the son disqualified him from inheriting. Henry landed with a few attendants at Ravenspur in Yorkshire on the 4th of July, while Richard was in Ireland. Henry carried everything before him, and, the deposition of Richard having been pronounced by the Parliament, was on the 30th of September solemnly acknowledged as king by the estates of the realm assembled in Westminster Hall.

The new settlement was first disturbed by a plot to assassinate the new king, which, however, was detected in time. Military operations were then commenced on the side both of Wales and Scotland, in the former of which countries an insurrection, headed by the famous Owen Glendwr, baffled all Henry's efforts during several successive campaigns to put down; while two Scottish armies that marched across the borders pretending that they came to restore King Richard, who it was said was still alive and resident at the northern court, were defeated, the first on the 22nd of June, 1402, at Nesbet Moor, the second on the 14th of September in the same year, in the much more destructive fight of Homildon Hill. The victorious commander in this last affair was Harry Percy, the renowned Hotspur, eldest son of the earl of Northumberland. That great house, conscious of its power and its services, now broke with the king of its own making, on his refusal to permit the ransoming of Henry Percy's wife's brother, Sir Edmund Mortimer, who had been taken prisoner by Glendwr. A most formidable rebellion followed, but was annihilated on the 21st July, 1403, by the battle of Shrewsbury, in which Henry Percy was himself slain. Before the end of 1405 Owen Glendwr was effectually put down, and a truce with Scotland had restored quiet in that quarter. It was in the time of this truce that on the 30th of March, 1405, an English cruiser captured the ship in which James, the eldest son of King Robert of Scotland, was proceeding to France, on which Henry retained possession of the young prince, who, becoming king the following year by the death of his father, remained a prisoner in England till 1424. About the same time Henry detected a conspiracy against his life, one of the principal persons engaged in which was his cousin Edward, duke of York, whose estates were immediately forfeited to the crown; and he quelled another insurrectionary attempt of the Percys, headed by Scroop, archbishop of York, who expiated his treason by a death on the scaffold. A third northern insurrection, the last effort of the crafty old earl of Northumberland, who had some years before been deprived of his estates and outlawed, was put down, 28th of February, 1408, at the battle of Bramham Moor, near Tadcaster, in which the earl himself fell. Meanwhile an irregular war with France had

been carried on, but these transactions led to no important national results during this reign.

In his latter years Henry—whose character, the more it became known, developed a harsher and more unamiable aspect—lost all the popular favour that had greeted his accession. He breathed his last on the 20th of March, 1413, in the forty-seventh year of his age and the fourteenth of his reign.

Of the laws made in this reign the most memorable is the statute against the Lollards (2 Hen. IV. c. 15).

HENRY V., surnamed of Monmouth, from the place of his birth, was the eldest son of King Henry IV., by his first wife, and was born in 1388. He was educated at Queen's College, Oxford, under the superintendence of his half-uncle, the great Cardinal Henry Beaufort. When his father was in exile in 1399, he and a son of the late duke of Gloucester were carried to Ireland and placed in custody in the castle of Trim, where they remained till the deposition of Richard. On his father's accession he was created Prince of Wales, Duke of Guienne, Lancaster, and Cornwall, and Earl of Chester. It is said that the renown and popularity the prince acquired by his military successes in Wales so inflamed the jealousy of his father as to occasion his recall from the army, and that after this he drew upon himself as much reprobation by his wild and dissipated life as he had gained favour by his previous conduct.

Henry V. was proclaimed king on the 21st of April, 1413, the day after his father's death. He began his reign with several acts of a generous stamp—transferring the remains of Richard II. to Westminster Abbey; releasing the young earl of March from the captivity in which he had been held all the preceding reign; and recalling the son of Hotspur from his exile in Scotland to be reinstated in his hereditary lands and honours. He had been seated on the throne little more than a year when he entered upon the enterprise of the conquest of France, which forms nearly the whole history of his reign. The claim which he advanced to the French crown was the same that had been put forward in the preceding century by Edward III., to whose rights he seems to have regarded himself as the legitimate successor in virtue of his possession of the throne, although he was certainly not the heir of that king by lineal descent. Henry, having appointed his brother, the duke of Bedford, regent of the kingdom during his absence, set sail from Southampton, 13th August, 1415, with a force of 24,000 foot and about 6500 cavalry in a fleet of from 1200 to 1400 vessels, and on disembarking immediately proceeded to lay siege to the strong and well-garrisoned fortress of Harfleur. It capitulated after a siege of six weeks, in the course of which time, however, a dysentery that broke out in their camp made a frightful devastation among the English.

On the 6th of October Henry set out on his march through Normandy, with a force which at the utmost could not have exceeded 9000 men. On the 24th he came in sight of a French army, commanded by the constable of France and the dukes of Orleans and Bourbon, the strength of which has been variously estimated at from 50,000 to 150,000 men. The great battle of Agincourt was fought on the next day, in which the English gained one of the most complete as well as wonderful victories on record.

Henry returned to France in August, 1417, having under his command a magnificent army of about 35,000 men. The result of this expedition was the treaty of 'Perpetual Peace,' signed at Troyes, by which all Henry's demands were agreed to, namely—the hand of Charles' eldest daughter, the Princess Catherine; the present regency of the kingdom; and the succession to the throne of France on the death of Charles. Henry soon after set out with his queen for England, and on the 2nd February, 1421, entered London amidst such pageants and popular rejoicings as that capital had never before witnessed. In the course of the same year Henry led another army into France to resist the aggressions of the Dauphin, where his arms met with their customary success. But the end of Henry's triumphant career was now at hand. The Dauphin and the Constable Buchan having laid siege to the town of Cosne, Henry, though ill at the time, set out to relieve that place, but was unable to proceed farther than Corbeil, about twenty miles from Paris, when resigning the command to his brother the duke of Bedford, he was carried back in a litter to the Bois de Vincennes, in the vicinity of the capital, and there, after an illness of about a month, he breathed his last on the 31st of August, 1422, in the thirty-fourth year of his age and the tenth of his reign.

HENRY VI., surnamed of Windsor, was born 6th December, 1421, being the only issue of Henry V. by his queen, the Princess Catherine of France. He was not quite nine months old when the death of his father left him king of England. The actual administration of affairs in England was intrusted to the younger of his two uncles, Humphrey, duke of Gloucester, as substitute for the elder, John, duke of Bedford, who was appointed president of the council, but who remained in France, taking his late brother's place as regent of that kingdom.

The history of the earlier and longer portion of this reign is the history of the gradual decay and final subversion of the English dominion in France. The death of Henry V. was followed in a few weeks (22nd October) by that of his father-in-law, Charles VI. Immediately on this event the dauphin was acknowledged by his adherents as Charles VII.; and Henry VI. was also proclaimed in Paris, and wherever the English power prevailed, as king of France. The next events of importance that occurred were the two great victories of Crevant and Verneuil obtained by the English over the French and their Scottish allies, the former on the 31st of July, 1423, the latter on the 17th of August, 1424.

The extraordinary succession of events that followed—the appearance of Joan of Arc on the scene; her arrival in the besieged city of Orleans (29th April, 1429); the raising of the siege (8th May); the defeat of the English at the battle of Patay (18th June); the coronation of King Charles at Rheims (15th July); the attack on Paris (12th September); the capture of Joan at Compiègne (25th May, 1430); her trial and execution at Rouen (30th May, 1431)—all belong to the singular story of the heroic maid.

[ARC, JOAN OF.]

The young king of England, now in his ninth year, had in the meantime been brought to Rouen (May, 1430), and was about a year and a half afterwards crowned at Paris (December 17, 1431). In

1435 the duke of Burgundy concluded a peace with Charles, and a few days after the great duke of Bedford died. This event gave the finishing blow to the dominion of the English in France. In April, 1436, the English garrison in Paris was compelled to capitulate. In 1444 a truce was agreed upon, to last till 1st April, 1446; and in this interval a marriage was arranged between King Henry and Margaret, the beautiful daughter of René, king of Sicily and Jerusalem, and duke of Anjou, Maine, and Bar. In return for the hand of his daughter, he demanded the restoration of his hereditary estates of Maine and Anjou, which were in the possession of the English, and the proposal was at length assented to. The connection seemed to be one thoroughly French in spirit, and it is no wonder that the earl of Suffolk, by whom it had been negotiated, became from this time the object of much general odium and suspicion. The first remarkable event that followed was the destruction of the duke of Gloucester, who, although he appears not to have openly opposed the marriage, was certainly the most formidable obstacle in the way of the complete ascendancy of Suffolk and the queen. Having been arrested on a charge of high treason, 11th February, 1447, he was on the seventeenth day thereafter found dead in his bed. His death was generally attributed to the agency of Suffolk, who, now, raised to the dignity of duke, became, ostensibly as well as really, prime or rather sole minister.

Soon after hostilities were renewed in France, and a numerous force having been poured by King Charles into Normandy, town after town was speedily reduced; Rouen, the capital, surrendered, November 4, 1449; and the fall of Cherbourg, August 12, 1450, completed the loss of the duchy. Before this catastrophe the duke of Suffolk, after having been banished from the kingdom, was seized as he was sailing across from Dover to Calais, and being carried on board one of the king's ships, was there detained for a few days, and at last had his head struck off by an executioner who came alongside in a boat from the shore, May 2, 1450. The murder of Suffolk was immediately followed by a popular insurrection. [CADE, JOHN.] Before the close of the following year the French, in addition to Normandy, had recovered all Guienne; and, with the exception of Calais, not a foot of ground remained to England of all her recent continental possessions.

The remainder of the history of the reign is made up of the events that arose out of the contest for the crown which eventually placed another family on the throne. [EDWARD IV.] The king sunk into a state of mind amounting to absolute incapacity. By the beginning of the year 1455, however, he had recovered, and again took upon him the nominal administration of the government, which during his malady had been committed to the duke of York. In the contest that soon ensued, he was taken prisoner by the earl of Warwick at St. Alban's, 23rd May, 1455, and towards the end of that year he was again declared to be in a state of incapacity. Again, however, in a few months, Henry recovered his health, and the government was conducted in his name till his second capture by the young earl of March (afterwards Edward IV.) at Northampton, 10th July, 1460. On this occasion the queen escaped with her son, and eventually made her way to Scotland. The

victory obtained by Margaret over the earl of Warwick at Barnet Heath, 17th February, 1461, again liberated her husband; after which, and the issue of the battle of Towton, 29th March, which established Edward on the throne, he retired with the queen and Prince Edward to Scotland. When Margaret again invaded England in 1462, Henry was placed in the castle of Hardlough in Merionethshire; and here he remained till the spring of 1464, when he was brought from Wales to join a new insurrection of his adherents in the north of England. After the two final defeats of the Lancastrians at Hedgley Moor, 25th April, and at Hexham, 15th May, the deposed king lurked for more than a year in Lancashire and Westmoreland, till he was at last betrayed, and seized in Waddington Hall, in Yorkshire, in June, 1465. He was immediately conducted to London, and consigned to the Tower, where he remained in close confinement till the revolution of October, 1470, again restored him for a few months to both his liberty and his crown. He was carried from London to the battle of Barnet, fought 14th April, 1471, and there fell into the hands of Edward, who immediately remanded him to the Tower. The old man survived the final defeat of his adherents, and the murder of his son, at Tewkesbury, 4th May; and a few days after an attempt which had nearly succeeded was made by Thomas Nevil, called the Bastard of Falconberg, to break into his prison and carry him off by force. This probably determined Edward to take effectual means for the prevention of further disturbance. All that is further known is that on the 22nd of May, 1471, the dead body of Henry was exposed to public view in St. Paul's. It was generally believed, however, that he had been murdered by the king's brother, the duke of Gloucester, afterwards Richard III.

HENRY VII. was born at Pembroke Castle, 21st January, 1456. His father was Edmund Tudor (or rather Tydor, pronounced Tuddor, that is, Theodore), surnamed of Hadham, who had been created Earl of Richmond in 1452, being the son of Sir Owen Tudor and Queen Catherine, widow of Henry V. He was thus paternally descended both from the royal house of France, and also, it is said, from the ancient sovereigns of Wales. But it was his maternal extraction that gave Henry Tudor his political importance. His mother was Margaret, the only child of John Beaufort, duke of Somerset, whose father of the same name was the eldest of the sons of John of Gaunt, duke of Lancaster, the root of the Lancastrian house, by his third wife, Catherine Swynford.

Edmund Tudor died in 1456, the same year in which his son Henry was born. Throughout the stormy period that followed, the child found a protector in his uncle, Jasper Tudor, earl of Pembroke, till, on the accession of Edward IV. in 1461, the earl was attainted, and obliged to fly the country. Henry appears to have been then consigned by the new king to the charge of Sir William Herbert, Baron Herbert (afterwards created Earl of Pembroke), and to have been carried by that nobleman to his residence of Raglan Castle in Monmouthshire. He is said, however, to have been brought to court on the restoration of Henry VI. in 1470. After the battle of Tewkesbury he seems to have been sent back to Raglan Castle, and to have remained there till his

uncle, who had fled to France, returned secretly, and found means to carry him off to his own castle of Pembroke, and to embark with him at Tenby, with the intention of proceeding to France. They were forced, however, by stress of weather to put into a port of Bretagne, and there they were detained by the duke, Francis II., till after the accession of Richard III.

As soon as it came to be known that Edward V. and his brother no longer existed, Morton, bishop of Ely, suggested to the heads of his party that the crown should be offered to Henry on condition of his engaging to espouse the Princess Elizabeth, daughter of Edward IV., and since the death of her brothers the undoubted heiress of the rights of the house of York. The scheme received the assent of the leaders of the various interests confederated against Richard. A messenger was despatched to Henry in Bretagne, September 24, 1483, and he was informed that the general rising in his favour would take place on the 18th of October. Henry sailed from St. Malo with a fleet of forty sail; but a storm dispersed the ships as he crossed the Channel, and when he reached the English coast near Poole he deemed it prudent not to land. Meanwhile the hasty ill-combined revolt of Buckingham and his associates fell to pieces without the striking of a blow. Buckingham was taken and executed as a traitor. Henry himself returned to Bretagne. At length, on the 1st of August, 1485, Henry sailed with another fleet from Harfleur, and on the 7th landed at Milford Haven in Wales. The two rivals encountered at Bosworth in Leicestershire, on the 22nd, when Henry obtained a complete victory, which, with the death of Richard, who fell in the battle, at once placed the crown on his head. [RICHARD III.] Henry's marriage with Elizabeth was not solemnized till the 18th of January, 1486.

It was not to be expected that a reign commenced in such circumstances should be undisturbed by insurrectionary attempts. The first that occurred was headed by Francis, Viscount Lovel, in April, 1486, which was speedily and effectually put down. Before the end of the same year, however, a new and more formidable commotion was excited by the imposture of the boy Lambert Simnel, the son of a joiner at Oxford, who was put forward as Edward Plantagenet, earl of Warwick, the son and heir of the late duke of Clarence, brother of Richard III. The brief royalty of Simnel, however, was terminated, June 16, 1487, by the defeat of his adherents in the battle of Stoke. This imposture was followed after some years by the appearance of the more celebrated pretender Perkin Warbeck, who was asserted by his adherents to be Richard, duke of York, the younger brother of Edward V., and generally supposed to have been murdered along with him in the Tower. Warbeck arrived in Ireland from Lisbon in the beginning of May, 1492, and was afterwards acknowledged as duke of York, or rather as Richard, king of England, not only by the duchess of Burgundy, but by the governments both of France and Scotland. This affair occupied Henry for the next five or six years; for it was not till the end of 1497 that the adventurer was finally put down. Another pretended earl of Warwick next arose, one Ralph Wulford, or Wilford, the son of a shoemaker, whose attempt, however, was immediately nipped in the bud by his apprehen-

sion and execution, in March, 1499. The same year in which Wulford was put to death witnessed the executions of both Perkin Warbeck and the earl of Warwick. From this time Henry's reign was one of complete internal tranquillity, of which he chiefly took advantage to augment his revenue and his hoarded treasures.

Henry was early in his reign involved in the politics of the Continent by the quarrel which arose between Francis, duke of Bretagne, and Charles VIII. of France, each of whom applied to him for his assistance. This quarrel, by the death of Francis, became a contest for the possession of Bretagne by France. Charles eventually compelled the duchess of Bretagne to marry him, after she had been affianced to Maximilian, the king of the Romans; and the duchy was thus finally annexed to the French crown. The indignation of England at this result forced Henry to conduct an army to France in person, in the beginning of October, 1492; but he had already secretly arranged a peace with Charles, and before there was any fighting the treaty was published in the beginning of November. By this treaty, called the treaty of Estaples, Charles bound himself to pay Henry the sum of 149,000*l.* sterling, in half-yearly instalments of 25,000 francs.

By successive truces with James III. and James IV., the peace with Scotland was preserved till 1495. After Warbeck's final discomfiture, however, in 1497, a new truce was concluded between the two countries; and this led in 1502 to a treaty of perpetual peace, cemented by the marriage of James with Henry's eldest daughter, the Princess Margaret.

Nearly two years before this, namely, November 14, 1501, a marriage had been solemnized between Henry's eldest son Arthur, prince of Wales, and Catherine, the fourth daughter of Ferdinand, king of Castile. Arthur, however, who was a prince of the highest promise, died within six months after this time; and then it was arranged that Catherine should be married to his surviving brother Henry. The marriage of Catherine and Arthur proved still more momentous in its consequences than that of Margaret and James.

The Queen Elizabeth died February 11, 1503, a few days after giving birth to a daughter; the death of Henry took place at Richmond, April 22, 1509, in the twenty-fourth year of his reign and the fifty-third of his age.

HENRY VIII., the second son of Henry VII., was born at Greenwich, 28th June, 1491. On the 1st of November following he was created Duke of York, and in 1494 his father conferred upon him the honorary title of lord-lieutenant of Ireland. Sir Edward Poynings being appointed his deputy. It is stated that Henry was at first destined to the archbishopric of Canterbury; 'that prudent king his father,' observes Lord Herbert (in the History of his Life and Reign), 'choosing this as the most cheap and glorious way for disposing of a younger son.' He received accordingly a learned education.

Very soon after Arthur's death the singular project was started of marrying Henry to his brother's widow. The proposition appears to have originally come from Ferdinand and Isabella, who were anxious to retain the connection with England; and to have been assented to by King Henry in great part from

his wish to avoid the repayment of the dower of the princess. The final agreement between the two kings was signed 23rd June, 1503.

Henry became king 22nd April, 1509, being then in his nineteenth year. One of the earliest proceedings of the new reign was the trial and punishment of his father's ministers, Dudley and Empson. They were indicted for a conspiracy to take possession of London with an armed force during the last illness of the late king, and were beheaded together, on Tower Hill, 17th August, 1510.

Henry had not been long upon the throne when he was induced to join what was called the Holy League, formed against France by the pope, the emperor, and the king of Spain. In 1513 Henry passed over to France with an army, and, having been joined by the Emperor Maximilian, defeated the French, 4th August, at Guinegaste, in what was called the battle of the Spurs, from the unusual energy the beaten party are said to have shown in riding off the ground, and took the two towns of Terouenne and Tournay. On the 9th of September also, the Scottish king, James IV., who as the ally of France had invaded England, was defeated by the earl of Surrey in the great battle of Flodden Field, he himself with many of his principal nobility being left dead on the field. This war with France, however, was ended the following year by a treaty, the principal condition of which was that Louis XII., who had just lost his queen, should wed Henry's sister, the Princess Mary. The marriage between Louis, who was in his fifty-third, and the English princess, as yet only in her sixteenth year, was solemnized 9th October, 1514; but Louis died within three months, and scarcely was she again her own mistress when his young widow gave her hand to Charles Brandon, duke of Suffolk, an alliance out of which afterwards sprang a claim to the crown. [GREY, LADY JANE.]

A rivalry broke out between Richard Fox, bishop of Winchester, secretary and lord privy seal, and Thomas Howard, earl of Surrey (afterwards duke of Norfolk), who held the office of lord treasurer. This led to the introduction at court of Thomas Wolsey, who, being then dean of Lincoln, was brought forward by Fox to counteract the growing ascendancy of Surrey, and who speedily made good for himself a place in the royal favour that reduced all the rest of the king's ministers to insignificance, and left in his hands for a long course of years nearly the whole power of the state. [WOLSEY, CARDINAL.] For a short time Henry remained at peace, both with the Emperor Charles V., who had succeeded to the Spanish throne, and Francis; the former of whom paid him a visit at Dover in the end of May, 1520; and with the latter of whom he had a few days after a seemingly most amicable interview, celebrated under the name of the 'Field of the Cloth of Gold.' But before the close of the following year Henry joined in the league with the emperor and the pope; and in March, 1522, declared war against France. In the summer of the same year the emperor flattered him by paying him a visit at London; his vanity having also been a short time before gratified by the title of 'Defender of the Faith' bestowed upon him by Pope Leo X. for a Latin treatise which he had published 'On the Seven Sacraments,' in

confutation of Luther. Henry continued to attach himself to the interest of the emperor, until the disappointment, for the second time, of Wolsey's hope of being made pope through the influence of Charles, is supposed to have determined that minister upon a change of politics. Before the memorable defeat and capture of Francis at the battle of Pavia, 24th February, 1525, the English king had made every preparation to break with the emperor. In August he concluded a treaty of peace and alliance with France, and after the release of Francis in March, 1526, Henry was declared protector of the league styled 'Most Clement and Most Holy,' which was formed under the auspices of the pope for the renewal of the war against Charles.

Before this date two domestic occurrences took place that especially deserve to be noted. The first of these was the execution, in 1513, immediately before Henry proceeded on his expedition to France, of Edmund de la Pole, duke of Suffolk, whose mother was Elizabeth Plantagenet, sister of Edward IV. He was now put to death without any form of trial or other legal proceeding; his crime, there can be no doubt, being merely his connection with the House of York. In 1521 Edward Stafford, duke of Buckingham, son of the duke beheaded by Richard III., was apprehended on some information which was furnished to Wolsey by a discarded servant, and being brought to trial, was found guilty, and executed as a traitor. The acts with which he was charged did not according to law amount to treason, even if they had been proved; but the duke is said by certain indiscretions of speech and demeanour to have wounded the pride of the all-powerful minister. In 1527 Henry cast his eyes upon Anne Boleyn, and appears to have very soon formed the design of ridding himself of Catherine. [BOLEYN, ANNE.] Anne was understood to be favourably disposed towards the new views on the subject of religion. Henry himself, though he had been till now resolutely opposed to the new opinions, was carried over by his passion towards the same side. The proceedings for the divorce were commenced by an application to the court of Rome, in August, 1527. For two years the affair lingered on through a succession of legal proceedings, but without any decisive result. From the autumn of 1529 are to be dated both the fall of Wolsey and the rise of Cranmer. [CRANMER, THOMAS.] The death of the great cardinal took place 29th November, 1530. In January following the first blow was struck at the church by an indictment being brought into the King's Bench against all the clergymen of the kingdom for supporting Wolsey in the exercise of his legatine powers without the royal license, and it was in an act passed immediately after by the Convocation of the province of Canterbury, for granting to the king a sum of money to exempt them from the penalties of their conviction on this indictment, that the first movement was made towards a revolt against the see of Rome, by the titles given to Henry of 'the one protector of the English church, its only and supreme lord, and, as far as might be by the law of Christ, its supreme head.' Shortly after, the convocation declared the king's marriage with Catherine to be contrary to the law of God. In August, 1532, Cranmer was appointed to the archbishopric of Canterbury. In the

beginning of the year 1533 Henry was privately married to Anne Boleyn; and on the 23rd of May following Archbishop Cranmer pronounced the former marriage with Catherine void. In the meantime the Parliament had passed an act forbidding all appeals to the see of Rome. Pope Clement VII. met this by annulling the sentence of Cranmer in the matter of the marriage; on which the separation from Rome became complete. Acts were passed by the Parliament the next year declaring that the clergy should in future be assembled in convocation only by the king's writ, that no constitutions enacted by them should be of force without the king's assent, and that no first-fruits, or Peter's Pence, or money for dispensations, should be any longer paid to the pope. [ANNATES.] In the next session, the Parliament, which reassembled in the end of the same year passed acts declaring the king's highness to be supreme head of the Church of England, and to have authority to redress all errors, heresies, and abuses in the church. After this, various persons were executed for refusing to acknowledge the king's supremacy; among others, two illustrious victims, the learned Fisher, bishop of Rochester, and the admirable Sir Thomas More. [FISHER, JOHN; MORE, THOMAS.] In 1535 began the dissolution of the monasteries, under the zealous superintendence of Cromwell (afterwards earl of Essex), who was constituted for that purpose visitor-general of these establishments.

Events now set in a new current. The month of May of this year witnessed the trial and execution of Queen Anne—in less than six months after the death of her predecessor, Catherine of Arragon—and the marriage of the brutal king, the very next morning, to Jane Seymour, the new beauty, his passion for whom must be regarded as the true motive that had impelled him to the deed of blood. Queen Jane dying on the 14th of October, 1537, a few days after giving birth to a son, was succeeded by Anne, sister of the duke of Cleves, whom Henry married in January, 1540, and put away in six months afterwards.

In 1536 Cromwell was constituted a sort of lieutenant over the church, by the title of vicar-general, which was held to invest him with all the king's authority over the spirituality. The dissolution of the monasteries in this and the following year, as carried forward under the direction of this energetic minister, produced a succession of popular insurrections in different parts of the kingdom, which were not put down without great destruction of life, both in the field and afterwards by the executioner. In 1538 all incumbents were ordered to set up in their churches copies of the newly-published English translation of the Bible, and to teach the people the Creed, the Lord's Prayer, and the Ten Commandments, in English; the famous image of Our Lady at Walsingham, and other similar objects of the popular veneration, were also under Cromwell's order removed from their shrines and burnt. In 1539 the Parliament, after enacting (by the 31 Henry VIII., c. 8.) that the proclamation of the king in council should henceforth have the same authority as a statute, passed the famous act (the 31 Henry VIII., c. 14) known by the name of the Six Articles, or the Bloody Statute. This statute, the cause of numer-

ous executions, proceeded from a new influence which had now gained an ascendancy over the fickle king, that of Gardiner, bishop of Winchester, the able leader of the party in church and state opposed to Cranmer and Cromwell. [GARDINER, STEPHEN.] This new favourite was not long in effecting the ruin of the rival that was most in his way; Cromwell, who had just been created Earl of Essex and made lord chamberlain of England, was in the beginning of June, 1540, committed to the Tower on a charge of treason, and beheaded in a few weeks afterwards.

On the 8th of August this year Henry married his fifth wife, the Lady Catherine Howard, whom he beheaded, 13th February, 1542. During this interval he also rid himself by the axe of the executioner of Margaret, countess dowager of Salisbury, the daughter of the late duke of Clarence, and the last of the York Plantagenets. Her real crime was that she was the mother of Cardinal Pole, who had offended the tyrant, and who was himself beyond his reach.

In the latter part of the year 1542 war was declared by Henry against Scotland. The failure of his efforts to obtain possession of the government and of the young queen, Mary Stuart, led to a renewal of hostilities in the spring of 1544, when Scotland was invaded by a great army under the earl of Hertford, which penetrated as far as Edinburgh, and burned that capital, with many other towns and villages. In the preceding year, also, Henry had concluded a new alliance with the emperor against the French king; and in July, 1544, he passed over with an army to France, with which he succeeded in taking the town of Boulogne. On this, however, the emperor made a separate peace with Francis; and on the 7th of June, 1546, Henry also signed a treaty with that king, in which he agreed to restore Boulogne and its dependencies in consideration of a payment of two millions of crowns.

He had some years before found a sixth wife, Catherine Parr, the widow of the Lord Latimer, whom he married 10th July, 1543. As the infirmities of age and disease grew upon him, the suspiciousness and impetuosity of his temper acquired additional violence. One of his last butcheries was that of Henry Howard, earl of Surrey, who, being convicted of treason, was executed in January, 1547. Surrey's father, the duke of Norfolk, was also to have suffered on the 28th, but was saved by the death of the king at two o'clock on the morning of that day.

The most important changes made in the law during this reign were those affecting ecclesiastical affairs, of which the principal have been already noticed. Along with these may be mentioned the statute defining the degrees within which marriage should be lawful (25 Henry VIII., c. 22). The law of real property was also materially affected by the Statute of Uses (27 Henry VIII., c. 10), and by the statutes which permitted the devise, which was not before allowed, except by the custom of particular places, of real estates by will. To this reign is also to be assigned the origin of the Bankrupt Laws. Wales was first incorporated with England, and the laws and liberties of England granted to the inhabitants of Wales, in the twenty-seventh year of Henry VIII.; and Ireland, which before was styled only a lordship, was in 1542 erected into a kingdom.

HENRY OF HUNTINGDON, an ancient English historian, the son of Nicholas, a married priest, was born about the end of the 11th century, and was educated under Alcuin of Anjou, a canon of Lincoln Cathedral. He was made archdeacon of Huntingdon some time before 1123. He composed a general history of England, from the earliest accounts to the death of Stephen, 1154, in eight books, published by Sir Henry Saville among the 'Scriptores post Bedam,' folio, London, 1596. The exact time of his death is not known.

HENRY, MATTHEW, an eminent nonconformist divine, was born at a farmhouse in Flintshire, October 18, 1662. His father left the Church of England in consequence of his refusal to subscribe to the Act of Uniformity. Matthew Henry received the principal part of his education under Mr. Doolittle of London. In 1685 he commenced the study of the law in Gray's Inn; but he soon relinquished this profession, and, after being ordained in 1687, settled at Chester as minister of a dissenting congregation. In 1712 he left Chester, and became the minister of another congregation at Hackney. He died on the 22nd of June, 1714.

The work by which Matthew Henry is principally known is his 'Exposition of the Old and New Testament,' which originally appeared in 5 vols. folio, but which he did not live to complete. He was also the author of many other works; of which the principal are, 'Inquiry into the Nature of Schism;' 'Life of Philip Henry;' 'Scripture Catechism;' 'Communicant's Companion;' 'Discourses against Vice and Profaneness;' 'Method of Prayer;' and numerous sermons on separate subjects.

HENRY, ROBERT, D.D., was the son of a farmer in the parish of St. Ninians, Stirlingshire, where he was born in 1718. Having completed his education at the University of Edinburgh, he was licensed as a preacher in 1746, being then master of the burgh or grammar-school of Annan, in Dumfriesshire. In 1748 he was elected minister of a Presbyterian congregation at Carlisle, with which he remained till August, 1760, when he removed to a similar situation in the town of Berwick-upon-Tweed. In 1768 Mr. Henry removed to Edinburgh. His first appointment was as minister of the church of the New Grey Friars, which he retained till 1776, and then exchanged for the easier charge of one of the ministers of the Old Church, in which he continued till his death. His access to the libraries at Edinburgh encouraged him to proceed with a design which he had long entertained, of a 'History of England on a New Plan.' The first volume, in 4to., appeared in 1771, the second in 1774, the third in 1777, the fourth in 1781, and the fifth, bringing down the narrative to the accession of Henry VII., in 1785. The author, upon whom the degree of D.D. had been conferred by the University of Edinburgh in 1770, died in 1790; but before his death he had completed the greater part of another volume of the history, extending to the accession of Edward VI., which was published in 1793.

HENRY, WILLIAM, was the son of Mr. Thomas Henry, of Manchester, a zealous cultivator of chemical science. Dr. Henry was born on the 12th of December, 1775. His earliest instructor was the Rev. Ralph Harrison. After studying at Edinburgh

and elsewhere, he received the diploma of Doctor in Medicine in 1807. He subsequently and successfully practised as a physician in Manchester, but he was compelled to retire from it on account of the state of his health.

Though pursuing the engrossing occupations of his profession, he both zealously and successfully attended to the science of chemistry, and contributed a great number of important papers to the Royal Society, the Philosophical Society of Manchester, and to various philosophical journals. He died on the 2nd of September, 1836, in his sixty-first year.

HENRYSON, ROBERT, a Scottish poet of much merit, lived in the latter part of the fifteenth century. Of his life hardly anything is known. His tale of 'Orpheus Kyng,' was printed at Edinburgh in 1508; and in 1593 there was printed his 'Testament of Faire Creseide,' 'Robin and Makyne' is known to most readers from Percy's 'Reliques.' Other specimens of Henryson's poems are in Sibbald's 'Chronicle of Scottish Poetry,' in Dr. Irving's 'Lives of the Scottish Poets,' and in Ellis' 'Specimens.' The fullest collections of them, however, are in Lord Hailes' 'Ancient Scottish Poems,' 1770, and in a volume containing his thirteen poems, called 'Fables,' edited by Dr. Irving in 1832, for the Bannatyne Club.

HENSLOVIA/CEÆ, a very small natural order of Exogens, according to Lindley nearly related to *Hydrangeaceæ*. *Henslovnia* consists of three or four species inhabiting the tropical parts of India.

HEONG-SHAN, a district town in the province of Quan-tung, China, on a branch of the Canton river, 22 miles N.W. of Macao, and first visited by the British war steamer *Nemesis*, on an exploring voyage in 1841. The district of the same name extends 30 miles from north to south, and 25 from east to west, intersected by several deep watercourses.

HEPATIC (Gr. *hepar*, 'the liver'), a term of very general use in anatomy and medicine, as applied to the liver, and its various functions and affections; as the *hepatic duct*, and the *hepatic artery*, situated between the lobes of the liver; *hepatic vein*, the hepatic vessels; *hepatic glands*, which receive the vein within the liver; *hepatic plexus*, a kind of convoluta connected with the vena portæ and the Hepatic vessels; *hepatic glands*, which receive the absorbents of the liver. The *hepatic flux* is an overabundant discharge of bilious secretion. The term is also frequently applied to mineralogical objects, from their resemblance to the dark blood-red colour of the liver; as *hepatic pyrites*, or *hepatic sulphuret of iron*, a variety of prismatic iron pyrites, which, on exposure to the weather, receives a brown tarnish, and through oxidation becomes finally decomposed. *Hepatic cinnabar* is a dark-coloured variety of cinnabar, and the *Mercure Sulphur of Hany*.

HEPATICE, a name formerly applied to a class of cryptogamic plants, part of which are popularly called Liverworts. It is now subdivided into several natural orders. [JUNGERMANNIACEÆ; MARCHANTIACEÆ.]

HEPATITIS. [LIVER, DISEASES OF.]

HEPATUS, Latreille's name for a genus of brachyurous crustaceans (Crabs), placed by Milne-Edwards under the tribe of *Calappians*, and, as that writer thinks, forming a link between the *Calappians*

(which they resemble in the disposition of their chelæ), and the *Cancerians* (which they approach in general form), as well as the *Leucosians* (from which they differ little as regards the details of the mouth).

The only species known, viz., *Hepatus fuscatus*, and *Hepatus Chiliensis*, are inhabitants of the coasts of America; the first having been found in the north, and at the Antilles, the second on the coast of Valparaiso. (M. Edwards.)

HEPHESTION. [ALEXANDER III., the Great.]

HEPHESTION, a grammarian of Alexandria, lived about the middle of the second century of the Christian era. He wrote a treatise on Greek metres (*Εὑχρησίδιον περὶ Μέτρων*), the best edition of which is by Gaisford, 8vo., Oxford, 1810.

HEPIALIDÆ, a family of lepidopterous insects of the section *Lepidoptera nocturna* of Latreille. The moths belonging to this family are distinguished by the want of tongue, the wings being deflexed, long and narrow, and the thorax devoid of crest. Their larvæ live in the interior of vegetables, on which they feed, or in some instances they live in the ground, and feed upon the roots of plants; they are fleshy, naked, and have six thoracic, eight abdominal, and two anal feet. The pupæ have the segments of the body denticulated. The principal genera contained in this family are *Hepialus*, *Cossus*, *Stygia*, and *Zeuzera*.

HEPTACHORD (Gr. *hepta* and *chordai*, 'seven chords'), a system of seven musical sounds, which, among the classical ancients, implied two conjunct tetrachords. The interval of the heptachord was equivalent to our seventh. In ancient poetry the word signified certain verses that were sung to the music of seven chords; that is, seven different tones or notes. In this sense the term was generally applied to the lyre, when it had but seven strings.

HEPTAGON, a figure of seven sides.

HEPTARCHY. [ENGLAND.]

HERACLE'UM, a genus of plants belonging to the natural order *Umbelliferae* and the tribe *Peucedaneæ*. *H. sphondylium*, Cow Parsnip, is a native of Europe, and probably of Siberia, and is found plentifully in the meadows and hedges of Great Britain. It affords wholesome and nourishing food for cattle, and is collected in Sussex for fattening hogs; hence it is sometimes called Hog-weed. The seeds of the plant are diuretic and stomachic, and exhale a powerful odour. *H. pubescens* is a native of Taurida in the shady places, and of the Caucasus, in alpine places. The young shoots are filled with a sweet aromatic juice, which is eaten by the natives of the Caucasus in a crude state. *H. Pyrenaicum* is a native of the Eastern and Central Pyrenees, and of Italy.

HERACLI'DÆ, the descendants of Hercules. According to tradition, after the death of Hercules, his children took refuge in Attica, in order to escape the persecution of Eurystheus, and they were hospitably received by Theseus. With the assistance of the Athenians, they defeated Eurystheus, and after the battle they are said to have obtained possession of the whole of Peloponnesus; but they had not remained in the country long before a pestilence again drove them back to Attica. They attempted soon afterwards to march again

into Peloponnesus, but were met at the Isthmus by an army consisting of Arcadians, Ionians, and Achæans. In a single battle with Echemus, king of Tegea, Hyllus, the eldest son of Hercules, was slain, and the Heraclidæ promised not to invade Peloponnesus for a hundred years. They did not, however, observe their engagement, for both Cleodæus, son of Hyllus, and his grandson Aristomachus, renewed the attempt, but without success. The Heraclidæ retreated to Doris, where they obtained a considerable army to assist them in the recovery of their dominions. With the aid of an Ætolian chief named Oxyllus, they crossed from Naupactus to the southern side of the Corinthian Gulf eighty years after the Trojan War. (Thucyd. i., 12.) A battle took place between the Dorians under the command of the sons of Aristomachus and the Peloponnesians under that of Tisamenus, the grandson of Agamemnon, in which the latter were defeated, and all Peloponnesus, except Arcadia and Achæa, fell into the hands of the Heraclidæ. Elis was assigned to Oxyllus, and the rest of the Peloponnesus was divided among the three sons of Aristomachus; Temenus obtained possession of Argos, Cresphontes of Messenia, and Aristodemus, or his sons Eurysthenes and Procles (for according to the general tradition Aristodemus did not live to enter Peloponnesus) of Lacedæmon. The land of the conquered country was divided among the Dorians, and the old inhabitants were obliged to emigrate, or were reduced to an inferior caste.

Such is the traditional account of that important event in Grecian history, usually called 'the return of the Heraclidæ,' by which the Dorians obtained possession of the greater part of the Peloponnesus. Though the general tradition assigned the complete conquest of Peloponnesus to the sons of Aristomachus, it appears probable from other traditions that the greater part of the Peloponnesus was not reduced by the Dorians till long afterwards. (Thirlwall's 'Hist. of Greece,' vol. i., pp. 262-273.)

HERACLITUS of Ephesus, surnamed the Naturalist, belongs to the dynamical school of the Ionian philosophy. He is said to have been born about B.C. 500, and he died in the sixtieth year of his age. The title he assumed of 'self-taught' refutes the claims of the various masters whom he is said to have had, and the distinguished position that he held in political life attests the wealth and lustre of his descent. The gloomy haughtiness and melancholy of his temperament led him to despise all human pursuits, and he expressed unqualified contempt as well for the political sagacity of his fellow-citizens as for the speculations of all other philosophers, as having mere learning and not wisdom for their object. Of his work 'On Nature' (*περὶ φύσεως*), the difficulty of which obtained for him the surname of 'the Obscure,' many fragments are extant, and exhibit a broken and concise style, hinting rather than explaining his opinions.

According to Heraclitus, the end of wisdom is to discover the ground and principle of all things. He maintains that the rational principle which governs the whole moral and physical world is also the law of the individual; whatever therefore is, is the wisest and the best; and 'it is not for man's welfare that his wishes should be fulfilled; sickness

makes health pleasant, as hunger does food, and labour rest.'

The physical doctrines of Heraclitus formed no inconsiderable portion of the eclectic system of the later Stoics, and in times still more recent there is much in the theories of Schelling and Hegel that presents a striking though general resemblance thereto.

The fragments of Heraclitus have been collected from Plutarch, Stobæus, Clemens of Alexandria, and Sextus Empiricus, and explained by Schleiermacher in Wolf and Buttmann's 'Museum der Altherthumswissenschaft,' vol. i. See also Brandis' 'Handbuch der Geschichte der Griechisch-Röm. Philos.,' Berlin, and Ritter's 'History of Ancient Philosophy,' Oxford.

HERACLIUS, the son of the patrician Heraclius who was governor of Africa under the Emperor Phocas, assisted in dethroning the latter in 610, and was proclaimed emperor in his place. He applied himself to reform the discipline of the army; he renewed the truce with the Longobards of Italy, and turned his arms against the Avari, who had invaded Thrace, and had advanced to the gates of Constantinople. Those barbarians soon after retired across the Danube loaded with their spoils. The Persians meantime invaded Syria, devastated Jerusalem, and made an irruption into Egypt, in consequence of which the large supplies of corn which that country used to send to Constantinople were stopped, and the capital was afflicted by a severe famine. Another Persian army had advanced through Asia Minor to Chalcedon, but Heraclius induced the commander to withdraw, and sent ambassadors to treat of peace with Khosru, the Persian king, who spurned his offers, and summoned Heraclius and his subjects to abjure Christ and pay worship to the sun. Heraclius, roused by this insult, collected an army, and marched against the Persians, whom he defeated in a succession of brilliant campaigns, and pursued them as far as the Tigris, in 622-27. The first year of the expedition of Heraclius against the Persians was the same in which Mohammed openly assumed the character of prophet and legislator, after his flight to Medina. Khosru was at last dethroned by his son Siroes, who concluded peace with Heraclius. The latter years of the reign of this emperor were passed amidst theological controversies. Heraclius supported the doctrine of the Monothelites, who taught that the human nature in Jesus Christ was entirely passive under the will of his divine nature. Pope John IV. assembled a council at Rome in 640, which condemned the Monothelites. Meantime the Arabians, after the death of Mohammed, and under the caliphate of Abu Bekr, invaded Syria, Palestine, and Mesopotamia, and under the following caliphate of Omar they conquered Egypt and Cyrenæa. Heraclius was unable to oppose the torrent of Arabian courage and fanaticism; he sunk into inactivity and sloth, and died of dropsy in February 641, after a reign of thirty years. From that epoch the decided though gradual decline of the Eastern empire may be dated. Heraclius was succeeded by Heraclius Constantine, his son by his first wife Eudocia, who in the fourth month of his reign was poisoned by his step-mother Martina, who had her own son Heraclionas proclaimed in his stead. An

insurrection, however, soon after broke out at Constantinople against the new emperor, who was mutilated and banished together with his mother; and Constans II., son of Heraclius Constantine, was raised to the imperial throne. (Theophanes and other Byzantine historians; Gibbon.)

HERALD, an officer whose duty, during the middle ages, was to carry challenges or peaceful messages from one prince or nobleman to another, to proclaim peace or war, to lay out the lists in jousts or tournaments, to be the witness of all combats, and to record in writing the names of those who behaved most valiantly, to number the dead after battle, and specially to supervise all matters connected with the bearing of coat-armour, the marshalling of processions, and other state ceremonies. His functions were something like those of the Greek *kerux* (κέρυξ), and the Roman *Fecialis*; but the origin of the name is much disputed, and the actual date of the institution uncertain. The earliest mention of a herald in England is in the reign of Edward III.; but there is little doubt that the office existed as early at least as the dawn of hereditary coat-armour. There are three orders or grades of heralds, namely, kings of or at arms, heralds, and pursuivants. They were anciently created with much ceremony, but are now appointed by the earl marshal in England, and by the Lyon king-of-arms in Scotland.

The present number in England is thirteen. Three kings-of-arms—Garter, Clarencieux, and Norroy; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants—Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Scotland there is one king-at-arms, named Lyon; six heralds—Snowdown, Albany, Ross, Rothesay, Marchmont, and Hay; and five pursuivants—Uncorn, Carrick, Kintyre, Ormond, and Bute. Ireland has one king-at-arms, Ulster; two heralds, Cork and Dublin; and two pursuivants, Athlone and St. Patrick. To these regular officers are sometimes added, by command of the king to the earl marshal, a herald or pursuivant extraordinary.

HERALD'S COLLEGE, or COLLEGE OF ARMS, a corporation founded by Richard III., in the first year of his reign, by a charter dated the 2nd of March, 1483, in which he gives to the principal officers of the corporation a house called Colde Arbor, in the parish of All Hallows the Less, London. In the first year of the reign of Henry VII. this house was seized into the king's hands under the Act of Resumption as the personal property of John Writhe, then garter king-at-arms. During the reign of that king and of his successor Henry VIII. the heralds made several unsuccessful attempts by petition to obtain a restoration of it, or the grant of some other building for their general use. King Edward VI., in the third year of his reign, by a charter dated June 4th, confirmed to them all their ancient privileges; and Philip and Mary, by charter of the 18th of July, 1554, re-incorporated them, and granted to them Derby House, then occupying the site of the present college on St. Benet's Hill, near St. Paul's Churchyard. The old building was destroyed in the great fire of London, but all the books, papers, &c., were saved, and removed to the palace in Westminster, where the heralds held their chapters, &c.,

until the college was rebuilt. The corporation consists of the heraldic officers of England under the presidency of the earl marshal, an office now hereditary in the family of Howard, duke of Norfolk. [HERALD.] There is a heralds' college in Scotland, termed the Lyon Court.

HERALDRY, the art of arranging and explaining in proper terms all that appertains to the bearing of coats of arms, badges, and other hereditary or assumed marks of honour; also the art of marshalling processions and conducting the ceremonies of coronations, instalments, creations of peers, funerals, marriages, and all other public solemnities.

The origin of heraldry, in the first and most commonly understood sense, has been attributed, by the general consent of the best writers on the subject, to the necessity for distinguishing by some outward sign, amidst the confusion of battle, the principal leaders during the expedition for the recovery of the Holy Land. But nothing is absolutely known concerning it beyond the fact that the middle of the twelfth century is the earliest period to which the bearing of heraldic devices properly so called can be traced; and the commencement of the thirteenth, the time about which they became hereditary.

The earliest roll of arms of which we have any notice is of the reign of Henry III.; and the reign of Edward I. presents us with the earliest heraldic document extant. The famous roll of Caerlaverock, a poem in old Norman French, rehearses the names and armorial ensigns of all the barons, knights, &c., who attended Edward I. at the siege of Caerlaverock Castle in 1300. Heraldry is therein first presented to us as a system. The principal rules and terms of the art were then in existence, and from about that time the terms are continually found in the fabliaux and romances of France and England.

The oldest writer on heraldry whose work has descended to us is Nicholas Upton, whose treatise 'De Militari Officio' was composed in the reign of Henry V., and translated in that of his successor by Juliana Berners, in the work known as the 'Boke of St. Albans.' As Upton quotes no earlier authorities, his definitions and explanations can only be looked upon as assertions made nearly 300 years after the origin of the practice, and consequently to be believed, or not, according to the discretion of the reader. In the reign of Richard III. the English heralds were incorporated and the college of arms founded, and in the following century a swarm of writers arose, both in France and England, each contradicting the other, and wasting much learning and research in the most absurd and idle controversies.

On the decline of chivalry the study of heraldry became gradually neglected, and the art which had formed for centuries a portion of the education of princes, and occupied the attention of some of the most learned men in Europe, was abandoned to the coach-painter and the undertaker, while kings-of-arms and pursuivants were looked upon as mere appendages of state pageantry, their office ridiculed, and their authority defied.

That the pedantry of such writers as Morgan, Ferne, Mackenzie, and others, contributed to these results, there can be little doubt. A taste for the critical study of antiquities generally is now, however, reviving throughout Europe, and the use of

heraldry as a key to history and biography is daily becoming more acknowledged.

The rules of heraldry as now practised at the college of arms are, as we have before remarked, comparatively modern, and vary in some points from those observed in France and Germany.

According to the received authorities there are ten classes of arms.

1. Arms of *Dominion*, being those which princes bear as annexed to the territories they govern.

2. Of *Pretension*, those borne by princes who are not in possession of the dominions to which such arms belong, but who claim or pretend to have a right to such possession; as, for instance, the kings of England from Edward III. to George III. quartered the arms of France.

3. Arms of *Community*, being those of bishops, cities, universities, and other bodies corporate.

4. Of *Assumption*, such as are assumed by a man of his proper right without the grant of his prince, or of a king-at-arms: as, for instance, when a man of any degree whatsoever has taken prisoner, in lawful war, any gentleman, nobleman, or prince, he may bear the arms of that prisoner, and transmit them to his heirs for ever.

5. Arms of *Patronage*, such as governors of provinces, lords of manors, patrons of benefices, &c., add to their family arms, as a token of their superiority, rights, and jurisdiction.

6. Arms of *Succession*, borne by those who inherit certain estates, manors, &c., either by will, entail, or donation.

7. Arms of *Alliance*, such as the issue of heiresses take up to show their maternal descent.

8. Arms of *Adoption*, borne by a stranger in blood, with the special permission of the prince, applied for in order to fulfil the will of the testator who may bequeath certain moneys or estates on condition of the party's assuming his name and arms.

9. Arms of *Concession*, augmentations granted by the prince of part of his own ensigns or regalia to such persons as he pleases to honour therewith.

10. Arms *Paternal* and *Hereditary*, such as are transmitted from the first possessor to his son, grandson, great-grandson, &c.; thereby forming complete and perfect nobility. The son being a gentleman of second coat-armour, the grandson a gentleman of blood, and the great-grandson a gentleman of ancestry.

These several sorts of arms are displayed on shields or escutcheons, and on banners, the ground of either being called the field, and the figures borne upon it the ordinaries and charges.

The reader will find this subject very fully illustrated in the plates HERALDRY, 1-7.

HERAT. [AFGHANISTAN; PERSIA.]

HE'RAULT, a maritime department in the south of France, formed out of a portion of Bas-Languedoc, is bounded N. by the departments of Aveyron and Gard, E. by that of Gard, S. by the Gulf of Lyon and the department of Aude, and W. by the departments of Aude and Tarn. Its greatest length from E. to W. is 84 miles, from N. to S. 49 miles. The area is 2393 square miles, and the population at the last census was 409,391.

The department is traversed in the north and north-west by the lower CE'VENNES, which attain

the height of 4198 feet in the Espinouse range on the confines of Tarn, and of 4264 feet in the chain of Larzac, or Larjac, extending N. of Lodève into the department of AVEYRON. From the main chain several ranges of hills of moderate elevation branch off towards the south, gradually subsiding as they approach the sea. The cultivable soil of the north and north-west consists of a chulky clay which produces only rye. The higher mountains are in general barren, or covered with woods. The plains in the interior, some of which are of large extent, consist of a light gravelly soil, very favourable to the growth of the vine and the olive. Along the lower courses of the Orb, the Hérault, and the Vidourle, and generally in the south of the department, the soil is strong, deep, rich, and very productive in all the cereal grains. Here and there, all through the department, there are extensive wastes, locally called *garrigues*, thinly covered with shrubs, dwarf oak, heath, broom, cistus, and aromatic plants, and producing tolerable pasture. The department presents abundant evidence of volcanic action at some distant period, particularly in the extinct craters of Agde and of St. Thibéry, near Pézenas, and in the basaltic hills near Montpellier.

The coast line, extending from the mouth of the Aude to that of the Vidourle, measures 66 miles in length. The salt lagunes of Thau, Maguelonne (so called from the ancient city of Maguelonne, which stood on the peninsula of Maguelonne, and of which there remains a very interesting church), Pérols, and Mauguio extend eastward from Agde to the Vidourle; they are separated from the Mediterranean by a narrow bank, in which, however, there are a few openings, called *graus*. The Canal des Etangs, which joins the Canal du Midi at Cette, passes through these lagunes. In the west of the department are the lagunes of Vendres and Capestang: the latter is land-locked and stagnant. The neighbourhood of all these lagunes is marshy and unhealthy; agues and rheumatic fevers prevail in the summer and autumn, though to a less extent than formerly, owing to the partial drainage and cultivation of the marshes. Except in the vicinity of the lagunes, the department enjoys a pure air and a most healthy climate.

The rivers of the department all rise in the Cévennes, and flow directly into the Mediterranean or into the lagunes. The principal are: the *Vidourle*, on the confines of GARD; the *Lez*, which passes E. of Montpellier, and becoming navigable takes the name of Canal de Grave: the *Hérault*, which gives name to the department; rising in the north-west of Gard, and running south, it enters the department of Hérault at Ganges; here, having received the Ergue on the right bank, it passes Montagnac and Pézenas, and enters the sea through the port of Agde after a course of eighty miles, only seven of which are navigable: the *Orb*, which, springing from the mountains W. of Lodève, and flowing first S., then W. till it meets the Jaur at Olargues, and finally S.S.E., passes Béziers, having previously received the Bernasobre from the west, and enters the sea near St. Geniès; and the *AUDE*, which touches the western boundary. Near the coast, most of the towns are joined to the Canals du Midi and des Etangs by short canals, thus establishing a

communication with Beaucaire and the towns on the Rhone [GARD] and the Garonne, and with the Gulf of Gascogne.

The department is crossed by the high road from Paris to Spain, through Perpignan, by five other royal and seventeen departmental roads. Montpellier, the capital, communicates with Cette and Nîmes by railroad. [GARD; CETTE.]

About a fourth of the entire area consists of arable land, and about a sixth is under vineyards. Wheat, rye, barley, and oats are produced in quantity more than sufficient for the consumption. There is a considerable breadth of artificial meadows; and large crops of lucerne, sainfoin, and clover are grown. For the quantity of wine produced, Hérault stands at the head of the wine-growing departments of France, the average annual produce being nearly 50,000,000 gallons. The red wines of St. Georges, St. Christol, and St. Drézéry, the muscatel wines of Frontignan, Lunel, and Béziers, and the white wines of Marseillan and Pinet, are considered the best. Fruits, especially raisins, olives, almonds, figs, and chestnuts, and all kinds of pulse, are grown. The mulberry is cultivated for the production of silk; aromatic and medicinal herbs, and plants used for dye-stuffs, are gathered. The principal material of the woods are the chestnut and green and white oak. Sheep, cattle, and mules are numerous; game is very abundant; and fish, including the john dory, tunny, oyster, lobster, anchovy, mackerel, eel, &c., are taken in immense quantities in the lagunes and in the sea.

The industrial products comprise woollen cloths for the army, and for exportation to Spain and Italy, silks, hosiery, calico, muslin, flannel, blankets, brandy, chemical products, pottery, tiles, honey, perfumes, leather, oil, beer, paper, &c. There are also numerous dye-houses, and establishments for the rearing of silkworms. Shipbuilding is carried on at Cette and other towns on the coast. Mines of coal, iron, lead, and copper, quarries of marble, building and mill stone, slate, gypsum, and granite are worked. A great quantity of salt is made by evaporation on the lagunes and on the shore of the Mediterranean, this department being one of the chief sources for the supply of that article to France. There are several mineral springs. The exports consist of most of the articles enumerated, but chiefly of wine, dry fruits, and brandy. The imports are wool, cotton bales, staves, colonial produce, raw hides, cork, &c. The principal sea-ports are CETTE and Agde. About 100 fairs are held annually.

The department is divided into four arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Montpellier, .	14	114	162,151
Béziers, . .	12	99	142,287
Lodève, . .	5	73	57,691
St. Pons, . .	5	45	47,262
Total, . .	36	331	409,391

Of the arrondissement of Montpellier, and of the whole department, MONTPELLIER is the capital.

Aniane, a pretty little town, 16 miles N.W. from Montpellier, is situated in a rich plain on the left bank of the Hérault, and has 3557 inhabitants who manufacture cream of tartar, verdigris, black soap, chemical products, cotton yarn, leather, and lime. This town owes its origin to the abbey built here by St. Benedict in the ninth century; the abbey (now the parish) church is an elegant structure; the abbey buildings are turned into a cotton factory. *Cette*. *Frontignan*, a small town with 2574 inhabitants, situated on the lagune of Maguelonne, and on the Montpellier and Cette Railroad, is famous for the excellent muscatel wines and raisins produced in its neighbourhood. Near Frontignan is *Balaruc*, famous for its warm springs, which have enjoyed a long celebrity for the cure of paralytic and scrofulous affections. The bathing establishments, furnished hotels for the accommodation of visitors, and a general hospital for poor patients, forming a pretty village, stand on the northern shore of the lagune of Thau. There are two seasons, May and June, September and October. The resident population is given at 690. *Ganges*, 25 miles N. from Montpellier, is prettily situated in a fertile plain closed in by high hills, and on the left bank of the Hérault. It is surrounded by pretty country houses, and commanded by an old castle. The population amounts to 4470, and the chief manufactures are silk and cotton yarn, silk stockings, silk gloves, and leather, with a trade in wine. Near the town there is a very extensive grotto, which is said to surpass in beauty the famous grotto of Antiparos. A great deal of raw silk is produced in the canton of Ganges. *Lunel-la-ville*, 14 miles E. from Montpellier, and on the railroad from that city to Nîmes, stands near the right bank of the Vidourle, in a district famous for its sweet wines, and has 6737 inhabitants. The most attractive objects in the town are the barracks, a fountain in form of an obelisk, and the public promenade. It has communication by the Lunel Canal, which terminates in the lagune of Mauguio, with the Rhone, the Mediterranean, and the Canal du Midi. There are several brandy, spirit, and liqueur distilleries; and the trade in corn, flour, wool, wine, raisins, manufactured goods, and colonial produce is considerable. *Massillargues*, or *Marsillargues*, 15 miles E.N.E. from Montpellier, on the Vidourle, is situated in a very fertile district; it has a fine old castle, and 3446 inhabitants. *St. Martin de Londres*, 17 miles N.N.W. from Montpellier, is a small place of only 1047 inhabitants, but interesting for the remains of its feudal fortifications, and for the old castle of La Roquette, which stands on an eminence near the Pic St. Loup, a volcanic mountain nearly 2000 feet high. Silk hosiery and charcoal are manufactured here. *Mauguio*, 6 miles from Montpellier, stands on the lagune of Mauguio, has some brandy distilleries, and 2550 inhabitants. In the middle of the town there is a hill, surmounted by a windmill, from which Aigues-Mortes and Cette, on the coast of the Mediterranean, and to the northward the Cévennes, are visible. There is a station of the Nîmes railway at Mauguio. *Mèze*, 19 miles S. from Montpellier, stands in a productive vine district on the lagune of Thau, where it has a good harbour for small craft under 60 tons burden. It is a pretty town with 6106 inhabitants, who manufac-

ture liqueurs, brandy, and salt, and trade in these articles, and in wine, corn, &c. The ancient abbey of Vallemagne, the church and cloisters of which are still entire, stands near Mèze, and forms one of the finest Gothic structures of the kind in France.

In the arrondissement of Béziers, the chief town, *Béziers*, stands on a hill above the Orb and the Canal du Midi, in $43^{\circ} 20' \text{ N. lat.}, 3^{\circ} 12' \text{ E. long.}$, 38 miles S.W. from Montpellier, and has 24,270 inhabitants. The streets are narrow and ill-laid out, but the houses are in general well built of stone. It contains several buildings interesting for their architecture or their antiquity; the principal are the cathedral of St. Nazaire; the churches of St. Aphrodise and La Madeleine; the former episcopal palace which now serves for the residence of the sub-prefect, and for courts of justice; the public library; the house of Pierre Paul Riquet, the engineer of the Canal du Midi; the market-house; and the barracks. The town has a tribunal of commerce and a college. The manufactures consist of woollen cloth, silk, hosiery, dimity gloves, parchment, verdigris, confectionery, brandy, spirits, liqueurs, chemical products, thrown silk, soap, leather, paper, glass, &c.; the commerce of the town consists of these articles and of corn, wool, iron, wine, oil, fruits, &c. A steam engine raises the waters of the Orb to a considerable height into a reservoir on the terrace, near the cathedral, whence the different quarters of the town are supplied. The Canal du Midi is carried through nine locks close to the town. The town of Béziers is ancient; it contains a few Roman remains, and is noted for the massacre of the Albigenes, July 22, 1209. *Agde*, a seaport and fortress at the embouchure of one of the branches of the Canal du Midi, and on the left bank of the Hérault, which is crossed by a suspension bridge, has a remarkably beautiful Gothic church, an exchange, a harbour for vessels of 200 tons, and 9747 inhabitants. The harbour is formed by the channel of the Hérault, which has a depth of sixteen feet, and is lined with quays formed of lava all the way to the sea. The fortifications, public buildings, and the houses are constructed of black basalt, and the streets are paved with volcanic products got from the Mont St. Loup. The town stands about two miles from the Mediterranean; it has an active coasting trade and fishery, a lighthouse of the first class, a school of navigation, and slips for building trading-vessels. Soap, verdigris, and brandy are the chief manufactures; the commerce is composed of these articles, and of wine, oil, fish, timber, iron, cordage, pitch and tar, corn and flour. About 120 vessels of 100 to 200 tons belong to the town. *Bédarieu*, a well built manufacturing town on the left bank of the Orb, which separates it from one of its suburbs, stands 18 miles N. from Béziers, and has 9087 inhabitants. Fine and coarse woollens, cotton and woollen hosiery, silks, hats, soap, olive oil, leather, and paper are manufactured. There are also dye-houses, glass works, and a copper foundry. The trade in wine and in the articles just named is extensive and important. *Capestang*, which gives name to the lagune of Capeatang, stands on the Canal du Midi, and has 2746 inhabitants. There are manufactures of cream of tartar and of brandy in the town. *Florensac*, situated near the left bank of the

Hérault, in a rich district of vine and meadow land, has a population of 3756. *St. Gervais*, a small town of 2256 inhabitants, is situated in a well-watered valley shut in between four hills, 22 miles N. from Béziers. There are excellent coal mines near the town, and also marble quarries and limekilns. *Montagnac*, the birthplace of Latude, celebrated for his long captivity in the Bastille, stands on the left bank of the Hérault, and has brandy distilleries, some unimportant manufactures, and 3719 inhabitants. *Murviel*, on a hill above the Orb, eight miles from Béziers, has a population of 1712. *Pézenas*, an ancient town, situated near the left bank of the Hérault, at its junction with the Peine, has an exchange, a college, and 7204 inhabitants. The town is well built, with pretty wide streets and good houses; the parish church and the theatre are the most remarkable buildings. The neighbourhood is remarkably beautiful, and so well cultivated as to have gained the title of the Garden of Hérault. *Pézenas* is celebrated for its salubrity; several craters, now extinct, and masses of basalt, are seen near it. It was in this town that Molière wrote his '*Précieuses Ridicules*.' The manufactures are linen, muslin, calico, woollen stuffs, hats, soap, chemical products, syrup and sugar of grapes, cotton yarn, and raw silk. There are also brandy and spirit distilleries, establishments for washing wool, and a considerable commerce in corn, olive oil, fruits, &c. *Roujan*, a small place in a volcanic district, near the right bank of the Peine, has a population of 1900; near it there are extensive coal mines, and also cold mineral springs. *Servian*, 8 miles N.E. from Béziers, has 2285 inhabitants. There is a castle here, the construction of which dates from the eleventh century.

In the arrondissement of Lodève, the chief town, *Lodève*, situated in a valley at the foot of the Cévennes, on the left bank of the Ergue, which here receives the Salondres, is 32 miles N.W. from Montpellier, and contains 11,864 inhabitants. It is the seat of tribunals of first instance and of commerce, and has also a chamber of commerce, a college, and a council of prud'hommes. The town is surrounded by strong walls, but the interior is badly built and ill laid out. The approaches to it are by avenues of fine trees. The air is pure, and the environs delightful; the hills around it are cultivated to their very summits, and plantations of the vine, the olive, and the mulberry everywhere meet the view. The most remarkable building in Lodève is the former cathedral church of St. Etienne, which contains a beautiful mausoleum in white marble of one of the bishops of Lodève. The town is the centre of a great cloth manufacture, and is celebrated for its piece-dyed goods, which are exported to the Levant. Soldiers' uniforms and other woollen stuffs, soap, leather, &c., are also made. Lodève is noted as being the birthplace of the celebrated Cardinal Fleury. *Clermont-Lodève*, 10 miles S. from Lodève, stands on the slope of a hill above the little river Ydromiel, and contains 6405 inhabitants. A college, a tribunal of commerce, a council of prud'hommes, and a savings' bank, are the principal institutions of the town. The most remarkable building is a handsome Gothic church with three naves, a very lofty tower, and, over the principal entrance, a rose

window of noble dimensions. Besides a good trade in rural products, the principal manufacture is piece-dyed cloth; but woollen and cotton hosiery, handkerchiefs, cotton yarn, leather, brandy, and chemical products are also manufactured. *Gignac*, near the left bank of the Hérault, is situated 12 miles S.E. from Lodève, in a country covered with vineyards, olive grounds, and mulberry plantations, and has 2778 inhabitants, who manufacture verdigris, olive oil, sugar, brandy, and woollen yarn, and trade in agricultural produce. *Lumas*, 7 miles from Lodève, has a population of 1407. Its neighbourhood produces famous cheese.

In the arrondissement of St. Pons, the chief town, *St. Pons*, stands on the Jaur, a feeder of the Orb, 56 miles W. from Montpellier, and has 6497 inhabitants. It is a well built town; most of the houses are constructed of marble from the neighbouring quarries. The church of St. Pons, which is classed as an historical monument, is one of the most interesting in the department. Within the town the Jaur receives the waters of a very abundant spring, which forms a vast basin of considerable depth; in front of this there are two immense elms, on the right a church built in the time of Charlemagne and well preserved, and on the left a Gothic tower. The town has a tribunal of first instance, a college, and an ecclesiastical school: the waters of the Jaur drive the machinery of several corn and fulling mills, saw-works, dye-houses, &c. There are important manufactures of woollen cloth in this town; hosiery, woollen yarn, and leather are also made; and there is a good trade in corn, cattle, and marble. *St. Chinian*, important for the manufacture of piece-dyed woollen goods, brandy, and leather, stands in a rich valley watered by the Bernasobre, 12 miles S.E. from St. Pons, and has 4339 inhabitants. *Olargues*, 11 miles N.E. from St. Pons, on the Jaur, a feeder of the Orb, has a population of 1017. *Olonzac*, 16 miles from St. Pons, near the Canal du Midi, has 1763 inhabitants. *La Salvetat*, 8 miles N.N.W. from St. Pons, is situated among high mountains, near the right bank of the Agout, a feeder of the Tarn, and has a population of 3777, who manufacture flannel, woollen cloth, woollen yarn, and swanskin, and trade in wool, cattle, and the excellent butter of the neighbourhood, which is considered the best in all Languedoc.

The department forms the see of the bishop of Montpellier, is included in the jurisdiction of the Cour Royale and University Academy of Montpellier, and belongs to the 10th Military Division, of which Montpellier is head-quarters. It returns three deputies to the Corps Legislatif.

(*Dictionnaire de la France; Annuaire pour l'An 1866; Statistique de la France.*)

HERBACEOUS PLANTS, or HERBS, are those plants the stalks of which are soft, and have nothing woody in them. Some of them have a root of hard wood. *Sweet herbs* are those used for flavouring, as mint; *pot-herbs* are valued for their nutritive qualities.

HERBARIUM, a collection of dried plants. When the plants have been brought home, all their parts should be spread out, freed from folding and overlapping, put between folds of cartridge paper, and gently pressed. Having remained under pressure for a night, they should be turned, put on fresh

paper, and thoroughly pressed. They are then to be fixed permanently to paper by a little gum, gently pressed after the gum is dried, named according to their natural orders, genera, and species, with the localities in which they had been gathered, and placed in the cabinet. Much care should be exercised in the process of pressing and drying. It is also important to secure the roots of manageable herbaceous plants, and to mark the season at which they were gathered.

HERBERT, JOHANN FRIEDRICH, was born in 1776 at Oldenburg, where his father at the time held an office connected with the administration of justice. Receiving his religious instruction from a man well acquainted with the philosophical systems of Leibnitz and Kant, Herbart, at the age of about twelve, was led to speculate upon such subjects as God, freedom, and immortality. In his eighteenth year he went to the University of Jena, where he studied under Fichte, and formed an intimate acquaintance with him, and he entertained the highest opinion of his master until Schelling's work, 'Vom Ich' (Of the I), fell into his hands, which was admired by Fichte, while Herbart opposed its tendency with the greatest zeal. This caused a breach between Fichte and Herbart, who gladly accepted the office of private tutor which was offered to him at Berne, in Switzerland. He had already conceived the idea of a system of psychology based upon mathematics, and the more clearly Fichte explained his views upon psychology in his 'Sittenlehre' (Doctrine of Morals), Leipzig and Jena, 1798, the more Herbart became convinced that the speculations of Fichte must be abandoned if any permanent basis was to be gained for his science. About the same time he devoted himself to the study of ancient philosophy, which led him to form an intimate acquaintance with the systems of Plato and the Eleatics. From 1802 to 1805 he delivered philosophical lectures in the University of Göttingen, where he developed his peculiar method of thinking. His tendency was pre-eminently practical, and it was partly owing to this circumstance, and partly to his personal acquaintance with Pestalozzi, that his first works treated on education. In 1809 he was appointed professor of philosophy at Königsberg, and was at the same time intrusted with the superintendence of the higher educational establishments in the eastern parts of Prussia, in the organization of which he did great service. In 1833 he was invited to the chair of philosophy in the University of Göttingen, where his lectures attracted great attention on account of the clearness and precision with which he explained his views. He remained at Göttingen until his death, which occurred on the 14th of August, 1841.

Herbart is the founder of a particular system of philosophy, which is interesting on account of his peculiar method rather than his originality of thought, for in reality his system is of a syncretic kind, and Fichte's influence upon it cannot be mistaken.

HERBELOT, BARTHELEMI D', was born at Paris, December 14, 1625. He commenced the study of the Oriental languages in early life, and acquired an accurate knowledge of the Arabic, Hebrew, Syriac, Persian, and Turkish languages. He was appointed Oriental secretary and interpreter to the king of

France, and subsequently professor of Syriac on the death of Auvergne. He also received a pension from the king. He died 8th of December, 1695.

The work by which D'Herbelot is known to posterity is entitled 'Bibliothèque Orientale, ou Dictionnaire Universel, contenant généralement tout ce qui regarde la Connoissance des Peuples de l'Orient,' folio, Paris, 1697. He also wrote several other works, which have never been published. Amongst these a Turkish and Persian Dictionary, in three volumes folio.

HERBERT OF CHERBURY, EDWARD, LORD, was born in the year 1581, at Montgomery, in Wales. After going through the usual course of studies at Oxford, Herbert visited London in 1600, and shortly afterwards proceeded to the Continent, where he joined the English auxiliaries in the Netherlands, and was soon distinguished by reckless daring and intrepidity. Having returned to England, he was, upon the accession of James I., created a knight of the Bath, and was distinguished at court by his gallantry and learning. In 1618 Sir Edward was sent ambassador to France: in this situation the bold independence with which he answered a remark of the Comte de Luynes brought upon him the displeasure of the French monarch, at whose request he was recalled. The conduct of Herbert met, however, with the approbation of James, who, upon the death of De Luynes, sent him again to Paris, where he published his first work, entitled 'Tractatus de Veritate, prout distinguitur à Revelatione, à Verisimili, à Possibili, et à Falso,' 4to., Paris, 1624. The year following he returned to England, and was created a baron of the kingdom of Ireland. In 1631 he was elevated to an English peerage, and two years after published an enlarged edition of the 'Tractatus,' of which another appeared in 1645, accompanied with the treatise 'De Religione Gentilium, Errorumque apud eos Causis.' Upon the outbreak of the political troubles under Charles I., Lord Herbert at first took the side of the Parliament, which, however, he subsequently abandoned at a great sacrifice of personal interests and fortune. He died in the year 1648. After his death two posthumous works were published, the 'Expeditio Buckinghami Ducis in Ream Insulam,' and the 'Life and Reign of King Henry VIII.,' with a dedication to the first Charles. It is by the latter work that Lord Herbert is best known to posterity. His Memoirs, which are the earliest instance of autobiography in our language, remained in manuscript until they were printed, in 1764, by Horace Walpole, at Strawberry Hill.

Herbert of Cherbury was the contemporary of Hobbes of Malnesbury, to whose principles of philosophising he was directly opposed, notwithstanding the striking coincidence of many of the results at which they respectively arrived.

HERBERT, GEORGE, born April 3, 1593, was the fifth brother of Lord Herbert of Cherbury. He was educated at Westminster, and elected thence to Trinity College, Cambridge, about the year 1608. In 1615 he became fellow of the college, and in 1619 was elected public orator. He was made prebendary of Leighton Bromswold, or Layton Ecclesia, in 1626. He married in 1630, and in the same year accepted the rectory of Bemerton. He died in 1632. His poetical works are well and

deservedly known. His chief prose work is 'The Priest to the Temple,' a sequel of his work called 'The Temple; Sacred Poems and Private Ejaculations.'

HERBERT, HON. ALGERNON, barrister-at-law, and sixth son of Henry, first earl of Carnarvon, was born in 1792, and educated at Eton. He passed through the university honours at Oxford with distinguished *éclat*; and was called to the bar in 1818. He was a man of extraordinary learning, and may be considered as the first and most original writer of the day in that peculiar line of antiquarian research in which he engaged. His first work was printed anonymously, under the title of 'Nimrod, or a Discourse upon certain Passages of History and Fable.' It was republished in two volumes in 1828; and succeeded by a third and fourth, which contained many erudite articles on a variety of subjects; such as Roma, Antichrist, Apocrypha, Cosmogonia, Paradise, the Deluge, Ammon, Alchymus, &c. Mr. Herbert afterwards published, in two thin quarto volumes (1836 and 1841), a work entitled 'Britannia after the Romans: being an attempt to illustrate the religious and political revolutions of that province in the fifth and succeeding centuries.' This was followed by an Essay on the 'Neo-Druidic Heresy,' 'Nennius, the Irish version of the *Historia Britonum*' (1848); and 'Cyclops Christianos, an Argument to disprove the supposed Antiquity of Stonehenge and other Megalithic Erections in England and Brittany' (1849). He died in 1855.

HERBERT, SIDNEY, *Lord Herbert of Lea*, statesman and minister, son of the eleventh earl of Pembroke, was born at Richmond in 1810. Educated at Harrow and at Oriel College, Oxford, he entered the House of Commons in 1832, in the conservative interest, as member for South Wilts, which he continued to represent until his elevation to the peerage. He was appointed secretary of the Admiralty in Sir Robert Peel's ministry of 1841. In 1845 he became secretary-at-war, and went out of office with his party after the repeal of the corn-laws. On the formation of Lord Aberdeen's coalition ministry he resumed his post of secretary-at-war. He was for a few weeks colonial secretary in the first administration of Lord Palmerston in 1855, and secretary-at-war in his second administration in 1859. His labours both in the House of Commons and in his office had so impaired his health that he was forced to resign his seat; and early in 1861 he was raised to the peerage. The state of his health compelled Lord Herbert to resign office, and proceed to Spa, whence he returned to England, and died at Wilton, near Salisbury, August 2, 1861. To him are due the re-organization of the army medical department and of the militia, the organization of the volunteer force, the efficient fortification of our dockyards, the extension of the Armstrong gun-factory, and great improvements in the sanitary condition and education of the army. He possessed winning and genial manners, and a singular aptitude for business, was a good debater, an eminent philanthropist, and a liberal patron of the arts. He married, in 1846, the daughter of Major-general Ashe & Court, of Armingtoun Hall, Warwickshire, niece of Lord Heytesbury; and his eldest son, born in 1850, is now earl of Pembroke, earl of Montgomery, and Baron Herbert of Shurland, Cardiff, and Lea.

HERCULANEUM, a very ancient Italian city, situated on the coast of Campania, near Naples. In the time of Titus, A.D. 79, it was overwhelmed by that memorable eruption of Vesuvius which also ruined Pompeii. It appears to have been buried under showers of ashes, subsequently overflowed by streams of lava; and is from 70 to 120 feet below the present surface of the ground. It was re-discovered by the sinking of a well in 1713, when several antiquities were found. This led to further investigation; and after several years, in which little was done, the Neapolitan government undertook the work of excavation. The theatre, a chalcidicum, and two temples were the chief buildings explored: the private houses are chiefly small, and of one story, like those of Pompeii. The whole excavation is said to have been about 600 yards long by 300; but it being impossible to remove the incumbent soil, in consequence of its thickness, as fast as one part was thoroughly searched, it was filled up with rubbish from another. The theatre is very large, having eighteen rows of stone seats, and could have accommodated 8000 persons. The chief advantage as yet derived from Herculaneum is the magnificent collection, not only of statues and paintings and vases, but of domestic implements of every use and description, deposited in the Royal Museum at Naples.

Great expectations were raised by the discovery of a large number of manuscripts written on rolls of papyrus. The attempts to decipher them hitherto have had but imperfect success; and those of which the subjects have been ascertained are of little interest. These manuscripts contain the works of Greek philosophers and sophists, and treat of natural and moral philosophy, medicine, criticism, the arts, &c. During the past few years systematic excavations have been made on the portion of Herculaneum which was situated nearest the sea, and which had only been covered by loose ashes. By this means the ancient buildings are seen to great advantage, and new and important discoveries are often made.

HERCULES, the offspring of Zeus by Alcmena, daughter of Electryon, a son of Perseus, and king of Mycenæ. His reputed father was Amphitryon (son of Alceus, another of the children of Persens), who, having accidentally killed his father-in-law Electryon, was compelled to leave Mycenæ and take refuge in Thebes. Here Hercules was born and educated, and here his early feats of strength and valour were done; such as slaying the lion of Cithæron, delivering Thebes from the tribute to Erginus, king of Orchómenos, and taking in marriage the daughter of Creon.

Being fated to serve Eurystheus, king of Mycenæ, he performed what are called his twelve labours, in obedience to the commands of his master. The legends of Hercules perhaps afford a better instance than those of any other hero or god, except Apollo, of the various sources from which mythical accounts spring. Hercules is represented as a half-naked man, with broad shoulders and brawny limbs, resting on a club, and covered round his loins with the skin of the Nemean lion.

HERCULES, one of the old constellations, called *ἑρкулίων* by Aratus, Hyginus, and Ptolemy, and described by the first as, 'a figure like that of a man in sorrow,' while the second offers various fabular significations from the stories of Hercules, Orpheus,

Theseus, Thamyris, Ixion, Prometheus, &c. The club, lion's skin, and character of Hercules are not so old as Aratus, who describes this figure as stretching his hands to different quarters, and makes an allusion to the neighbouring dragon, which shows that he was not painting a hero.

The constellation is situated between Draco, Boötes, Lyra, and Ophiuchus; but as there is no star in it larger than of the third magnitude, there is nothing very remarkable about it. The principal stars α and δ lie between the bright stars in the head of Ophiuchus and in Corona Borealis.

HERCULES-BEETLE (*Dynastes Hercules*), a species of coleopterous insect of the section *Pentamera* and family *Dynastidae*, or Prince-beetles. This species is a native of Brazil, and is from four to six inches long. The head is marked by a horn, or process, of great length in proportion to the body. This proceeds from the upper thorax, and is lined below with a thick, brownish-orange, velvety pile. The female is destitute of this horn.

HERCULES, PILLARS OF. [GIBRALTAR.]

HERDER, JOHANN GOTTFRIED VON, was born in 1744, at Morungen in East Prussia, where his father kept a little girl's school. The only books he was allowed to read were a Bible and Hymn-book, though he secretly turned his attention to other works. He gained the acquaintance of persons who appreciated him, and procured him a place as instructor in the Friedrich's College at Königsberg. With the most indefatigable industry he studied philosophy, natural science, history, and languages, and in 1764 became assistant at the cathedral school at Riga, to which office that also of preacher was attached. Though his sermons were greatly admired, he soon left the situation, as he desired to study the world at large. He accordingly went to France, and was there chosen by the Prince of Holstein-Oldenburg as his travelling companion. He would have gone from France to Italy had he not been arrested by a complaint in his eyes at Strasburg, where he first became acquainted with Göthe. In 1775 he became theological professor at Göttingen. He died in 1803.

The writings of Herder fill about sixty volumes, and are on the greatest variety of subjects. As a theologian he has gained celebrity by his 'Spirit of Hebrew Poetry;' as a philosopher, as the author of the 'Philosophy of the History of Man.' His collection of popular ballads of all nations has a high reputation.

HERDERITE, a right rhombic prismatic crystal, with a conchoidal fracture, a grayish colour, and nearly transparent.

HEREDITAMENT. [DESCENT.]

HEREDITARINESS. A tendency to certain diseases, as gout, consumption, cancer, insanity, &c., is often transmitted from parents to their offspring. Long life, a robust frame, and good health are also inherited by many children from their ancestors. Unusual peculiarities, special marks, and deformities such as moles, harelip, growth of hair in unusual places, more or less toes or fingers than ordinary, and malformations, may generally be traced to hereditary influence. But this tendency is especially distinguishable in insanity, and it is believed that a large proportion of cases may be traced to this cause. It

would seem that an unhealthy organization of the brain, or bodily qualities incompatible with sound mental vigour, are transmitted, and, in consequence, the heirs are not able to withstand the causes of insanity so well as those of a good constitution and sound mental capacity would do. For many years past an ordinary defence of murderers has been that of insanity; and evidence is called to prove that some of the prisoners' ancestors or relatives have been the victims of mental disease.

HEREFORD, an ancient city, and parliamentary and municipal borough, is situated on the left bank of the Wye, 134 miles W.N.W. from London by road, and 144 by the Great Western Railway. The city, as a municipal borough, is divided into three wards, and is governed by six aldermen and eighteen councillors. The parliamentary borough returns two members to the House of Commons. The municipal and parliamentary boundaries are identical. At the census of 1861 the population was 15,585: in 1851 it was 12,108. The number of voters on the register in 1864 was 1080. Two members have been returned to the House of Commons for Hereford since the time of Edward I. The city is a polling place and the chief place of election for the county.

In early times this city was important as a garrison to restrain the Welsh. The castle consisted of two wards of different dimensions, having a keep within the smaller: the Wye formed its defence on the south side; on other points it was defended by moats. In 1652 the parliamentary commissioners returned it as 'ruinous,' and its materials worth no more than 85*l*. The principal events of its history are its pillage by the Welsh in 1055; its capture by King Stephen in 1141; the execution of Owen Tudor in 1461; the surrender of the city, in 1643, to the parliamentary troops headed by Sir William Waller; and the siege of Hereford by the Scotch under Lord Leven. In and adjoining the city there were formerly establishments of gray friars, black friars, and knights-hospitaller of Jerusalem.

Hereford is situated in a broad, fertile, and well-cultivated valley, and at sufficient elevation above the river Wye to be free from fogs and damp. The principal streets are broad and straight, and have all been macadamized. The private houses, with few exceptions, are built with red brick, and the public buildings of stone. The shire-hall was built after a plan of Sir Robert Smirke, and is remarkable for its unassuming beauty and good arrangement. Within the last few years the town has been greatly improved by the erection of a new market-house with clock-tower, new and extensive cattle market, several large and handsome buildings, &c. The town-hall, a large wood and plaster building supported by oaken pillars, was pulled down in 1861. The union workhouse stands just beyond the north-east limits of the city. The county gaols are in the same neighbourhood. There are several hospitals or almshouses, and some important and well-conducted free schools. The principal churches are those of All Saints, St. Peter, St. Nicholas, and St. John. In addition to the churches belonging to the establishment, there are places of worship for the principal denominations of dissenters.

A triennial musical festival is held in Hereford. The episcopal palace is ancient, and surrounded by

large gardens; the college forms a quadrangle. The total value of the numerous charities in the town is 25217; besides 4360 loaves distributed by the dean and chapter. There are manufactures of gloves, hats, flannels, and cutlery; and a trade in cider, hops, corn, wool, bark, and timber. Coals are chiefly obtained from Abergavenny; and railways connect the city with Shrewsbury, Worcester, Gloucester, and Monmouth, from thence to every part of the United Kingdom. The October fair held here is the largest in England for cattle and cheese. Hereford was the birthplace of Nell Gwynn and David Garrick.

Hereford Cathedral stands upon the south side of the city, not very far from the Wye. The date of the original building is fixed at 825; the whole was rebuilt by Bishop Athelstan about the year 1030. This cathedral was entirely demolished in 1055. No renewal was attempted until the latter years of William the Conqueror's reign, when Bishop Lozing and others commenced the present building. In 1786 the western portion of the cathedral fell, and alterations were made; the spire was removed, and a new western end added by Wyatt. It has recently undergone a thorough restoration, under the superintendence of Gilbert Scott, Esq., and is now admitted to be one of the best of its kind—considering its size—in the kingdom. The present length of the entire building is 320 feet, and the height of the central tower 160 feet. The cathedral contains many monuments of great antiquity, some of which are highly ornamented. Attached to it is a chapter-house and library, containing a curious map of the world of the thirteenth century, and other geographical works. For a minute description of this cathedral, see Duncombe's 'History of Herefordshire,' and Britton's 'Cathedrals.'

The diocese of Hereford is one of the most ancient in England, being of British origin, and re-established by the Saxons in 680. It comprises the two archdeaconries of Hereford and Salop, including thirteen deaneries, which extend partly into the counties of Monmouth, Radnor, Stafford, Montgomery, and Worcester.

HEREFORDSHIRE is bounded E. by Worcestershire and Gloucestershire; N. by Shropshire, with a portion of Worcestershire; W. by Radnorshire, Brecknockshire, and a part of Monmouthshire; and S. by Monmouthshire and Gloucestershire. The length, N. to S., is about 40 miles; the breadth, W. to E., 34 miles. The area is 860 square miles, or 534,823 acres. The population in 1861 was 123,712—62,908 males, and 60,804 females—being an increase of 8223 (seven per cent.) on the census of 1851. There were 25,314 inhabited houses, 815 uninhabited, and 170 in course of erection.

Surface, Rivers, &c.—The surface of this county is generally hilly, but the valleys occasionally expand into open plains. The Hatterel range of the Black Mountain, which forms its border on the west-south-west, is the highest land within its limits; there is likewise a third and lower line of hills extending in the same direction from Middlewood to Wormbridge. In the south-west the Saddlebow and Garway are conspicuous; and in the south the hills near Walford and Penyard. The Malvern Hills and the range stretching northward from Stamford Bishop are the principal heights on the eastern boundary. On the

north are the hills of Downton and Leintwardine, together with the range running in a south-west direction from Ludlow. Near the centre of the county, Dinmore, Westhope, and Badnage Hills, with the line on which the circle of firs called Lady Lift stands conspicuous, form the most prominent features.

No large rivers have their source in these hills; the principal streams which water Herefordshire rise in the higher counties of South Wales. They are, the Wye, the Lugg, the Teme, the Arrow, the Frome, the Leddon, the Doyer, and the Munnaw.

The *Wye*, which rises in Cardiganshire, enters Herefordshire on its western side, and after many windings reaches the city of Hereford, and finally leaves the county near the Leys. It is imperfectly navigable throughout the whole of this county. The immediate vicinity of mountains, and the very large surface of country which it drains, cause sudden and frequently destructive floods. For picturesque beauty this river is justly celebrated. Trout, grayling, and salmon are taken. Since the destruction of a weir in the lower part of the river the number of salmon has increased. Neither of the other rivers is navigable to any useful extent; they are chiefly remarkable for their plentiful supply of fish. Two canals have been formed through portions of this county for the conveyance of coal and other heavy goods; and the county is also well supplied with railway accommodation.

Climate, Geology, and Agriculture.—The climate of Herefordshire varies greatly, according to the elevation and exposure. The neighbourhood of Ross and Ledbury, as well as the central portion of the county, enjoys a superior climate to such portions of the north and west as are in the vicinity of Wales; but the general climate of the whole county is remarkably healthy.

Most of the surface of this county belongs to the old red sandstone formation, but the highest points are of the class of Silurian rocks. These are Marcle Hill, near Ross, on the Wye, and the range between Ludlow and Kington. The Black Mountains, on the Breconshire border, are 2545 feet high; and the Wye cliffs are 2000 feet, at Symond's Yat.

The soil consists principally of a deep and heavy loam, with a substratum of clay in some districts, and gravel in others. The whole is very favourable to the growth of trees, especially the apple-tree and oak. In the neighbourhood of towns the land is cultivated chiefly as meadow or pasture. The high lands are generally occupied by oak coppices, which are numerous and extensive. In the lower lands the wheat crop engrosses the farmer's chief attention. Hop-yards are common in the middle and eastern portions of the county.

Of the entire acreage of the county, 470,400 are grass and arable, and about 13,000 acres are devoted to hops. The soil generally is unusually fertile. The apple crop yields about 20,000 hogsheads of cider, mostly of superior quality. Large quantities of pears are grown, and from them perry is made, which is very much drunk in the county. Oak-bark (used in tanning) is also an important production.

The county is celebrated for its breed of cattle, which are red, with white or mottled faces, and occasionally white about the legs. They are generally preferred for grazing, not being good milkers. The

breed of sheep (estimated at 500,000) is almost as celebrated as that of the cattle. Dairy farming is never practised here, and the milk of the cows, which are only kept for breeding, is given to the calves. The oxen are now no longer worked, but are fed at two years old, and sent to market at three. Agricultural horses of average quality are bred in considerable numbers. The north part of the county produces useful riding and coach horses. Pigs are chiefly procured from Wales, whence a large supply of eggs and poultry are also derived.

Divisions and Towns.—Herefordshire is divided into 11 hundreds and 221 parishes. It is in the diocese of Hereford, and in the Oxford circuit. The assizes are held at Hereford. The county returns three members to Parliament, the number of registered electors in 1865 being 7179; the city two; and the borough of Leominster two; making seven in all.

The following are the chief towns, with the population of each in 1861:—

Bromyard is about 13 miles N.E. from Hereford. The town is small and irregularly built, and a considerable proportion of the edifices are of wood. It has a union workhouse, and branch banks. Population, 2995.

Hereford. [HEREFORD.]

Kington is 19 miles N.W. from Hereford. The town is generally well built, and the inhabitants are principally employed in the manufacture of gloves and nails. The town contains a free grammar-school and a charity school. Population, 3076.

Ledbury is 15 miles E. by S. from Hereford. The church is a spacious edifice of Norman architecture. The town, which is situate on a declivity at the southern extremity of the Malvern Hills, contains several alms-houses, and grammar, charity, and national schools. Its trade depends upon the produce of the neighbouring orchards and hop-grounds. The hops, cider, and perry are all of excellent quality. Population of the parish, 5598. Ledbury is on the Hereford and Worcester Railway, and the Hereford and Gloucester Canal. There are manufactures of rope and sacking, and in the vicinity are some good marble quarries.

Leominster, a parliamentary and municipal borough, is 13 miles N. from Hereford. It has sent members to Parliament since the reign of Edward I., and received its charter of incorporation from Queen Mary, for supporting her cause against Lady Jane Grey. The high street of the town is spacious, but many of the other streets are narrow and inconvenient. The church is of considerable antiquity; it is an irregular building, the work of different periods. There are also places of worship for dissenters. The town contains a market-house, house of industry, a gaol, a branch bank, new town-hall and corn exchange, a free grammar-school, and a new school on the national plan. The old town-hall is a singular structure of plaster and timber work, erected in 1663. The municipal borough is governed by four aldermen and twelve councillors. The parliamentary borough returns two members. The municipal and parliamentary boundaries are now identical: population, 5658. In 1864 there were 349 voters on the register for the borough, which is a polling place for the county. There are manufactures of leather, gloves,

hats, and woollens; and the town has a good trade in hops, wheat, wool, and cider. A few miles from Leominster, a modern column indicates the site of the battle of Mortimer's Cross, fought during the wars of the Roses, which raised the Yorkist leader to the throne with the title of Edward IV.

Ross, a market town, is about 14 miles S.S.E. from Hereford. The church is a handsome and spacious structure, with a lofty spire, founded by Robert Betun, bishop of Hereford, in the twelfth century. There are places of worship for dissenters, a union workhouse, charity schools, an alms-house, a dispensary, and other benevolent institutions. Population, 4346. Ross is a polling place for the county. The cider of the vicinity is in high repute. Pope's lines on the 'Man of Ross' have rendered the name of this place familiar to students of English literature. The hero was John Kyrle, a resident during the reigns of William III., Anne, and George I. After visiting the house in which he lived, Coleridge wrote the lines beginning—

'Richer than misers o'er their countless hoards.'

Weobly is 11 miles N.W. from Hereford, and 147 miles from London. The town consists of one principal street, which contains some well-built modern structures. It was formerly a parliamentary borough, but was disfranchised by the Reform Act. Population, 849. It has a free grammar-school, and the remains of a castle famous in the wars of Stephen and the Empress Matilda.

History and Antiquities.—The greater part if not the whole of Herefordshire was comprised in the territory of the Silures, and was conquered by the Roman general, Julius Frontinus, about A.D. 73. A line of Roman and British intrenchments may be traced from the Malvern Hills to Whitbourn, Thornbury, Croft, Brandon (near Leintwardine), and Coxwall Knoll (near Brampton Brian). There are also traces of a camp on the east of Leintwardine, near Downton, and several Roman roads in various parts of the county.

During the Heptarchy Herefordshire belonged to Mercia, and in 680 a synod was held at Hereford, which was the principal town of Mercia in the time of Offa.

The position of Herefordshire relative to Wales subjected it to continual inroads from the Welsh. A considerable part of the county was included in the 'Marches,' a term used to express the frontier in dispute between the Welsh and the English. In spite, however, of repeated defeats of the Welsh, and very severe exactions, attacks continued to be made upon the persons and property of the Marchers; but no event occurred which immediately affected this county, until the crown of England was in dispute between Stephen and Maud, the daughter of Henry I. Geoffrey de Talebot, and Robert, earl of Gloucester, then declared in favour of the empress. Talebot retired to Hereford, but soon quitted it, and the castle of Weobly, which had been garrisoned against Stephen, was totally demolished. Stephen afterwards invested the city of Hereford.

During the troubled times of Edward II. Herefordshire was the scene of many executions. The king's adherents, Hugh Despencer, Balde, and Reding, were executed at Hereford. No particular event occurred by which the county was locally

affected, until the rebellion of Owen Glendwr threw the Marches into confusion. [GLENDRWR.]

During the wars of York and Lancaster Herefordshire did not escape the general commotion. During the civil wars the city of Hereford was garrisoned for the king, but was taken by Sir William Waller. After the battle of Naseby, the king marched to the relief of Hereford, and the Scotch army raised the siege. In the course of the year 1646 the city was taken by surprise, and the whole county was reduced by detachments in the interest of the Parliament, under the command of Sir William Waller and Colonel Birch.

There were several castles in Herefordshire, of which a few ruins remain, but most of them have been demolished. The only druidical remains are a pile of stones, called Arthur's Stone, situated in the parish of Dorstone.

HERESY, HERETICS. The word 'heresy' (from *αἵρεσις*, 'choice') was originally used to express any opinion which a man adopted. Thus it was applied to the philosophic sects of Greece and Rome. (Cicero, 'Paradox, Proöm.') In the New Testament the term often simply denotes a religious party, without implying any censure. (Acts v. 17; xv. 5; xxvi. 5; xxviii. 22.) Josephus calls the three great Jewish sects *heresies*. ('Antiq. Jud.,' xiii. c. 5, s. 9.) But it is also used in the New Testament as a term of reproach. Thus it was applied by the Jews to Christianity (Acts xxiv. 5, 14), and by the apostles to those who resisted their doctrines (1 Cor. xi. 9; Gal. v. 20; 2 Peter ii. 1; Titus iii. 10). The fathers applied the words *heresy* and *heretics* respectively to opinions which were different from what they considered the doctrine of the apostles, and to those who held such opinions, though some of the fathers draw a distinction between *heresy*, as a wilful rejection of the doctrines of Scripture, and errors arising from ignorance or weak judgment. When the creed of the church began to be settled by ecclesiastical councils, all who refused to submit to their decisions were denounced as heretics. They were also called *heterodox*, while those who adhered to the opinions of the church were called *orthodox*, or *catholics*. Heretics were distinguished from unbelievers, inasmuch as they professed Christianity. Heresy must not be confounded with schism: the former relates to doctrine; the latter is any division on points of discipline. The number of heresies mentioned by early ecclesiastical writers is from 80 to 150; but Lardner ('Hist. of Heretics,' i. 5) has shown that many of these ought to be excluded from the list; nor have we any evidence that many of them had numerous followers. The most important of the various sects generally included under the term are treated of under their respective names.

Before the Reformation in England heresy was the holding of opinions contrary to the Catholic faith and the determination of Holy Church: at least this is the definition of heresy in the Statute 2 Hen. IV., c. 15. The court in which a man could be convicted of heresy, according to the common law, was that of the archbishop in a provincial synod. After conviction the criminal was delivered up to the king to do what he pleased with him. If the criminal had abjured his heresy and then relapsed, the king in council, upon a second conviction, might issue the

writ De Hæretico Comburendo, upon which the criminal was burnt alive. One Sawtre, it is said, was the first man burnt alive for heresy in England, and the writ De Hæretico Comburendo was formed in his case.

The 1 Eliz., c. 1, repealed all former statutes about heresy, which was accordingly punished, after the Reformation was fully established, by ecclesiastical censures, and by burning alive a criminal who had been convicted, in the manner above ascribed, in a provincial synod. The writ for burning the heretic could not be demanded as a matter of right, but was left to the discretion of the crown; and both Elizabeth and James I., in their discretion, thought proper to grant the writ. Elizabeth, it is said, burnt alive two Anabaptists, and James burnt alive two Arians.

The Statute of 29 Car. II., c. 9, abolished the writ De Hæretico Comburendo. Heresy is now left entirely to the judicial committee of Privy Council; and the punishment of death in consequence of any ecclesiastical censure was by that act abolished in England. As Elizabeth and James practically showed their approbation of burning heretics alive, so Lord Coke (3 'Instit.,' c. 5) approves of the punishment.

At present the judicial committee of Privy Council punish for heresy, when they do punish, *pro salute animæ*, as it is termed, that is, solely out of regard to the soul of the offender. But it is difficult to say at present what can be called heresy; and perhaps it is difficult to say what is exactly the punishment for it. Indeed, there seems no risk in asserting that much of the jurisdiction of the judicial committee of Privy Council in respect to heresy, whether it shows itself in speaking, writing, or preaching, has been destroyed by the various Toleration Acts.

The history of heresy in England is instructive. The change from burning alive to the almost unlimited expression of opinion on religious matters, is one of the steps in the social progress of England. This has been illustrated in a remarkable way by the recent work 'Essays and Reviews.'

HERETICO COMBURENDO, in the Middle Age, a writ issued against a heretic, by which he was condemned to be burned alive.

HERFORD or **HERVORDEN**, is a town with 10,000 inhabitants, in Prussian Westphalia, situated on the Werra, at its junction with the Aa, in the government of, and sixteen miles S.W. from, Minden. The place is the capital of a circle, and has a large prison, arsenal, gymnasium, six churches, and the central museum of arts, antiquities, and manufactures for the province. Cotton cloth and yarn, leather, tobacco, and linens are made here.

HERIADES, a genus of hymenopterous insects of the section *Melifera* (Latreille), and family *Apidæ*. Body elongated, slender, almost cylindrical, that of the males with a small cavity beneath, near the apex; mandibles triangular; maxillary palpi two-jointed.

The little bees belonging to this genus, we are informed by Latreille, make their nests in holes in old trees. We presume that, as in the genus *Chalostoma*, the holes are made by the bees themselves.

The smallest British species of bee belonging to

the family *Apide* (*Heriades campanularum*) is very common in many parts of England during the summer and autumnal months; it frequents the flowers of the various species of *Campanula*, and is seldom or never found to visit the flowers of any other genus of plants.

HERICOURT. [SAÔNE, HAUTE.]

HERIOT is a feudal service consisting in a chattel which is given to the lord on the death of a tenant, and in some places upon alienation by a tenant. Heriots are either heriots-custom or heriots-service. A heriot due from the dying tenant by reason of his relation of tenant within a particular manor, or other district, is called *heriot-custom*: *Heriot-service* is a heriot due in respect of the estate of the tenant in the particular land held by him.

HERIOT, GEORGE, founder of the excellent hospital in Edinburgh which bears his name, was born in 1563. His father was a goldsmith in Edinburgh, who filled several of the most important civic offices, and represented the metropolis in several Parliaments. George Heriot the younger was bred to his father's occupation, which was at that time highly lucrative, and was connected with the profession of a banker or money-lender. In 1586 he married Christian Marjoribanks, daughter of a respectable burgess. In 1597 he was appointed jeweller to the queen, and shortly after to the king—her majesty's account to him for a space of two years amounted to nearly 40,000*l*. On the removal of the court to England, Heriot of course followed the fortunes of his royal master. He had now accumulated a large fortune, and chose for his second wife Alison, daughter of James Primrose, clerk to the privy council, and ancestor of the earl of Roseberry. But he was deprived of this lady also by her dying in childbirth in 1612, in her twentieth year. 'The loss of his young, beautiful, and amiable partner at a period so interesting,' Sir Walter Scott conjectures, was the probable reason which induced Heriot to devote his fortune to a charitable institution. After leaving considerable sums to his various relations, this munificent philanthropist bequeathed the remainder of his large estate to establish an hospital for the gratuitous education of the sons of Edinburgh freemen. The building—a magnificent quadrangle of the Gothic order—is said to have been designed by Inigo Jones in 1628, but was not completed till 1659. It is under the management of the town council and clergy of Edinburgh. So largely have the funds increased, that they not only support and educate most efficiently one hundred and eighty youths annually, but also maintain in the highest state of efficiency a number of schools in different parts of the city. The founder of this noble charity—'Gingling Geordie,' as King James termed him—was a great favourite with his majesty. An admirable portrait of him has been drawn by Sir Walter Scott in the 'Fortunes of Nigel.'

HERISON, in military matters, a sort of chevaux-de-frise made of one strong beam, with a number of iron spikes which revolve upon a pivot, and always present themselves in front, whichever way the beam revolves.

HERITABLE BOND. [HERITABLE SECURITIES.]

HERITABLE JURISDICTIONS, in Scotch law,

were grants of criminal jurisdiction formerly conferred for distinguished military service, along with the lands to which they were attached, on certain great families, in order to expedite the administration of justice throughout the land. As the lands were made over not only to the grantee, but to his heirs, the jurisdictions annexed to them were consequently heritable. These jurisdictions, becoming in course of time a source of great abuse, were abolished, along with other powers conferred on landed proprietors, shortly after the rebellion of 1745, by the Act 20 Geo. II., c. 43, compensation being given to those who suffered patrimonial loss by the operation of the statute.

HERITABLE SECURITIES, in Scotch law, are various modes in which lands and heritages may be rendered a source of credit to their proprietors. The real right may be constituted by registration of the bond or sasine in favour of the creditor, or be dependent on the force of a condition simply qualifying the right of property. The principal ways in which heritable securities may be created are:—

1. By *wadset*, an *ex facie* irredeemable right in favour of the creditor, but qualified by a separate deed conferring the right of reversion on payment of the debt for which the lands were impledged. This form is now rarely met with in practice.

2. By *real burden* specifically imposed by the disposition upon the lands, and binding upon the disponee and his heirs.

3. By *heritable bond*, a deed in which the debtor binds himself to repay the principal sum with interest, and grants obligation to infest the creditor in an annual rent payable out of the lands, during the non-payment of the principal sum. This security is of the nature of a real burden, and is completed by infestment in the person of the creditor. This term is sometimes, but improperly, applied to—

4. The *bond and disposition in security*, in which, in addition to the above, there is a conveyance of the lands themselves for the creditor's further security.

5. *Absolute disposition and back bond* is a form of security in which the disposition of the lands to the creditor is absolute, qualified only by a personal obligation to restore them on payment of the debt.

ADJUDICATIONS and INHIBITIONS are also of the nature of heritable securities.

HERITOR, in law of Scotland, originally meant the proprietor of a heritable subject, but is now applied to such possessors of lands or houses as are liable in payment of parochial burdens, either for the support of parish schools, the maintenance of the poor, or minister's stipend.

HERM. [GUERNSEY.]

HERMANN, the *Arminius* of the Roman historians, was the son of Sigimer, chief of the Cherusci, and was born about 16 B.C. Having been sent in early youth as a hostage to Rome, he obtained the favour of Augustus, and was inscribed among the Roman knights. On his return to his native country, he conceived the project of delivering it from the Romans. He defeated Varus, the Roman governor in Germany, by which the Romans lost all their conquests beyond the Rhine. After a series of successes against the Romans, Hermann remained unmolested in Northern Germany. Shortly after, however, he was killed by his own relatives, being accused, as it

would seem, of aspiring to absolute dominion. He died at the age of thirty-seven, in 21 A.D., after being for twelve years the leader and champion of Germany.

HERMANNSTADT, a town of Hungary, near the Wallachian frontier, 73 miles S.S.E. of Klausenburg. It is inclosed by walls, and is the head-quarters of the military commandant of Transylvania, the seat of Roman Catholic and Lutheran gymnasia, and a Greek bishop's see. The principal edifices are the Bruckenthal palace, with a library, museum, and theatre; Lutheran, Calvinist, Roman Catholic, and Greek churches; barracks, military hospital, orphan asylum, and many museums. There are also manufactures of linen and woollen fabrics, felt hats, horn combs, earthenware, and leather.

HERMAPHRODITE. [MONSTER.]

HERMAS, a Christian writer of the first century, who is said by Eusebius ('Hist. Eccl.' iii. c. 3) and Jerome ('De Illust. Viris,' c. 10) to have been the same individual whom St. Paul salutes in his Epistle to the Romans (xvi. 14). He was the author of a work entitled 'The Shepherd,' which is frequently quoted with the greatest respect by almost all the early Christian writers. We learn from Eusebius ('Hist. Eccl.' iii. c. 3, 5), and other writers, that it was received by many churches as a canonical work. After the time of Origen, who considered it of divine authority, its canonical authority appears to have been generally denied.

'The Shepherd' contains no express citations of any books of the Old or New Testament. The work was originally written in Greek, but there is only an ancient Latin version of it extant in the present day. There is an English translation by Wake, London, 1693 and 1710.

HERMENEUTICS, the science of interpretation, especially applied to the meaning of the Scriptures. It differs from exegesis, in that its true province is the discovery of the real meaning of the text, while the province of exegesis is the exposition of this meaning, and its application to the wants of mankind. The inquiries of hermeneutists are simply literary, dealing with the signification of words and idioms, the object and circumstances of writing, the credibility and character of the writer, and all that concerns the text and the interpretation of the Holy Scriptures. This branch of literature has received more attention of late than perhaps at any previous time; and although some (so-called) eminent critics of the present day have succeeded marvellously in 'darkening counsel by words without knowledge,' the result on the whole has been favourable to the elucidation of the text of Scripture.

HERMES, an ancient Greek divinity, known to the Romans as *Mercurius*, was, according to Hesiod ('Theog.' 942), the son of Zeus and Maia, the daughter of Atlas. The attributes of this deity are numerous and of opposite kinds; but it appears probable that he was originally considered to preside over flocks and herds.

In Homer the name of this deity is usually *Hermias*. He is represented as the messenger of Zeus and the gods, and he conducts the souls of the departed to Hades. In later times he was regarded as the god of eloquence; the inventor of the lyre and weights and measures; the patron of merchants and

of gain, and even of thieving; and the protector of heralds, poets, musicians, and wrestlers. Statues of Hermes, which were originally square blocks with a carved head upon them, were placed in the doorways of most private houses and temples at Athens. (Thucyd., vi. 27.) They were also erected where several roads met, to point out the way, and in the gymnasia, or public places of exercise.

Hermes is usually represented with a chlamys, or cloak; a petasus, or winged cap; talaria, or winged sandals; and a caduceus, or wand, with two serpents twined about it, in his hand.

The Egyptian god Thoth was also called Hermes by the Greeks. A great number of philosophical and astrological works, purporting to be written by the Egyptian Hermes, were in circulation in the early ages of the Christian era. Most of them appear to have been written at Alexandria by Gnostic Christians, or philosophers of the Aristotelian or of the new Platonic schools. A few of these works are still extant.

HERMES, GEORG, the founder of a philosophical school of Roman Catholic theology, was born on the 22nd of April, 1775, at Dreyerwalde, in Westphalia. He became a pupil of the gymnasium at Rheina, and in 1792 entered the theological faculty at Münster. In 1798 he was appointed teacher at the gymnasium of Münster, and all his exertions henceforth were directed towards restoring, on a firm basis, that which had been demolished by Kant's 'Criticism of Pure Reason.' In 1807 he was appointed professor of theology at Münster, and in 1819 filled the same office at the University of Bonn. His lectures attracted students not only from all parts of Catholic Germany, but the king of the Netherlands sent a large number of young men to Bonn for the special purpose of pursuing their studies under Hermes. In the enjoyment of the highest esteem both of his colleagues and pupils, he died at Bonn on the 26th of May, 1831.

The only work that Hermes published bears the title 'Einleitung in die Christ-Katholische Theologie,' Münster, 1819, 8vo.; a second edition appeared in 1831. Soon after the elevation of Droste-Vischering (between whom and Hermes considerable ill-feeling existed) to the archbishopric of Cologne, reports were made to Rome about the infidel tendency of the work of Hermes, in which the objectionable point was his principle, that reason or philosophy must in the first place prove the reality of a divine revelation, and in the second, the truth of the Roman Catholic system.

On the 26th of September, 1835, the pope issued a brief against the work of Hermes, and the consequence was a rupture between the courts of Berlin and Rome, and a long controversy, the best exposition of which may be found in Elvenich's 'Der Hermesianismus und sein Römischer Gegner Peronne,' Breslau, 1844, 8vo.

HERMIAS. [ARISTOTLE.]

HERMIT, more properly *Eremit*, from the Greek, *ἐρημίτης*, signifying an inhabitant of the desert, is the name given to such religious persons as retired from society without becoming members of any monastic community. [ANCHORET; MONACHISM.]

HERMIT-CRAB. [PAGURIANS.]

HERMITAGE, the solitary cell or habitation of

a hermit, or sometimes the term is used to denote the dwelling-places of a community of hermits. These have often exercised considerable influence on the surrounding districts, and frequently laid the foundation of towns, cities, and ecclesiastical establishments.

HERMOGENES was a native of Tarsus, and lived under Marcus Aurelius. At the age of fifteen, it is said, he was professor of Greek eloquence at Rome, where his lectures were attended by that emperor. At the age of eighteen he wrote his work on the oratorical art, consisting of four sections. His illustrations and quotations are chiefly taken from the 'Orations' of Demosthenes. The work of Hermogenes was held in high esteem, and became a standard book in all Greek schools. It has been repeatedly printed in the Greek text, and Gaspard Laurent published it with a Latin translation and commentaries, 8vo., Geneva, 1614. Hermogenes had joined to his work a book of 'Progymnasmata,' or specimens of oratorical exercises, which Priscianus translated into Latin, the Greek text of which remained inedited till the end of the last century, when it was first published by A. H. L. Heeren, and has since been republished by Veesenmeyer, 8vo., Nürnberg, 1812, and by others.

HERMOGENES, a heretic of the early church, against whom Tertullian has written a treatise, was most probably a native of Africa, and flourished, according to Basnage and Le Clerc, in 168. We have no account of any of his writings, though it may be inferred from the arguments of his opponents that he was an author. For a further detail of his opinions see Lardner, 'Hist. of Heretics,' ch. xviii.

HERMOSILLO, a city of Mexico, with a population of 15,000. It is the centre of the commerce and mineral riches of the state of Sonora, and has some brandy distilleries, schools, prisons, a hotel, and a mint. The principal exports are maize, cotton, and fruit. Cotton goods are manufactured.

HERNANDIA'CEÆ, a natural order of incomplete exogenous plants. It contains only two genera, *Hernandia* and *Inocarpus*. *Hernandia*, the typical genus of this order, was named after Hernandez, a naturalist sent out to Mexico by Philip II. of Spain. *H. sonora* is a tall erect tree, a native of the various parts of the East and West Indies, and has obtained its name *sonora* from the noise made by the wind in whistling through its persistent involuclcs. The bark, the seed, and the young leaves of this tree are slightly cathartic. The juice of the leaves is employed as a depilatory. It destroys the hair wherever it is applied, and this without producing pain.

HERNANI. [BASQUE PROVINCE.]

HERNIA, from *ἑρως*, 'a branch,' signifies the protrusion of any organ from its natural position in the body, as *hernia cerebri*, *hernia pulmonis*, when the brain or lung protrudes through an aperture in the skull or the chest. But when used alone this term means what is commonly called a *rupture*, that is, the protrusion of any portion of the intestinal canal from the cavity of the abdomen.

Herniæ sometimes form without any evident cause, the intestine being gradually protruded; but more frequently they result from some violent bodily exertion, as lifting heavy weights, excessive coughing or straining; or from sudden jarrings or shocks, as

in jumping or falling; or from blows on the abdomen.

The general characters distinguishing a hernia are, a tumour, neither red nor hot, and often not painful, situated at some part of the abdomen, most frequently in or near the groin; largest when the patient stands up, and often disappearing entirely when he lies down; distended by coughing or other violent expiration, and liable to variation in size by exercise or rest, by abstinence or taking food; often producing disorders of the digestive canal, as flatulency, colic, &c. In the cases in which the hernia forms suddenly, as in consequence of a great exertion, the patient feels as if something had given way at the groin or other part of the abdomen, and on putting his hand there he feels a tumour which may vary in size from that of a nut to that of his fist, is elastic, hard, and tense, and soon after the accident becomes painful and tender. In the other class of herniæ the tumour forms almost imperceptibly to the patient, and grows larger regularly but slowly. If a hernia can be returned into the abdomen at pleasure, it is not by itself a dangerous disease; but if it becomes strangulated, that is, if the intestine is so constricted by the parts through which it has passed that its contents cannot pass through it, and its vessels are so much compressed that active inflammation is excited, it constitutes one of the most serious accidents to which the human body is liable. The symptoms indicating strangulation of the intestine are obstinate constipation of the bowels; pain and tenderness of the tumour, and spreading from it over the whole surface of the abdomen; extreme restlessness and languor; nausea and vomiting; a hard, small, and rapid pulse; thirst and coldness of the limbs. If the hernia be not reduced, these symptoms will regularly increase, till mortification of the intestine ensues, and (except in some most rare cases) death rapidly follows.

Several forms of hernia are recognized by surgeons according to the part of the abdomen through which the bowel protrudes. The most common are the Inguinal, Femoral, and Umbilical herniæ.

Whatever be the situation or condition of a hernia, it should be at once, if possible, reduced; the patient should go to bed, and after lying a short time on his back, with his knees raised, the intestine will often of itself recede into the abdomen, especially if it have been frequently protruded; but if it do not, then it should be worked into its place by means of the hands. If this fail, there are several auxiliary means that may be employed, of which a selection must be made according to the circumstances of each individual case. The warm bath should be first tried in all cases. The abstraction of blood will be useful, not only by the faintness which it produces being a favourable state for reducing the hernia, but by its relieving the inflammation which always arises when the intestine is strangulated, and by checking it in its fatal progress. If the warm bath and bleeding fail, the patient should be placed between warm blankets to recover from their depressing effects, and no more manual attempts should be made for some time. The next means employed should be the continued application of cold by ice or a rapidly evaporating lotion laid over the tumour. Should this fail, and the symptoms of strangulation be increasing,

some surgeons recommend tobacco enema. Great caution is necessary, however, in employing it, and by many it is not had recourse to at all. If the tobacco enema is used, a last attempt at reduction should be made whilst the patient is under its influence. The operation consists in cutting down upon the strangulated bowel, and carefully enlarging the opening through which it has protruded, so that it may return with facility, and if this attempt is still unsuccessful, an operation must be resorted to.

When a hernia has been completely reduced, its recurrence must be prevented by wearing a truss.

HERO, HEROIC, HEROISM are used, in their common English sense, to denote an unusual, and, as it were, superhuman degree of bravery and virtue. This meaning flows directly from the original Greek word, which denoted (at least in the times subsequent to the Homeric poems) a person intermediate between gods and men, and usually of divine descent on at least one side. Such were worshipped with divine honours by those cities and races of men which claimed them as their founders or ancestors. This divine origin, however, was not essential; thus Philippos of Crotona, who fell in battle against the Phœnicians and Egæstæans, was made a hero for his beauty; a heroum, or shrine, was built on the spot where he was buried, and sacrifices were offered to him. (Herod., v. 47.) At a later age, Arátus and Brásidas were worshipped as heroes at Sicyon and Amphípolis; and the Athenians slain at Marathon received similar honours. The Heroic Age, properly so called, appears, however, to have terminated with the immediate descendants of the Greeks who returned from Troy. In Homer the word hero occurs frequently, but in quite a different sense: it is applied collectively to the whole body of fighters, Argeii, Danaí, and Achæi, without reference to individuals of peculiar merit, and indeed often appears to be used for little more than an expletive, when he, or the man, or the soldier, would have done equally well. Indeed, the application of the word is not even limited to warriors, but is applied to heralds, wise counsellors, kings, &c.

The promiscuous (or Homeric) use of the word hero disappeared in the age succeeding the Homeric poems. When the Greeks looked back to the warlike legends of the earlier race who had borne the title, the lays, exploits, and persons were called heroic; and from the combined effect of poetical exaggeration, reverence for antiquity, and traditions of national descent, the more modern Greek use of the word arose, carrying with it notions of mythical dignity, and of superiority to the later race of mankind.

HERO, or HERON. There are two of this name, both writers on mechanical subjects. Hero the Elder was the pupil of Ctesibius, and lived at Alexandria about B.C. 100. The country of the younger Hero is uncertain, but he is supposed to have lived about 610.

Hero the Elder must have enjoyed great reputation, since he is mentioned by Gregory Nazianzen with Euclid and Ptolemæus: but he is now principally known by some fragments of his writings on mechanics, which are to be found in the 'Mathematici Veteres,' Paris, 1693. Hero the Younger wrote on Practical Geometry and Military Science.

HEROD (HERO'DES), the name of several Jewish princes:—

I. HEROD THE GREAT was the second son of Antipater, by whom he was appointed governor of Galilee at the age of twenty-five. In B.C. 40, when the Parthians invaded Judæa, Herod escaped to Rome, where, by the influence of M. Antonius, he was appointed king of the Jews; but the Roman generals in Syria assisted him so feebly, that it was not till the end of the year 38 B.C. that Jerusalem was taken by Sossius. The commencement of Herod's reign dates from the following year. In the year 38 he had married Mariamne, the granddaughter of Hyrcanus, hoping to strengthen his power by this match with the Asmonean family, which was very popular in Judæa. He made Aristobólus, the brother of Mariamne, high-priest, but shortly after Aristobólus was secretly put to death by the command of Herod. Cleopatra, queen of Egypt, having been informed of the murder, Herod was summoned to answer the accusation before M. Antonius, whom he pacified by liberal bribes. When setting out to meet Antonius, he had commanded his brother Joseph to put Mariamne to death in case he should be condemned, that she might not fall into the power of Antonius. Finding on his return that Joseph had revealed this order to Mariamne, Herod put him to death. In the war between Octavianus (afterwards the Emperor Augustus) and M. Antonius, Herod favoured Antonius. After the battle of Actium he went to meet Octavianus at Rhodes, by whom he was well received, and confirmed in his kingdom. Before he set out, he had imprisoned Mariamne and her mother Alexandra, commanding their keepers to kill them, if he should be put to death by Octavianus. On his return, Mariamne reproached him with his intentions towards her, which she had again discovered. This led to an estrangement between Herod and his wife, and he finally accused her of adultery. She was condemned and executed. After her death Herod suffered the deepest remorse. His open disregard of the Jewish law increased the hatred of the people towards him. To secure himself against rebellion he fortified Samaria, which he named Sebaste, and built Cesarea, and other cities and fortresses. In the year 17 B.C. he began to rebuild the temple at Jerusalem. The work was completed in eight years, but the decorations were not finished for many years after. (John ii. 20.) Herod's power and territories continued to increase, but the latter part of his reign was disturbed by the most violent dissensions in his family. He died in March, B.C. 4, in the thirty-fourth year of his reign and the seventieth of his age.

The birth of Jesus Christ took place in the last year of Herod's reign, four years earlier than the era from which the common system of chronology dates the years A.D. (Clinton's *Fasti Hellenici*.)

II. HEROD ANTIPAS, son of Herod the Great, was appointed by his father's will tetrarch of Galilee and Peræa. About A.D. 26 he divorced the daughter of Aretas, king of Arabia, and married his sister-in-law Herodias. John the Baptist having remonstrated against this marriage, was imprisoned, and afterwards put to death. (Luke ii. 19, 20; Mark vi. 17–29.) About the same time Aretas marched against Antipas and defeated him. In A.D. 39

Antipas was accused by Agrippa, king of Judæa, of a secret understanding with the Parthians, and was banished by Caligula to Lyon.

III. HEROD AGRIPPA, son of Aristobulus, and grandson of Herod the Great, after experiencing many vicissitudes in early life, was appointed, upon the accession of Caligula, king of the dominions formerly held by Philip, namely, Gaulanitis, Batanæa, and Trachonitis, to which Caligula added the tetrarchy of Lysanias; and afterwards, when Antipas was banished, the tetrarchy of Galilee and Peræa. Claudius added Judæa and Samaria to his dominions. His government was popular with the Jews, to please whom he persecuted the Christians. (Acts xii. 1-3.) He died of a loathsome disease at Cesarea, in the third year of his reign over all Palestine, A.D. 44. (Acts xii. 20-23.)

IV. HEROD AGRIPPA, son of the above, was seventeen years old at the time of his father's death. Upon the death of Herod, king of Chalcis, four years afterwards, Claudius bestowed that kingdom upon Agrippa. He did not leave Rome till A.D. 53, when Claudius gave him the tetrarchies of Gaulanitis, Batanæa, and Trachonitis. His dominions were enlarged by Nero. It was in A.D. 60 that the trial of Paul before Agrippa took place. (Acts xxvi.) Agrippa exerted himself to keep down the spirit of revolt among the Jews. When war broke out, Agrippa joined the Romans. After the taking of Jerusalem, he retired with his sister Berenice to Rome, where he died at the age of about seventy years.

(Josephus, *Antiquities of the Jews*, and *Jewish War*; Jahn's *Hebrew Commonwealth*; Prideaux's *Connection*.)

HERODES, TIBERIUS CLAUDIUS ATTICUS, a native of Marathon, in Attica, and of an illustrious family, was born under the reign of Trajan. He inherited from his father a very large property. Herodes was educated by the best teachers of his time; and he became an accomplished scholar, rhetorician, and philosopher. Having removed to Rome, his wealth, his connections, and his extemporary eloquence, which is spoken of as wonderful, gave him great importance, and he was made consul with C. Bellicius Torquatus in 143. Herodes married, at Rome, Annia Regilla, of an illustrious and wealthy family. She bore him four children, and died while pregnant of the fifth. His brother-in-law suspected Herodes, who was of a violent and jealous temper, of foul treatment of his wife, and he brought him to trial on the charge of murder; but Herodes was acquitted. Herodes displayed an excessive grief for the loss of his wife, and he dedicated her estate to Minerva and Nemesis. An inscription, which he wrote, or caused to be written, in Greek hexameters, records the fact. There is another inscription, likewise in Greek verse, in which the poet invites the Roman women to honour the memory of Regilla, descanting upon her beauty, virtue, and high lineage. These two inscriptions, which are on two large slabs of Greek marble, have given much employment to critics. (Visconti, *Iscrizioni Tropee ora Borghesiane*, 4to., Rome, 1794.) Herodes died at Marathon, in the seventy-sixth year of his age, towards the end of the reign of Aurelius, or the beginning of that of Commodus.

He erected monuments, temples, baths, and aqueducts in Italy, Greece, and Asia. Pausanias (vii. 20) mentions an Odeon, or Music Theatre, at Athens, as built by him, called the Theatre of Regilla, after his wife: he also embellished the Stadium near the Ilissus, which was originally constructed by the orator Lycurgus, 350 B.C.

HEROD'IANUS ('*Ῥωδιανός*, Matt. xxii. 16; Mark iii. 6; xii. 13; see also Mark viii. 15), were in all probability a political party in Judæa, who were anxious to preserve the government in the hands of Herod's family. Many critics consider the Herodians to have been a religious sect. In their religious opinions they probably belonged to the sect of the Sadducees; since that which is called by Mark (viii. 15) 'the leaven of Herod,' is styled by Matthew (xvi. 6) 'the leaven of the Sadducees.'

HERODIANUS, a Greek author, who wrote a history, in eight books, of the Roman emperors who reigned successively in his lifetime, beginning with the death of Marcus Aurelius in 180, and ending with the accession of the younger Gordianus in 238. This history comprehends a period of little more than half a century, within which lived the emperors Commodus, Pertinax, Julianus, Niger and Albinus, Septimius Severus, Caracalla and Geta, Macrinus, Elagabalus, Alexander Severus, Maximinus, the two Gordiani, and Balbinus. The style of Herodianus is plain, and his narrative in general seems written in a fair spirit. He is the last of the Greek historians of antiquity who lived before the partition of the Roman Empire. Among the editions of his history that of Irmisch, in 5 vols. 8vo., Leipzig, 1798-1805, in Greek and Latin, contains numerous notes, chronological and genealogical tables, and several copious indexes. The last edition and the best text is by Bekker, Berlin, 1826, 8vo. There are several German translations of Herodian.

HERODOTUS, a native of Halicarnassus, a Dorian city in Caria, was born about B.C. 484. If the passages in his own History (i. 130; iii. 15) were written by himself, he was probably alive in B.C. 408. He was the son of Lyxus and Dryo, and of an illustrious family in his native state. Not liking the government of Lygdamis, who was tyrant of Halicarnassus, he retired for a time to Samos, where he is said to have cultivated the Ionic dialect of the Greek, which was the language of that island. Before he was thirty years of age he joined in an attempt, which proved successful, to expel Lygdamis. Herodotus again left his native country, and joined, as it is said, a colony which the Athenians sent to Thurii, in South Italy (B.C. 443.) He is said to have died at Thurii, and was buried in the Agora, or Public Place. Herodotus was a traveller and observer, as well as an historian. The extent of his travels may be ascertained pretty clearly from his History. The story of his reading his work at the Olympic games, which has found its way into most modern narratives, has been well discussed by Dahlmann, and we may perhaps say disproved. (*Aus seinem Buche sein Leben*, Altona.)

Herodotus makes no display of the great extent of his travels. He frequently does not say that he was at a place, but he uses words which are as conclusive as any statement. He describes a thing as standing behind the door (ii. 182), or on the right hand as

you enter a temple (i. 51); or he was told something by a person in a particular place (ii. 28); or he uses other words equally significant. In Africa he visited Egypt, from the coast of the Mediterranean to Elephantine, the southern extremity of the country (ii. 29); and he travelled westward at least as far as Cyrène (ii. 32, 181). In Asia he visited Tyre, Babylon, Ecbátana (i. 98), and probably Susa (v. 52-54; vi. 119). He also visited various parts of Asia Minor, and probably went as far as Colchis (ii. 104). In Europe he visited a large part of the country along the Black Sea, between the mouths of the Danube and the Crimea, and went some distance into the interior. He seems to have examined the line of the march of Xerxes from the Hellespont into Attica, and certainly had seen numerous places on this route. He was well acquainted with Athens (i. 98; v. 77, &c.), Delphi, Dodona, Olympia (ix. 81), Tegea (i. 66), Thasos, Delos, Zacynthus (iv. 195), and numerous other places in Greece. That he had visited some parts of South Italy is clear from his work (iv. 99; v. 44, 45). The mention of these places is sufficient to show that he must have seen many more.

The Nine Books of Herodotus contain a great variety of matter, the unity of which is not perceived till the whole work has been thoroughly examined. But the subject of his History was conceived by the author both clearly and comprehensively. 'The object of the inquiries (for so we may render the word *ιστορίαι*) of Herodotus of Halicarnassus is this, that the acts of man may not be forgotten through lapse of time, and that great and wondrous achievements, performed partly by Greeks and partly by Barbarians, may not be without their fame; and also how it came to pass that Greeks and Barbarians waged war together' (i. 1). His object then was to combine a general history of the Greeks and the Barbarians (that is, those not Greeks) with the history of the wars of the Greeks and the Persians. Accordingly, in execution of his main subject, he traces the course of events from the time when the Lydian kingdom of Croesus fell before the arms (B.C. 546) of Cyrus, the founder of the Persian monarchy, to the capture of Sestos (B.C. 478); an event which crowned the triumph of the Greeks over the Persians.

The great subject of his work, which is comprised within the space of sixty-eight years, not more than the ordinary term of human life, advances with a regular progress and truly dramatic development, from the first weak and divided efforts of the Greeks to resist Asiatic numbers, to their union as a nation, and their final triumph in the memorable fights of Thermópyle, Sálamis, and Plataea. But with this subject, which has a complete unity well maintained from its commencement to its close, the author has interwoven, conformably to his general purpose, and by way of occasional digression, sketches of the various peoples and countries that he had visited in his widely extended travels. His predecessors in historical composition appear generally to have chosen subjects of a limited nature, partaking chiefly of the character of local annals. Herodotus chose for his subject a series of events which concerned the universal Greek nation, and not them only, but the whole civilized world; and by the way in which he

executed his great undertaking he has earned the honourable and well-merited appellation of the Father of History.

The style of Herodotus is simple, pleasing, and generally perspicuous; often highly poetical both in expression and in sentiment. But it bears evident marks of belonging to a period when prose composition had not yet become a subject of art. His sentences are often ill-constructed and hang loosely together; but his clear comprehension of his own meaning, and the sterling worth of his matter, have saved him from the reproach of diffuseness and incoherence.

There is no translation of Herodotus which has yet done justice to the original; and no commentary has yet exhausted one-tenth of the matter which admits and requires illustration.

The first edition of Herodotus was the Latin translation of L. Valla, Venice, 1474, folio. The most complete edition of Herodotus is by J. Schweighäuser, Strasburg, 1816, 6 vols. 8vo. 'The Apology of Herodotus,' by H. Stephens, prefixed to his corrected edition of Valla's translation, Frankfort, 1595, is a clever and amusing vindication of Herodotus against the charge of falsehood, made on the ground that many of his stories were so singular and improbable. L'Archer's French translation, Paris, 9 vols. 8vo., with the Commentary, is a useful book. There are various English translations. That by Beloe is as bad as a translation can be.

HEROIC VERSE in its ancient sense means that which was the vehicle of Greek and subsequently of Latin epic poetry, of which the actions of the heroes were the appropriate subject. In English our common ten-syllable couplet passes under this name, chiefly, it should seem, because it is the measure into which the epics of antiquity have been most frequently translated. The Alexandrine of twelve syllables, however, has been also used by our elder writers for this purpose, as by Chapman in his translation of the *Iliad*.

HERONS. Under the head of *Echassiers* (*Grallatores*), Cuvier distinguishes the following groups, or, as he terms them, families, viz., the *Brevipennes*, the *Pressirostres*, the *Cultirostres*, the *Longirostres*, and the *Macroactyles*.

The *Cultirostres* include the Cranes, the Boatbills, the Herons, the Storks, the Jabirus, the Ombrettes, the Tantal, the Openbeaks, and the Spoonbills.

Mr. Vigors considers that the *Grallatores* are naturally divided into the following five families: *Gruidae*, *Ardeidae*, *Scolopacidae*, *Rallidae*, and *Charadriidae*, an arrangement which is adopted by Mr. Selby, and many other ornithologists.

For other views relative to the arrangement of the *Grallatores*, we may refer the student to Willughby, Ray, Latham, Duméril, Illiger, Vieillot, De Blainville, Swainson, the Prince of Canino, and other zoologists.

Under this title of *Hérons*, it is our purpose to treat of the true Herons, the Spoonbills, the Storks, and the Cranes.

HERONS.

Bill long, stout at the base, and sharp pointed; gape extending beneath the eyes; a little nasal fossa prolonged into a furrow extending almost to the point of the upper mandible; lores naked. The

internal edge of the middle toe pectinated. Tarsi very long, scutellated in front, reticulated posteriorly. Neck elongated. The stomach is capacious, and capable of considerable distension. The food of these birds consists of fish, reptiles, and such small mammalia as shrews, water rats, &c. Some, as the Common Heron, are gregarious during the breeding season, and build in lofty trees; others are altogether solitary. All are reclusive, frequenting wide marshes, and the banks of rivers, which supply them with food. Geographical range universal.

As examples, we may mention the Common Heron (*Ardea cinerea*), the Crested Purple Heron (*Ardea purpurea*), the Great White Heron (*Ardea alba*), the Little Egret Heron (*Ardea gazetta*), the Buff-backed Heron (*Ardea russata*), the Squacco Heron (*Ardea ralloides*), the Bittern (*Botaurus stellaris*), and the Night Heron (*Nycticorax Europeanus*), all claiming to be regarded as British birds.

The Common Heron is, in the opinion of Belon and some others, the *Erodias* (Erodias) of Aristotle, but we do not consider this as certain. But the bird is, without doubt, the *Ardea* of the Romans, and is the *Beccapesce*, *Airone*, *Ocacicogna*, and *Garza* of the modern Italians; *Garza* of the Spaniards; *Reyger* and *Rheier* of the Germans; *Héron* of the French; and *Common Heron*, or *Heronshaw*, of the British.



Common Heron (*Ardea cinerea*).

This species is too generally well known to need a detailed description.

In the days of falconry the heron was greatly valued, and the destruction of its eggs was visited with a penalty of twenty shillings; moreover, it held as high a place at the tables of the great as it did in the field. Its flesh is now disregarded, though according to Mr. Selby it is far from being despicable.

SPOONBILLS.

In this group the bill is very singularly formed, being spatulate at the extremity. These birds are all included under one generic head, *Platalea*.

Generic Character.—Bill very long, strong, very much flattened, point dilated and rounded into the form of a spoon or spatula; upper mandible channelled, transversely furrowed at its base. Nostrils at the surface of the bill approximated, oblong, open,

bordered by a membrane. Face and head partially or entirely naked. Tarsi long, strong; three toes anteriorly united up to the second joint by membranes or webs, posterior toe touching the ground. Wings moderate, ample; the first quill nearly as long as the second, which is the longest.

Habits of the Genus.—The spoonbills live in society in wooded marshes, generally not far from the mouths of rivers, and are rarely seen on the seashore. Their food consists of small fishes, spawn, and small fluviatile testaceous molluscs, as well as small reptiles and aquatic insects. According to circumstances, they build their nests either in high trees, in bushes, or among rushes. Their moult is simple and ordinary, but the young bird does not take the confirmed livery of the adult till the third year; the bill is gradually developed, and appears covered with a membrane. The crest makes its appearance at the second year. The sexes have external distinctions, but the characters are but slightly marked. (Temminck.)

We select as an example the Common White Spoonbill, *Platalea leucorodia*, Linn.



Spoonbill (*Platalea leucorodia*).

This species is, there can be little doubt, the *λευκωρῳδίας* (Leucorodius) of Aristotle ('Hist. Anim.,' book viii., c. 3). It is the *Becquaroueglia* (Belon) and *Cucchiaronne* (Bonaparte) of the Italians; *Pale*, *Poche*, *Cueiller*, *Truble* (Belon), and *Spatule* of the French; *Weisser Laffler* and *Laffel Gans* of the Germans; and *Spoonbill* and *White Spoonbill* of the British.

This bird is a rare visitant to the marshes of our island, but is common in many parts of the adjacent continent, and nowhere more so than in Holland, arriving there as a summer resident, and departing southwards, often with the stork, in autumn.

In this bird, and probably other species, the trachea makes a double flexure before entering the thorax, in which peculiarity it evinces an analogy to the cranes.

The eggs of the Common White Spoonbill are three or four in number, generally white, but sometimes marked with spots of reddish brown. The nest is made either in trees or among rushes or reeds.

STORKS.

The Storks are included by most naturalists under one generic head, *Ciconia*. Linnæus, Cuvier, and others separate from this the genus *Mycteria*,

distinguished by the somewhat upward flexure of the long and powerful beak; these are *Les Jabirus* of Cuvier.

There can be no hesitation as to the propriety of placing the huge *Marabous*, distinguished by their naked neck and head, and by a sort of naked pre-sternal pouch, in a distinct genus, to which the name of *Leptoptilos* has been given, and we regard the genera *Scopus*, Brisson (*Les Ombrettes*, Cuvier), and *Anastomus*, Illiger (*Les Becs ouverts*, Cuvier), as well established. Hence the generic characters of *Ciconia* will refer only to a limited number of species, of which the White Stork may be regarded as the type.

Genus *Ciconia*.—*Generic Character*.—Bill long, straight, subcylindrical, in form of an elongated cone, pointed, trenchant. Nostrils slit longitudinally in the horny substance of the bill, placed near the base. Eyes surrounded with a naked space, which does not communicate with the bill; the face, the space round the eyes, or a part of the neck often naked. Tarsi long; three toes forward, united by a membrane up to the first joint, the posterior toe articulated on the same level with the others; nails short, depressed, without dentilations. Wings moderate; the first quill shorter than the second, which is rather shorter than the third, fourth, and fifth, which are the longest.

M. Temminck observes that the storks live in marshes, and feed principally on reptiles, frogs and their spawn, as well as fishes, small mammiferous animals, and young birds. They are, in all the countries of the world where they occur, a privileged race, on account of their utility and of the havoc they make among noxious animals. Their migra-



White Stork (*Ciconia alba*).

tion takes place in great flocks. They are easily tamed. The moult is autumnal. The sexes do not differ. All the species make a clattering noise with their bills.

The species best known are the White Stork, *Ciconia alba*, and the Black Stork, *Ciconia nigra*.

The White or Common Stork is the *Πελαργός* of Aristotle and the Greeks; *Ciconia* of the Romans; *Cicogna*, *Cicogna bianca*, and *Zigognia* of the Italians; *Cicogne* and *Cigogne blanche* of the French; and *Weisser Storch* of the Germans.

Assured by the kindness with which it is treated in requital for its services in clearing the land of dead as well as living nuisances, the white stork approaches the dwellings of man without fear. In Holland and Germany, especially, the bird is treated as a welcome guest, and there, as indeed elsewhere, it annually returns to the nest which has cradled many generations, on the steeple, on the turret, on the false chimney that the Hollander has erected for its site, in the box, or on the platform which the German has placed for its use. The stump of a decayed tree is sometimes chosen by the bird, and the nest is made of sticks and twigs, on which are laid from three to five cream-coloured or yellowish white eggs, about the size of those of a goose. The incubation continues for a month, at the expiration of which period the young are hatched and carefully attended to by the parents until they are fully feathered and able to procure food for themselves. In the continental towns domesticated storks which have been taken from the nest when young may be often seen parading about the markets, where they are kept as scavengers to clear the place of the entrails of fish and other offal, which they do to the satisfaction of their employers.

Geographical Distribution.—The arrival of the stork in Europe takes place in the spring. In Seville it is very common; but, according to the prince of Musignano, it is very rare and only an accidental visitor near Rome. Though so common in Holland, it very rarely arrives in Britain; nevertheless it regularly visits Sweden and the north of Russia, and breeds there. The winter is passed by the bird in the more genial climates of Asia, and in the northern part of Africa, Egypt especially. Those who have seen these birds in the act of migration speak of their numbers as very large; Belon also remarks, that the storks are never seen in flocks, except when they are in the air; and he relates how, being at Abydos, in the month of August, a great flight of storks came from the north, and when they reached the commencement of the Mediterranean Sea they there made many circuitous turns, and then dispersed into smaller companies. When Dr. Shaw was journeying over Mount Carmel, he saw the annual migration of those which had quitted Egypt; and he states that each of the flocks was half a mile in breadth, and occupied three hours in passing over.

We may now glance at those foreign species of great size and uncouth aspect, termed *Marabous*, *Adjutants*, *Adjutant-cranes*, or *Gigantic Storks*, *Les Cigognes à Col Nud*, and from under whose tail the light and valuable plumes called *Marabou feathers* are procured. We have already alluded to these birds, so remarkable for stature, the enormous volume of their long beak, the nakedness of the head and neck, and the inflatable pendent sac hanging over the upper parts of the chest.

Of these birds three species are known, one from Africa (*Ciconia marabou*, Vigors), one from India (*Ciconia argala*, Vigors), and one from Java and the adjacent islands, described by Dr. Horsfield in the

thirteenth volume of the 'Linnæan Transactions,' and afterwards by Temminck (*Planches colorées*). Temminck, however, committed an error in calling the African bird *Argala*, and the Indian bird by the Senegal name of *Marabou*, having been induced, we believe, to make this transfer in consequence of the superiority of the plumes derived from the Indian species. The consequence of this perversion of native names has been such as might have been expected. Thus, in the last edition of his 'Règne Animal,' M. Cuvier quotes the *Ciconia marabou* of Temminck, with the characters of the Indian bird, as a native of Senegal; while he states the *Ciconia argala* of the same author, to which he attributes the characters of the African species, to be brought from India. Nothing could more strongly evince the necessity of restoring the name of *Argala* to the Indian species, and that of *Marabou* to the African species. For an account of the habits of these birds, see ADJUTANT.

CRANES.

We now come to a group which feed much more on vegetable matters than do any of those which we have previously noticed: there is therefore, as might be expected, a conformable change in the structure of the bill and stomach. The Cranes constitute the family *Gruidæ* of Mr. Vigors, and are divided into several genera.

Genus *Grus*, Pallas. *Generic Character*.—Bill of the length of the head or rather longer, strong, straight, compressed, the point in the form of an elongated cone, obtuse towards the end; lateral base of the mandible deeply channelled; base of the bill elevated. Nostrils in the middle of the bill pierced through and through in the groove, and closed backwards by a membrane. Region of the eyes and base of the bill often naked, or covered with warty excrescences (mamelons). Feet long and strong, a large naked space above the knee; three anterior toes, the middle one united to the external by a rudiment of a membrane; interior toe divided, posterior toe articulated higher on the tarsus. Wings moderate; first quill shorter than the second, which last is nearly as long as the third, and that is the longest; secondaries nearest to the body arched, or very long and subulate in some foreign species.

In the greater part of the species the trachea of the male forms circumvolutions upon itself; in the other species similar sinuosities occur in both sexes, which do not differ in external appearance. Moults once in the year.

Example, *Grus cinerea*.

This is the *Γερανός* (Geranus) of the Greeks; *Grus* of the Romans; *Grue* and *Grua* of the Italians; *Grue* of the French; *Grulla* of the Spaniards; *Graniich* and *Aschgrauer Graniich* of the Germans; and *Crane* and *Common Crane* of the British.

The Crane is migratory and gregarious. Mr. Selby has remarked that in its contour and gait it bears a considerable resemblance to some of the *Struthionidæ*, and that we are reminded of the ostrich by the long flowing plumes that overhang the tail. He is of opinion that through this and other families its affinity to the rasorial birds is readily traced; and he observes that in its internal conformation it differs very essentially from the more typical families of the *Grallatores*, and that its strong and muscular stomach indicates a different general economy from

that of the *Ardeidæ*. This is quite true; but whilst the Crane frequents open and cultivated lands, for the sake of the newly sown corn and seeds to be found in such tracts, it is far from averse to small



Common Crane (*Grus cinerea*.)

testaceous molluscs, worms, frogs, and other reptiles. Temminck says that the nest is placed among the rushes, &c., and sometimes on the walls of isolated houses. The pale bluish-green eggs, marked with brown, are two in number.

Geographical Distribution.—Temminck states that this crane inhabits the marshy plains of the oriental countries; that it is common in the north, migrates regularly in spring and autumn, is rare in its passage in Holland, and only in very severe winters. Asia is one of the tracts of country much frequented by it. Dr. Von Siebold notices it in his list of birds killed at Japan. Mr. Selby states that its equatorial migrations extend to India, Egypt, and other warm parts of Asia and Africa, but that it retires in summer to the northern and eastern parts of Europe to breed. The migrations are performed high in the air, and the progress of the flock may be traced by the loud cries of the birds when they are beyond the reach of sight. The night-time is frequently chosen for these changes of locality. The prince of Musignano notes it as very rare and accidental near Rome; Willughby, however, saw many of them in the poulterers' shops in winter. But it is in England that the alteration of the country, by drainage and inclosure, has caused perhaps the most remarkable absence of these fine birds. They were numerous in the time of our ancestors, and highly esteemed by them, both as objects of sport and as furnishing a dish fit for the table of princes.

Description.—General plumage ashy-gray; throat, front of the neck, and occiput very deep blackish-gray. Forehead and space between the eye and the bill furnished with black hairs; top of the head naked and red. Some of the secondaries arched, longer, and loose-barbed. Bill greenish-black, horn-coloured towards the point, and reddish at the base; iris red-

brown. Feet black. Length from the bill to the end of the tail, three feet eight or ten inches. The old birds have a large whitish space behind the eyes and along the lateral part of the upper portion of the neck.

Genus *Anthropoides*, Vieillot. In this genus are included the beautiful Demoiselle Cranes so conspicuous for the elegance of their actions.

The Demoiselle (*Anthropoides virgo*, *Ardea virgo* of Linnaeus) is about three feet six inches high, measured to the top of the head: from the point of the bill to the tip of the tail it is about three feet in length. Upper part of the head light gray; sides of the head, neck, and depending breast feathers, blackish; head and neck fully feathered. A tuft of pure white loose-barbed feathers, three or four inches long, directed backwards with a curvature downwards behind each eye. General tint slaty-gray; outer portions of all the quill-feathers dingy black. Secondaries longer than the primaries, forming, when the wings are folded, dependent downward-curved plumes. Bill yellowish or flesh-coloured; iris reddish-brown.

The Stanley Crane (*Anthropoides Stanleyanus*, *Anthropoides paradiseus* of Bechstein) is in its general plumage bluish-gray; the top of the tumid head, which is well covered with soft feathers, is whitish, and there is a brownish postocular band; the irides are chestnut-black, and the points of the quills, tail, &c., are brownish-black. Length from the tip of the bill to the end of the tail, three feet six inches.

Locality.—East Indies.

Genus *Balearica*, Gray. Allied to *Anthropoides*, but differing in the oval form of the nostrils, and in having on the top of the head an erect spreading crest, consisting of setaceous feathers. Two species are known: 1, the Balearic Crowned Crane (*Balearica pavonina*), a native of Northern Africa; and 2, the Kaffir Crowned Crane (*Balearica Regulorum*), from South Africa. This latter is the *Grus regulorum* of Lichtenstein, and differs from the former in the far larger size of the wattle. With respect to the habits of these birds, they are presumed to be migratory; but little is known of them, except in captivity, to which the birds are easily reconciled, living in friendship with the domestic poultry, and other captives, and even, as we have heard, interfering to prevent disputes. In a state of nature they are said to frequent swampy places, and to subsist partly upon fishes, worms, and insects, and partly on vegetable substances. They run with the wings expanded, and with great rapidity. Their note is loud, trumpet-like, and hoarse. In the catalogue of the African Museum (which was sold off in 1838) one of the species, there called the Kaffir Crane, is said to be held sacred by the Kaffirs bordering upon the Cape Colony; and if one should happen to be killed, even by accident, a calf or a young cow must be slaughtered as an atonement. Mr. Swainson notices specimens of *Ardea pavonina*, Linn., as having been brought to him when in Malta, from the little island of Lampedosa, where, he says, they are by no means scarce.

To the *Gruidee* are referrible the genera *Psophia* [AGAMI], and *Dicholophus* [CARIAMA], and perhaps *Palamedea*.

HEROPHILUS, a native of Chalcédon, was one

of the most celebrated physicians of the Alexandrine school, and lived in the reign of the first Ptolemæus of Egypt. Of his works, which appear to have been very voluminous, nothing now remains except the extracts made from them by Galen and Cælius Aurelianus, in which they are so interwoven with those of his contemporary Erasistratus, that it is impossible to say what part of the progress which medicine made in their time was owing to the labours of each.

The chief feature which marks the time of Herophilus in the history of medicine is the commencement of the study of anatomy from dissections of the human body, for which purpose the bodies of all malefactors were appropriated by the government. With such zeal did Herophilus pursue this science, that he is said to have dissected 700 subjects, and it was against him and Erasistratus that the very improbable charge was first made of having frequently opened living criminals that they might discover the secret springs of life. (Celsus, 'Præfat.')

By the labours of Herophilus and Erasistratus nearly every part of the anatomy of the human body was rendered clearer, and many most important discoveries were made.

Herophilus practised surgery as well as medicine, but it is probable that very soon after his time the division of surgery and medicine into distinct professions took place. Of his knowledge of medical practice there is not sufficient evidence in the extracts which Galen makes from his works to enable us to form an accurate idea, and his fame must rest rather on the indirect assistance which he afforded by his anatomical researches, than on any immediate addition to the means of curing disease. He does not appear to have drawn many pathological conclusions from his knowledge of the healthy structure; but his observations on the pulse, of which his master Praxagoras had taught him some of the value as a means of discriminating diseases, were important and interesting; and it was he who first showed that paralysis is the result, not of a vitiated state of the humours, as was previously imagined, but of an affection of the nervous system. Herophilus seems to have founded a school which took its name from him. According to Strabo (xii. p. 580) there was a great school (*διδασκαλίον*) of Herophilists in his time established in a temple between Laodiceia and Carura in Phrygia.

HERPES. The word herpes was employed in a very vague sense, and applied to many eruptions of different kinds, until restricted by Willan to a well-defined affection of the skin, characterized by the eruption of clusters of transparent globular vesicles, situated on a red and inflamed base extending some lines beyond them. The vesicles of each cluster commonly vary in size from a millet-seed to a very small pea; the clusters themselves are distinct, being separated by portions of perfectly healthy skin, and they generally rise in quick succession.

The eruption is preceded and accompanied by a degree of constitutional disturbance which generally varies with the extent of the local affection; being often slight and attracting no notice when this is limited and consists of a few clusters only, but very great, and marked by a very high degree of fever, when the clusters are numerous and spread over

an extensive surface in a young and plethoric subject.

The clusters of vesicles, though they retain in all cases the same characters, and follow nearly the same march, are sometimes confined to a particular locality, justifying the designation, *H. labialis*, *H. præputialis*, or assume a particular arrangement, giving rise to the varieties, *Herpes zoster*, when they are situated on one half of the body and extend in a line or band; *H. phlyctenodes*, when they are disseminated; and *H. circinnatus*, when they occur in circles or rings.

In *H. labialis* the clusters are disposed irregularly about the mouth, generally on the external surface of the lips. It is always a slight affection in itself, requiring no treatment beyond that of the disorder which it accompanies. *Herpes præputialis* soon heals under the influence of cleanliness, the local application of the lead lotion, and the administration of a few alteratives. In *Herpes zoster*, familiarly known by the name of Shingles, there is a succession of clusters of white silvery vesicles, forming an oblique line or band, limited to one half of the body, and almost always occurring on the trunk. It is unattended with danger, excepting in old persons, where the clusters are occasionally followed by gangrenous and sloughy sores. In young and plethoric subjects the treatment should consist of bleeding, saline purgatives, diet, and the application to the part of a sedative lotion. In *Herpes phlyctenodes* the clusters are disseminated, and have no particular seat. It is often met with in children during dentition. In *Herpes circinnatus*, or Herpetie Ringworm, the eruption is limited in extent, frequently of a circular form, and consists of extremely minute vesicles, which dry up and terminate in exfoliation, leaving a scurfy areola. It disappears under the influence of the local application of almost any astringent solution.

HERPESTES (Gr. ἑρπεσ, 'to creep'), a genus of carnivorine animals, of the weasel kind, of the family *Mustellidæ*.

HERPETOLOGY, that branch of science which treats of the organization, natural history, and arrangement of reptiles. The term, literally construed, means a discourse upon reptiles, from ἑρπετός (Herpeton) 'a reptile,' and Λόγος (Logos) 'a discourse.' [REPTILES.]

HERPETON (Gr. a reptile), a genus of Water-snakes, of the family *Hydrophidæ*, in which the crown is covered with plates, and the head furnished with two scaly tentacula.

HERRE'RA, ANTONIO, Coronista mayor de las Indias y Castilla, born at Cuellar, 1549, died at Madrid, 19th March, 1625. His great work bears the title of 'Historia General de los Hechos de los Castellanos en las Islas y Tierra Firma del Mar Oceano, en 8 decadas,' 4 vols. folio, Madrid, 1601. A highly improved edition, with corrections and additions, is entitled, 'Descripción de las Indias Occidentales,' 4 vols. folio, Madrid, 1730. The rarest perhaps of several other politico-historical works of Herrera is entitled 'Historiade lo Sucedido en Escocia y Inglaterra en 44 anos que vivió Maria Estuarda,' 8vo., Madrid, 1589, and 8vo., Lisbon, 1590.

HERRERA, FERNANDO, a native of Seville, lived in the sixteenth century, the golden age of Spanish poetry, among the reformers of which he

was prominent. He won the admiration of his contemporaries, who prefixed to his name the epithet of Divine.

An edition, now rare, of his poetical works appeared after his death under the title 'Obras en Verso de Hernando de Herrera,' Sevilla, 1582, 4to. Another equally rare is, 'Versos de Hernando de Herrera, emendados y divididos por él en 3 libros,' Sevilla, 1619, 4to.

Of his prose writings those remaining are, 'Relacion de la Guerra de Chipre, y Suceso de la Batalla de Lepanto,' Sevilla, 1572, 8vo.; and 'Vida y Muerte de Thomas Moro' (translated from the Latin of Stapleton), Sevilla, 1592, 8vo., and Madrid, 1625, 8vo.

HERRE'RA, FRANCISCO DE, surnamed *El Viejo* (the Elder), was born at Seville, 1576. He was one of the most eminent of the Spanish painters of the school of Seville. Among his best works are the Last Judgment in the church of S. Barnard, the Descent from the Cross, and the Effusion of the Holy Ghost, in the church of S. Ines, and, in fresco, the cupola of S. Bonaventura; all at Seville. He also worked in bronze, and has left some etchings. In 1647 he completed his works in the episcopal palace at Seville, and went in 1650 to Madrid, where he died, some say, in the same year, others in 1656.

HERRE'RA, FRANCISCO DE, the Younger (*El Mozo*), painter and architect, son of the preceding, inherited his father's talents. The father being a man of a tyrannical disposition, his son left him, and went to Rome to pursue his studies. After his father's death he returned to Seville and eventually went to Madrid, where he became principal painter to the king, and superintendent of the royal edifices. He died in 1685, aged 63.

HER'RERITE, a mineral found at Albarradon, in Mexico, and so called in honour of Herrera, who first analyzed it. It is discovered in masses of a grass-green colour, and vitreous in lustre. Its constituents are—tellurium, 55.58; carbonic acid, 31.86; peroxide of nickel, 12.32.

HERRICK, ROBERT, was born in the year 1591. Of his life few or no particulars are known, except that he was vicar of a parish called Dean Prior, in Devonshire, for the space of twenty years, was ejected by Cromwell and restored by Charles II., and long held in remembrance by his parishioners as a poet. His poems were published in 1647-48 under the title of 'Hesperides, or the Works, both Human and Divine, of Robert Herrick, Esq.' The 'Hesperides' have been reprinted in 2 vols. 4to., and 2 vols. 8vo.; 'Select Poems,' 1 vol. 8vo.; 'Poetical Works,' 2 vols. 8vo.

HERRIES, RIGHT HON. J. C., an eminent financier and political economist, was born in 1778. He received his education at the University of Leipzig, and in 1798 became a junior clerk in the Treasury. Without family connections or fortune, he had to depend on his own merit and exertions for success. During the administrations of Mr. Vansittart and Mr. Percival, he discharged the duties of private secretary from 1807 to 1811. During the latter year he was made comptroller of army accounts, and soon afterwards was appointed to the office of commissary-in-chief, which, during the war, was a place of great trust and importance. In 1822, after contributing materially to the financial reform of the

civil list, and to a complete alteration in the constitution and practice of the customs and excise departments, Mr. Herries entered political life by accepting the office of secretary of the treasury, when he was soon afterwards elected member for the borough of Harwich, which he continued to represent until 1841. In 1827 he became chancellor of the exchequer under Lord Goderich's administration, and in 1828 he was appointed master of the mint and president of the board of trade. In 1841 Mr. Herries unsuccessfully contested the borough of Ipswich, and remained out of office during the next six years, when he was returned for Stamford. During Lord Derby's administration he held office as president of the India board; but on the termination of his lordship's ministry, the right honourable gentleman finally retired from Parliament, to pass the rest of his days in domestic ease.

Amidst his many active duties, Mr. Herries was not inattentive to literature and the arts, and he was well acquainted with the ancient and modern languages of Europe. In early life he published a translation from the German work of Frederick Gentz, on the state of Europe before and after the French revolution, which excited much attention at the time; and a second edition made its appearance in 1802. His death took place in April, 1855.

HERRING, a fish of the order *Clupeidae*, of which it may be regarded as the type, and of the genus *Clupea*. It is a scaly fish, and its teeth are small and numerous. Herrings are marine fishes, congregating in vast shoals, and periodically visiting certain coasts in great multitudes. They are found in the seas of the northern parts of the world, especially in the temperate regions. They deposit their spawn in shallow water, and are very prolific—the roe of a single female herring having been found to contain 60,000 eggs. They are believed to be inhabitants of deep water, but coming up to the coasts in shoals at regular seasons they swim on the surface, and fall an easy prey to larger fish, and also to gulls and sea-birds. They are usually caught in nets. Fresh-water herrings, so called, are fishes of the genus *Coregonus*, and family *Salmonidae*, and are correctly called gwyniad in Wales, powan in Scotland, and pollan in Ireland. The herring salmon of the North American lakes is of the same nature, and does not belong to the herring tribe.

HERRING FISHERY. The principal season for herring fishing commences in September and ends in December, but to some extent, the fishing is carried on all the year round. Yarmouth, Lowestoft, Hastings, Folkestone, Cardigan Bay, and Swansea in England and Wales; the coasts of Caithness, Sutherland, Aberdeenshire, Banffshire, Morayshire, and Ross-shire in Scotland; and Galway, Killybegs on the coast of Donegal, Mayo, the estuary of the Shannon, the coast between Dingle Bay and Kenmare, Bantry Bay, Waterford, and from Mizen Head to Cahore Point on the Wicklow coast, in Ireland—are the principal localities.

The common mode of taking herrings is by a 'drift' net, being in fact a set of large nets joined together extending nearly a mile in length. They are let into the water in a straight line, with a boat at each end, and both boats and nets are then allowed to drift with the tide. The herrings are caught by

striking against the net, and becoming entangled in its meshes. When brought on shore some are sold fresh, but the greater part are cured by means of salt. At Yarmouth and some other places the herrings are, after being slightly salted, made into what are called 'bloaters,' by a process of smoking.

Herring fisheries have always been the subject of legislative protection in the United Kingdom. An act passed in 1808 granted bounties to the fishermen, and prescribed regulations for fishing, curing, inspecting, and branding herrings. The whole coast of Great Britain was divided into districts, in each of which officers were appointed to inspect and brand the barrels of herrings, and to prevent fraud in regard to the bounty. In 1817 a further boon was granted to the fishermen by allowing them the use of salt duty free, a peculiar advantage which ceased in 1823 by the repeal of the duty on that article. In 1830 the bounty was wholly withdrawn; and the 21st and 22nd Vict., c. 69, exacts a fee for every barrel of herrings on which the government brand is imposed as a mark of its quality, prohibits the use of certain nets and certain methods in taking the fish, and surrenders the traffic to the care of private interest and the salutary effect of public competition.

In addition to the home fisheries, we obtain a large supply of herrings from Norway and Newfoundland. In 1863 the exports of herrings from the United Kingdom amounted to 438,745 barrels, of the value of 501,032*l.* Prussia, Hanover, and Austria were the principal markets.

HERSCHEL, WILLIAM, was the second son of a musician at Hanover, and was born November 15, 1738. His father brought him up to his own profession, with a good education in other respects. At the age of fourteen he was placed, it is said, in the band of the Hanoverian regiment of guards, which regiment he accompanied to England at a period which is variously stated from 1757 to 1759. Another account states that he came to England alone. After his arrival, he was for some time at Durham, where he is said to have superintended the formation of a band for the militia, and afterwards was for several years organist at Halifax, where he employed himself in teaching music and studying languages.

About 1766 he was organist of the Octagon chapel at Bath; in which place he began to turn his attention to astronomy. Though not a mathematician of the first order, his attainments in that science were more than respectable. The earliest writing of Herschel which has come to our knowledge is the answer to the prize question in the *Ladies' Diary* for 1779, namely: 'The length, tension, and weight of a musical string being given, it is required to find how many vibrations it will make in a given time, when a small given weight is fastened to its middle and vibrates with it.'

His astronomical pursuits led him to desire a telescope, and, as the purchase of a good reflector was 'fortunately' above his means, he resolved to make one for himself. After many trials he succeeded in making a Newtonian telescope of five feet focal length.

Herschel began to contribute to the 'Philosophical Transactions' in 1780, and in 1781 announced to the world his discovery of a supposed comet, which soon turned out to be a new planet. [URANUS.]

It is the method which gave rise to it on which this part of Herschel's fame must rest. Perceiving how much depended upon an exact knowledge of telescopic phenomena, and a perfect acquaintance with the effect produced by differences of instrumental construction, he commenced a regular examination of the heavens, taking the stars systematically in series, and using one telescope throughout. Herschel was not a diletante star-gazer, but a volunteer carrying on with no great pecuniary means a laborious and useful train of investigation.

The announcement of this comet or (as it turned out) planet drew Herschel immediately into the full blaze of fame; and George III. honoured his reign by immediately attaching the new astronomer to his court under the title of private astronomer to the king, and with a salary of 400*l.* a year. Herschel fixed his residence first at Datchet, and afterwards at Slough, near Windsor, and his abode became, as Fourier remarks, one of the remarkable spots of the civilized world. His family consisted at first of one of his brothers, and his sister, Miss Caroline Herschel, who was his coadjutor and assistant in his computations and reductions, and was also employed in observation. [HERSCHEL, CAROLINE LUCRETIA.]

Herschel married a widow lady, Mrs. Mary Pitt, and left one son, whose name has long been known to the public as one of the most active and successful adherents of science that our day has produced.

Herschel was soon in affluent circumstances, partly by the profits arising from the sale of his mirrors for reflecting telescopes, and partly by the jointure of his wife, which was considerable, and he died wealthy. In 1816 he was presented with the decoration of the Guelphic order, and in 1820 was chosen the first president of the Astronomical Society. After completing his paper on 145 double stars, which was published in the first volume of the *Transactions of the Astronomical Society*, his health began to decline, and his death took place on August 23, 1822.

Herschel must be remembered by the number of bodies which he added to the solar system, making that number half as large again as he found it. Including Halley's comet, and the four satellites of Jupiter and five of Saturn, the number previously known was eighteen; to which he added nine, namely, Uranus and six satellites, and two satellites to Saturn. His discovery of the rotation of Saturn's ring, his measurements of the rotation of Saturn and Venus, his observations of the belts of the former, and his conjectural theory, derived from observation, of the rotation of Jupiter's satellites, with a large number of minor observations, prove that no one individual ever added so much to the facts on which our knowledge of the solar system is grounded. To this we must add, that his announcement (in 1803) of the motions of binary stars round each other was accompanied by the first proof that there exists in the universe organized systems besides our own; while his writings on the Milky Way, the constitution of nebulae, &c., &c., gave an experimental foundation to the conception that what was called the universe might be, and in all probability is, but a detached and minute portion of that interminable series of similar formations which ought to bear the name.

The instrument by which this great work was

achieved was the reflecting telescope. The second reflecting surface which is found in the constructions of Newton, Gregory, and Cassegrain, having been rejected, and the eye-piece applied directly to the image produced from the large mirror, forms the distinguishing feature of the Herschelian telescope. Herschel had constructed more than one such instrument of 20 feet focal length before he attempted the enormous one of 40 feet. This instrument was begun in 1785, and Herschel dates the completion from August 28, 1789, on which day he discovered with it the sixth satellite of Saturn.

The catalogues of double stars, nebulae, &c., and of the comparative brightness of stars, would alone constitute a title to the name of a distinguished astronomer, and the optical researches, with those on the refrangibility of heat, are highly valuable: while the papers on the power of telescopes should be read by all who wish to understand those instruments.

HERSCHEL, CAROLINE LUCRETIA, sister to the great astronomer of that name, and the sole assistant of his astronomical researches, was born in Hanover in 1750. So highly were her scientific labours in connection with her brother's abstruse calculations appreciated by his Majesty, George III., that he was graciously pleased to grant her a salary sufficient for her moderate requirements. Not only did she execute the whole of the extensive and laborious numerical calculations necessary to render her brother's researches available to science, but she found time at intervals, both for actual astronomical observations of her own, and for the execution of more than one work of great utility and extent. With a Newtonian sweeper, constructed by her brother, she was in the habit of searching the heavens for comets, and that so effectively as to be rewarded with eight different discoveries from August 1786 to August 1797. Her claim to the first discovery of five of them was admitted by the scientific world. During these sweeps of the heavens, Miss Herschel also discovered several remarkable nebulae and clusters of stars which had never before been observed, and which are recorded in Sir William Herschel's catalogue. Among her astronomical works, which she found time to execute at intervals of leisure, were—1st, 'A Catalogue of 561 Stars observed by Flamsteed;' 2nd, 'A General Index of Reference to every Observation of every Star inserted in the British Catalogue;' 3rd, 'A Zone Catalogue,' comprehending all the nebulae and clusters of stars observed by her brother in his sweeps; for which she received the gold medal of the Astronomical Society of London, and was elected an honorary member. On the death of her brother, in 1822, she left England, where she had resided for about half a century, and returned to her native place, which she never again quitted—passing the last twenty years of her life in repose, and respected by all who knew her. She died in 1848, in her ninety-eighth year.

HERSCHELITE, a mineral which occurs in six-sided prisms, and so called in honour of Sir William Herschel. In colour it is translucent, white, or opaque. It consists of potash, silica, and alumina; and its specific gravity is 2.11.

HERSE (Fr. *herise*), in the Middle Age, a kind of machine used in fortification, which consisted of

a series of spikes projecting from transverse pieces of wood. It was sometimes used as a portcullis, to serve as an interior protection, after the outer gate had been forced by the enemy.

HERSFELD. [HESSE-CASSEL.]

HERTFORD. [HERTFORDSHIRE.]

HERTFORDSHIRE, an English county, situated between $51^{\circ} 36'$ and $52^{\circ} 5' N.$ lat., and $0^{\circ} 13' E.$ and $0^{\circ} 45' W.$ long. It is bounded N. by Cambridgeshire, E. by Essex, S. by Middlesex, W. by Buckinghamshire, and N.W. by Bedfordshire. Its length from N.E. to S.W. is 39 miles; its greatest breadth, N.W. to S.E., 25 or 26 miles. Its area is 391,141 statute acres, of which about 350,000 are grass and arable. The population at the census of 1861 numbered 173,280—84,352 males, and 88,928 females—being an increase of 5982, or 4 per cent., from 1851. The number of inhabited houses in the county was 34,893; 1563 being returned as uninhabited, and 193 building.

Surface, Rivers, &c.—Hertfordshire has no lofty hills. The highest elevations are the Chalk Downs. Kensworth Hill, just within the border of the county, near Dunstable, is 908 feet high. The surface of the county is generally undulating, and from the abundance of wood presents a variety of pleasing scenery.

The rivers for the most part belong to the basin of the Thames. The principal are the Colne and the Lea: the Hiz and some other streams in the northern part of the county belong to the system of the Ouse. The Lea rises in Luigraue or Leagrave Marsh, near Luton, in Bedfordshire. Its whole length, from the source to its junction with the Thames at Bromley, near London, is about 50 miles. The navigation commences at Hertford.

The Colne, a feeder of the Thames, rises between Idlestree, or Elstree, and Barnet, and flows through a projecting part of the county of Middlesex into Hertfordshire again, which it leaves at Rickmansworth. The streams which belong to the system of the Ouse have but a small part of their course in this county.

The New River, which was begun in 1608, and which contributes so largely to the water supply of the metropolis, is brought to London from springs in the neighbourhood of Ware. It has a feeder from the Lea near the town, and is carried along the valley and nearly parallel to the course of that stream.

The county is traversed by the London and North-Western, the Great Northern, and Great Eastern lines, and by the Grand Junction Canal.

Geology, Climate, and Agriculture.—This county is comprehended in the chalk basin of London. The S.E. and S.W. parts are occupied by the London clay, which extends to a line drawn from the Stort, between Sawbridgeworth and Bishop's Stortford, to the north of Ware, Hertford, and Hatfield, to St. Albans, and from thence along the valley of the Colne. To the N.W. of this line all the county is occupied by the chalk, excepting a few spots along the border of Bedfordshire, where the subjacent strata crop out.

The county has no minerals of any value: there are a few medicinal springs, chiefly chalybeate; the principal are on Barnet Common, Northaw Common,

and at Cuffley, in Northaw parish, all near the Middlesex border.

The climate is as mild and genial as that of most of the inland counties. The harvest is early where the soil is light and rich, as is the case in some of the valleys. On the cold wet clays which are found in some parts of the county, and the most exposed tops of the chalky hills, the crops are later; wheat, barley, oats, turnips, and sainfoin being the chief products.

The number of resident gentry in Hertfordshire tends to introduce a high state of cultivation around their immediate residences; but as the mansions are generally erected in the driest and best situations, the cold wet clays are somewhat neglected.

Hertfordshire is remarkable for its high banks and hedges. Wherever the old high banks have been levelled, and neat quick hedges have been planted in their stead, the ground which has been gained has soon paid the expense.

It cannot be said that there is any peculiar system of cultivation in Hertfordshire. Every system may be occasionally met with. The consequence has been a great difference in the products of adjoining farms. The crops are reaped as close to the ground as possible, in order that the straw may be sold in London, and manure brought back in return. Fewer cattle are fed in winter than in more distant counties, as manure can be obtained without them.

Garden husbandry has been introduced on the best soils nearest to London for the growth of early potatoes, cabbages, peas, and other culinary vegetables, which are succeeded in the same year by other crops, the whole being forced by an abundance of manure.

There are many orchards in Hertfordshire, chiefly for apples and cherries, which are sold in London. No cider is made. There are many woods and coppices in the poorer soils, but they are fast diminishing in number.

The manufactures in Hertford are chiefly confined to paper and straw-plait, but much malting is carried on.

Divisions and Towns.—Hertfordshire is divided into 8 hundreds and 134 parishes. It is in the diocese of Rochester and the Home circuit. The assizes are held at Hertford. The county returns three members to Parliament; and the borough of Hertford two, making five in all.

Two members were formerly returned for St. Albans, but that borough was disfranchised for bribery in 1852.

The number of registered electors for the county in 1865 was 6228.

The following are the principal towns, with the population of each in 1861:—

St. Albans. [ALBANS, ST.]

Baldock is 34 miles from London. The town is said to have been built by the knights templar before the time of Henry III. The church is a large and handsome Gothic edifice. There is a range of six almshouses in the High Street. A considerable trade is carried on in malt, and there are also manufactures of straw-plait. Population, 1974.

Barnet is about 13 miles N.W. from Hertford, and 11 miles from London. It formerly belonged to the abbot of St. Albans, to whom the market was

granted in the reign of Henry II. The country around is celebrated for its hay, and a great deal of business is done at the market. The church was erected in 1400, by John Mort, bishop of St. Albans. It contains many ancient monuments. In 1471 the decisive battle of Barnet was fought on Gladsmore Heath, near the town, between the York and Lancastrian forces, when the latter were defeated, and their leader, the earl of Warwick, was killed. An obelisk has been erected in commemoration of this event. Population, 2989.

Berkhamstead is 26 miles from London (or 28 by the North-Western Railway), and about 18 from Hertford. It has a considerable trade, which is assisted by the navigation of the Grand Junction Canal. The town is large and handsome. It was called by the Romans *Durobrivæ*, and became a place of some eminence under the Saxons. The church is a Gothic structure of considerable beauty, containing numerous interesting monuments. Among the schools in the town is a free grammar-school, founded in the reign of Henry VIII. There is also a corn exchange, and a gaol and house of correction. Cowper, the poet, was born here in 1731, while his father was rector of the parish. Population, 3585.

Bishop's Stortford is distant from London 30 miles (or 32½ by the Great Eastern Railway). It takes its name from the river Stort and the fact that the manor belonged from a very early period to the bishops of London. The town is built in the form of a cross, the two principal streets intersecting each other, with the market place in the centre. A great deal of corn is accumulated here, and the malting trade carried on to a great extent. The general business of the town is much facilitated by a canal communicating with the Lea. The church possesses a fine lofty tower. There is also a town-house and several chapels. Population, 5390.

Broxbourne, a place on the Great Eastern Railway, 19 miles from London, resorted to chiefly for the purpose of fishing. It contains a church dedicated to St. Austin. Population, 2663.

Cheshunt, a village 14 miles from London by the Great Eastern Railway, and about 6 S.E. from Hertford. The name is written in Domesday 'Cestrehunt,' from which it has been conjectured that it was a Roman station. Cheshunt was the retreat of Richard, son of Oliver Cromwell, under a feigned name, and the scene of his death in the reign of Queen Anne. Population of the parish, 6592.

Hatfield is 19½ miles from London, and about 6½ W.S.W. from Hertford. The manor of Hetfelle (as it is called in Domesday) was granted by King Edgar to the abbey or monastery of St. Ethelred at Ely, and upon the erection of that abbey into a bishopric in 1108, is supposed to have acquired the designation of Bishop's Hatfield. The bishops of Ely had a palace at Hatfield, which, with the manor, was made over to the crown in the time of Henry VIII.: the palace was the residence of Prince Edward, afterwards Edward VI. Elizabeth held her first privy council here. The gateway and west end of the palace are still standing. Hatfield is a station on the Great Northern Railway, the head of a poor-law union, and a county polling-place. Population of the parish, 3871.

Hemel Hempstead is 23 miles from London, and

about 15 W.S.W. from Hertford. The town consists chiefly of one long street. The females of the town are much engaged in making the straw-plait, and there are corn and paper mills in the neighbourhood. The town-hall is a long narrow building, with an open space under for the market, which is one of the largest in the county for corn. The town contains also a union workhouse, and the West Herts Infirmary. The church, a large building, is partly of Norman architecture, of which the west door is a fine specimen. Population, 7948.

Hertford, the county town, is in a low valley below the junction of the Maran or Mimram, and just above that of the Beane with the Lea, which last-mentioned river runs through the town. It is 26 miles from London by the Hertford branch of the Great Eastern Railway.

The town is irregularly laid out, but the streets are well paved, and the town has a very clean and neat appearance. It has two parish churches. Near the east end is a large building belonging to the governors of Christ's Hospital, in London, at which a number of the girls and of the younger boys of that charity receive their education. The buildings are capable of containing 500 children, with their needful attendants. Haileybury College, formerly used for the instruction of students intended for the civil service of the late East India Company, is at a short distance from the town.

No manufacture is carried on at Hertford, but a good deal of business is done in malting, and there are many corn-mills on the Lea, the Mimram, and the Beane. It also has a large corn market. It is a municipal borough, and is governed by four aldermen and twelve councillors. The assizes for the county are held here. Hertford returns two members to Parliament. Population of the municipal and parliamentary borough, 6769. The number of voters on the parliamentary register for the borough in 1864 was 539. Hertford is also the place for the county election.

Hertford is a place of considerable antiquity. About 905, Edward the Elder built the castle, and rebuilt the town, which had probably been ruined by the Danes. Jean II., king of France, and David, king of Scotland, spent part of their captivity here during the reign of Edward III. Queen Elizabeth occasionally resided and held her court in the castle. There are numerous almshouses and other charities, an infirmary, county-hall, new corn exchange, free library, gaol, national, grammar, and charity schools in the town.

Hitchin is 34 miles from London, and 14½ N.W. from Hertford. The town, which consists of several streets, is irregularly laid out. The principal trade is in corn and malt. Much straw-plait is made; there are some breweries, and also a silk-mill. The church is a handsome edifice, built upon the foundations of a more ancient structure. The south porch is a remarkably fine specimen of Gothic architecture in the perpendicular style, and there is a font of the same character; also numerous sepulchral monuments and brasses. There are several public schools. Hitchin is a station on the Great Northern Railway, and has several lavender farms. Population, 7677.

Hoddesdon is a hamlet 17 miles from London. The town consists chiefly of two long streets. The

ancient market-house, a wooden edifice supported on arches and pillars curiously carved, is in the middle of the town. The chief business of the town is malting. The church is large, of perpendicular character, with some elegant chapels and ancient monuments. Population, 1898.

Rickmansworth is 18 miles from London, and about 27 from Hertford. The town is irregularly laid out. The church, with the exception of the tower, was rebuilt some years ago. There are several silk, paper, and flour mills near the town; and some straw-plaiting and horse-hair weaving is carried on. The Grand Junction Canal passes through the town. Near Rickmansworth is Moor Park, which was the residence of Cardinal Wolsey, of the unfortunate James, duke of Monmouth, and of Lord Anson. The town contains several free schools. Population, 4873.

Royston is 37½ miles from London, and about 17 from Hertford. It is situated partly in Cambridgeshire. The principal business is malting; a large corn trade is also carried on. The church was formerly the conventual church of a priory of the regular canons of St. Augustine. A brick building in the northern part of the town was once the occasional residence of James I. There are schools of various descriptions in the town, a union workhouse, and a market-house, under which a curious ancient cave has been discovered. Population, 1882.

Tring is 31½ miles from London by the North-Western Railway, and about 23 miles from Hertford. The town is neat, and contains several good houses. The church is an ancient building, with a massive tower, and contains some ancient monuments. There is a Lancasterian free school, and various small charities in the town. Manufactures of silk, canvas, and straw-plait are carried on. The parish is intersected by the Grand Junction Canal. Near Tring the largest cutting on the North-Western Railway occurs, passing through chalk strata. It extends nearly two miles and a half, has an average depth of forty feet, but in some places amounting to sixty; and 1,400,000 cubic yards of chalk were removed in forming it. Population, 4841.

Ware is 20 miles from London, and 2½ miles from Hertford by the Enfield branch of the Great Eastern Railway. Up to this place the Danes, in the reign of Alfred, brought their vessels, and protected them by a dam or weir across the river, from which weir the town is said to have obtained its name; the Lea is navigable to Ware. The church consists of a chancel, with a chapel on each side; a nave with two side aisles, and two projections resembling transepts; with a square embattled tower. There is considerable trade at Ware in grain and coal. The town is also one of the chief seats of the malting trade in the kingdom. At one of the inns is a large bedstead, 12 feet square, elaborately carved in oak, and of uncertain origin and use. It is alluded to by Shakspeare ('Twelfth Night,' act iii., scene ii.), and is popularly known as the Bed of Ware. There are numerous schools in the parish. Near Ware are the head-springs of the New River, by which water is conveyed for the supply of the northern part of London. Population, 5397.

Watford is 15 miles from London by the North-Western Railway. It is situate close to a ford over

the Colne (whence its name), and has manufactures of straw-plait and malting. The place is also a large mart for corn and live stock. The Grand Junction Canal runs on its western side. The town consists principally of one main street, about a mile in length, near the centre of which stands the church. Population, 7418.

History and Antiquities.—At the time of Cæsar's invasion, Hertfordshire seems to have belonged to the Catyenchlani, or Catuellani, of whom Cassivellaunus, the antagonist of Cæsar (B.C. 54), is supposed to have been the chief. [BRITANNIA.]

Several of the ancient British roads or trackways crossed this county. The traces of the British Watling Street are obliterated by the Roman road afterwards carried along the same line. Traces of Ermin Street, and still more of Icknield Street, may yet be recognized. The Romans included Hertfordshire in the province of Flavia Cæsariensis. At Wilbury Hill, three miles west of Baldock, is an ancient camp on the Icknield Way, inclosing about seven acres.

When the Saxons subjugated Britain, Hertfordshire appears to have been included in the two kingdoms of Essex and Mercia. In the invasions of the Northmen, which troubled the close of the reign of Alfred (in 896), they brought their vessels up the Lea to the neighbourhood of Hertford or Ware. Edward the Elder, son of Alfred, built Hertford Castle.

In the civil broils of the reign of John, Hertford Castle was defended for the king by Walter de Godarvil, against the revolted barons and the Dauphin Louis of France. After the general rising of the peasantry under Wat Tyler and Jack Straw, many of the ringleaders were tried and executed at St. Albans. In the war of the Roses, this county was repeatedly the scene of contest. The battle of Barnet, in which Warwick fell in battle against Edward IV., was fought in Middlesex, just beyond the boundary of Hertfordshire.

On the breaking out of the war between Charles I. and the Parliament, this county was the scene of one of Cromwell's earliest exploits. While yet a captain of a troop of horse which he had raised, he arrested the high-sheriff of Hertfordshire as he was proceeding to St. Albans to publish the king's proclamation declaring all the parliamentary commanders traitors.

HERTHA, or HERTHUS, the Goddess of Earth among the ancient Germans. Tacitus ('Mor. German.,' c. 40) says that she was worshipped by the Suevi, and that her sanctuary was in a grove in an island of the ocean, and was served by a single priest. A cart, covered by a cloth to conceal the goddess, was taken out of the sanctuary on certain occasions, and was drawn by cows about the country with great solemnity. This was a time of general rejoicing, a cessation of war took place, and peace reigned over the land, until the goddess was restored to her sanctuary.

HERVEY, JAMES, born in 1714, was educated at Lincoln College, Oxford. He took orders in the established church, devoted his whole life to acts of piety and beneficence, and died early, of a decline, in 1758. For some years preceding he had been rector of Weston-Favell in Northamptonshire. His

works are numerous, and all religious. In doctrine he leaned towards the Calvinistic school. The most popular of his works were, 'Meditations among the Tombs,' 'Contemplations in a Flower Garden,' 'On the Night,' &c., 1746-47; and 'Theron and Aspasia; or, a series of Dialogues and Letters on the most important Subjects,' 1753.

HERZEGOVINA, an extensive tract of country situated on the eastern shores of the Adriatic, generally known as Turkish Dalmatia, has of late years assumed some geographical importance from the successful resistance of the Montenegrins to Turkish domination, of which Herzegovina formed the centre and starting point. It lies between lat. 43° and 44° 20' N. The southern and larger portion belongs to Turkey, and the remainder to Austria. It is bounded N.E. by Croatia and Bosnia, S. by Montenegro and Albania, and W. by Dalmatia and Cattaro. Herzegovina formerly belonged to Croatia, when that kingdom was independent; but in 1326 it was incorporated with Bosnia. Under the Emperor Frederick III. it became an independent duchy; but after many protracted contests with the Ottoman arms, it was finally ceded to Turkey by the peace of Carlovicz, in 1697. The Porte once more incorporated it with Bosnia, and it has been retained by that power for the last two centuries. The extent of Bosnia, including Herzegovina, is estimated at 900 square leagues; and, according to a census taken in 1848, the population was roughly estimated at 1,400,000. The Bosniaks form about a third of the population; the Croats are estimated at 180,000; and the Morlachs at 150,000; the latter being concentrated at Herzegovina, and famed as the most determined adversaries of the Turks. All these different peoples belong to the ancient Slavonic race. They chiefly follow the Greek Church, and have a thorough detestation and contempt for the Turkish rule.

HESIOD. [PAS-DE-CALAIS.]

HESIOD was a native of Asera, a village at the foot of Helicon, whither his father had migrated from Cuma in Æolis. The only works that remain under the name of Hesiod are—'The Theogony,' 'The Shield of Hercules,' and the 'Works and Days.' The 'Works and Days' consists of advice given by Hesiod to his brother Perses on subjects relating for the most part to agriculture and the general conduct of life. In its present state the poem shows want of purpose and of unity, too great to be accounted for otherwise than on the supposition of its fragmentary nature. The 'Theogony' consists, as its name expresses, of an account of the origin of the world, including the birth of the gods, and making use of numerous personifications. The 'Shield of Hercules' is a fragment, or rather a cluster of fragments; some of them by very late Rhapsodists, who copied, according to Aristophanes the grammarian, from Homer's description of the shield of Achilles.

The best modern editions of Hesiod are Götting's (in 1 vol. 8vo., published in the 'Bibliotheca Græca'), and Dindorf's, Leipzig, 8vo.

HE'SIONE (Zoology), the name of a genus of *dorsibranchiate Annelids*, with a short but rather stout body, composed of a few ill-defined rings. A very long cirrus, which probably executes the function of branchiae, occupies the upper part of each foot, which has also another lower one and a packet

of fine bristles. The proboscis of Hesione is large, and without either jaws or tentacles.

HESPERIDÆ (Stephens), a family of Lepidopterous insects of the section *Lepidoptera diurna* of Latreille.

Distinguishing Characters.—Antennæ terminated by a distinct club, generally with a minute hook at its extremity; tibiae with two pairs of spurs, one at the apex, and the other near the middle; claws very small, bifid; body thick; wings small, the posterior pair with a groove to receive the abdomen. The larvæ are pubescent, or naked, and have a large head; pupa smooth, inclosed in a web.

These little butterflies have a large head, and a thicker body and smaller wings than the more typical species; they are, moreover, at once distinguished from them by their possessing two pairs of spurs, or spines, to the legs; their flight is short and in frequent jerks; hence they have received the name of Skippers.

One species, *Hesperia sylvana*, very common in various parts of England, and chiefly found on the borders of woods, will afford an example of the tribe of which we are treating.

There are several other species of the family *Hesperiidæ* found in this country, of which the *Thymele alveolus* may be noticed. This is a little black butterfly with numerous silver-like spots, and is known to the English entomologist by the name of the Grizzled Skipper.

HESPERIDES, in Greek mythology, a family of Nymphs, the daughters of Atlas, by Hesperis, the daughter of Hesperus. They dwelt in a beautiful garden in the western parts of the earth, in which grew the celebrated tree which bore golden apples. These apples were guarded by a fierce dragon named Ladon, which never slept. Hercules killed the dragon and carried off the precious fruit. The gardens of the Hesperides are variously placed—in an oasis of the African desert, in Cyrenaica, at the foot of Mount Atlas, and in the Happy Islands of the Atlantic.

HE'SPERIS, a genus of plants belonging to the natural order *Crucifera*, and the tribe *Sisymbrea*. The flowers emit a sweet fragrance during the night, and hence the genus derives its name. *H. matronalis*, Dame's Violet, is the only British species.

HESSE, an extensive country of Germany, which, in ancient times, was inhabited by the Catti. Till about the middle of the thirteenth century the history of Hesse was blended with that of Thüringen; but Henry Raspe, landgrave of Thüringen, dying without children in 1247, a war for the succession took place, which was terminated in 1263 by a compact, by which Hesse was separated from Thüringen, and assigned to Henry, son of Sophia, duchess of Brabant, daughter of the late landgrave's brother, who was the common ancestor of all the succeeding landgraves of Hesse-Cassel, and the dukes of Hesse-Darmstadt.

HESSE-CASSEL, from the time of William IV., 1592, suffered in the successive wars which desolated Germany, but did not sustain any loss of territory; on the contrary, it made several acquisitions. After the Thirty Years' War, Hessian mercenaries in the service of other continental powers were employed in almost all the European and Turkish wars; a system which indeed enriched the princes of Hesse,

but did not tend to promote the prosperity of the country. The title of elector was first assumed by the landgrave William IX. in 1803.

This prince concluded a treaty with the allied powers, and subsequently became a member of the German Confederation. He died in 1821. His son and successor, William II., embroiled himself seriously with his subjects. He appointed his son, the electoral prince, regent, who entered on his functions October 1, 1831, and succeeded to the electorship November 20, 1847.

The electorate of Hesse is situated between 49° 56' and 52° 25' N. lat., and 8° 25' and 10° 8' E. long. It consists of three distinct portions, of which the largest, extending only to 50° 40' lat. and 10° 15' long., is bounded N.E. by Hanover and the Prussian province of Saxony, E. by Weimar and Bavaria, S. by Bavaria, W. by Nassau and Hesse-Darmstadt. The detached portions are the county of Schaumburg on the N., surrounded by Hanover and Lippe, and the lordship of Schmalkalden on the E., surrounded by the Saxon principalities and the Prussian circle of Schleusingen. The area of the whole is 4430 English square miles.

Divisions.—The electorate is divided into four provinces, with a total population of 738,454.

I. LOWER HESSE (358,806 inhabitants), divided into 10 circles, with 34 towns, 8 market boroughs, and 519 villages. Chief town, Cassel, the capital of the electorate. [CASSEL.]

II. UPPER HESSE (119,493 inhabitants), divided into 4 circles, with 16 towns, 4 market boroughs, and 206 villages. Chief town, Marburg, the capital, and seat of the university.

III. FULDA (136,572 inhabitants), 5 towns, 7 market boroughs, and 198 villages. It consists of, 1, the grand-duchy of Fulda; 2, the circle of Hersfeld; 3, the circle of Hünfeld; 4, the lordship of Schmalkalden.

IV. HANAU (123,583 inhabitants), 7 chief towns, 14 market boroughs, 189 villages, divided into circles. Chief town, Hanau, at the confluence of the Kinrig and the Main, with a population of 16,582.

Face of the Country, Soil, Climate, and Productions.—The country is in general hilly; but it contains numerous valleys, which in some places expand into more extensive plains. On the S.E. and S. the Thüringerwald, the Rhön, and the Spessart extend their branches into the country from the Saxon duchies and Bavaria, and cover the province of Hanau, and the whole tract between the Werra and the Fulda. The other principal chains are the Hundsrück, the Wesergebirge, and the Vogelsgebirge. The soil is almost unexceptionally fertile and well adapted for agriculture. The climate is on the whole temperate, and everywhere healthy. The principal rivers are the Main, the Weser, the Werra, the Lahn, and the Fulda.

Corn, maize, pulse, and potatoes in great abundance, are cultivated. Flax and timber are staple articles: tobacco, hemp, madder, a few hops, and rapeseed are also among the products. The vine is cultivated only in some parts of Hanau. The pasturage is in general good. Garden produce of excellent quality is raised about Cassel and Hanau. The breeding of cattle is general. Domestic poultry and game are very abundant. Hesse abounds in mineral

wealth, producing silver, copper, lead, iron, quick-silver, cobalt, salt (from saline springs and in great quantities), saltpetre, vitriol, and alum. There are also coals, marble, very fine white alabaster, porcelain, potter's clay, pipe clay, &c. Gold in small quantities is found in the sands of the Edder.

Manufactures, Trade, &c.—The manufactures of Hesse-Cassel have been greatly extended since the state joined the German Customs Union. The most important are linen fabrics, called Osnaburgs, flannels, carpets, cottons, silks, and velvets; iron and steel goods of every description, paper, wooden wares, pianos, chemical products, tobacco, beet-root sugar, pottery, and jewellery, are also made. The chief exports are linens, carpets, jewellery, iron and steel goods. The imports consist of colonial goods, cotton, silk, wine, and brandy. The chief branch of trade is in the transit of goods, which is facilitated by the navigable rivers and numerous railways. In 1832 Hesse-Cassel and Hesse-Darmstadt united with Prussia to form the origin of the German Customs Union.

Constitution and Government.—The present constitution of Hesse-Cassel was proclaimed January 5, 1831. It was abrogated for some time, a new charter, of April 13, 1852, being substituted; but in consequence of general dissatisfaction, expressed in the refusal to pay taxes, the constitution of 1831 was re-established by a decree of the elector, of June 21, 1862. According to this fundamental law, the executive power alone is in the hands of the sovereign and his responsible ministers, and the right of legislation is vested in a House of Parliament, consisting of a single Chamber. It is composed, in conformity with the electoral law of May 6, 1863, of the princes of the reigning house; the heads of a number of noble families possessing landed estates; nine deputies of other nobles and of noble institutions; two deputies of universities; sixteen representatives of towns, two of which are from the city of Hanau, and two from Cassel; and sixteen representatives of rural districts. The right to vote, as also that of being elected a deputy, is bound to a small property qualification. One half of the representatives of rural districts must be engaged in agriculture; but the towns may choose their deputies from among any class of citizens. The council of ministers is responsible to the people, and may be put in accusation by a vote of the Chamber.

Church and Education.—The reigning family, as well as the majority of the inhabitants of Hesse-Cassel, belong to the Reformed, or Calvinist Church. According to the last census, there were 373,599 Calvinists; 133,800 Lutherans; and 102,486 United Evangelicals—altogether 609,885 Protestants. The Roman Catholics numbered 107,695, and the Jews 16,358. The affairs of the Reformed Church are managed by three consistories, at Cassel, Marburg, and Hanau; while the Lutherans are under a general superintendent, appointed by the minister of the interior. The United Evangelicals carry on their own ecclesiastical government by a central committee and occasional synods. A Roman Catholic bishop, at Fulda, is at the head of the Catholic Church. The clergy, in general, have very little influence, and are ill-paid and of small social consideration.

Until recently, Hesse-Cassel was somewhat behind

the neighbouring German states in education; but within the last few years great improvements have been made in this respect. Numerous elementary schools have everywhere been established, and although education is not compulsory, there are few grown-up persons to be met with who are unable to read and write. The upper educational establishments comprise the University of Marburg, the Military and Polytechnic School at Cassel, and the Theological Seminary at Fulda. The latter is for Roman Catholics; while the Protestants have similar establishments at Cassel, Marburg, and Hanau. The University of Marburg, founded in the year 1527, has, on the average, between three and four hundred students.

Revenue and Expenditure.—The budget period embraces a term of three years. The annual revenue and expenditure are each about 750,000*l*. The public debt is about 1 $\frac{3}{4}$ millions sterling. The whole financial state of Electoral Hesse is as yet very imperfectly known; most of the former governments refusing to give a specific account of the management of the 'state property,' including crown-lands, forests, mines, and other important sources of revenue. It has been stated in the Chamber that, under proper administration, and 'absence of high speculation,' the income from these sources would be abundantly sufficient to pay the whole of the public expenditure.

Army.—The army is formed by annual conscription, with permitted substitution. The nominal term of service is five years, reduced in practice to little more than one. Organized on the 'peace footing,' and actually under arms, are the following troops:—Four regiments of infantry, 5770 men; one brigade of cavalry, 988 men; one regiment of artillery, 651 men: total, 7409 men.

The population of the country was 567,866 in the year 1818, and kept on slowly increasing till 1849, when came a period of decline. The census of 1849 showed a population of 759,751, which had sunk in 1852 to 755,350. The next census of 1855 showed a further diminution to 736,392, or a loss of 18,958 souls. The census of 1858 registered the disappearance of another 10,000 inhabitants. Thus, in nine years, the country lost nearly five per cent. of its population, chiefly by emigration to North America.

When the Congress of Vienna remodelled the titles of the German sovereigns, the ruler of Hesse-Cassel was offered the appellation of grand-duke, which, however, he refused, requiring to be made either a king or to remain an 'elector,' although the latter name had become quite unmeaning by the destruction of the Germanic empire. Nevertheless, he was allowed to retain the title, which he had obtained from Napoleon I. in 1805, in exchange for that of landgrave.

The reigning family possess a large private fortune, acquired chiefly by the sale of their subjects in the last century. During the American war, from 1776 to 1784, Landgrave Frederick II. sold to the British government between twenty and thirty thousand Hessians, by which transaction he is said to have gained above two millions sterling. The son and successor of Frederick II., Landgrave William IX., when flying before the anger of Napoleon I., invested his money with a Hebrew merchant of Frankfurt, Anselm Rothschild, whom he appointed his 'hof-agent.' Having made the fortune of the latter, and

laid the foundation of his 'house,' the landgrave left his own heirs the sum of 60,000,000 thalers, or 9,000,000*l*. Notwithstanding this vast personal property, the reigning family have continually refused their consent to the transfer of the public domains to the state. A small portion only of these estates contributes to the revenue.

Hesse-Cassel occupies the eighth place in the German Confederation, and has three votes in the *Plenum*, or general council of the Diet.—(Milner's *Gallery of Geography*, 1864; *Statesman's Year-Book*, 1866; *Almanach de Gotha*, 1866, &c.)

HESSE-DARMSTADT, the grand-duchy of which is governed by the second main branch of the house of Hesse, was founded in 1567 by George I., on whose death his dominions were divided among his three sons. Louis V. succeeded him in the principal line; Philip obtained Butzbach, which reverted on his death to the main line; and Frederick, the youngest, was the founder of the junior line of Hesse-Darmstadt, namely, that of Hesse-Homburg. Excepting the ruinous effects of the Thirty Years' War, the reigns of the succeeding princes were on the whole prosperous, and various acquisitions of territory were made. Louis IX., who reigned from 1768 to 1790, was a friend of peace and a patron of the arts and sciences. He found the country burdened with a large debt, which he paid off, and left to his son, Louis X., an improved territory with 300,000 inhabitants. This prince, during his long reign of forty years, was a greater gainer than almost any other German sovereign by the French revolution; he acquired very large additions to his dominions, and first assumed the title of grand-duke as Louis I. In 1815 the grand-duke joined the German Confederation. His son and successor Louis II. was engaged in continual disputes with the Estates; and disturbances, in some instances attended with bloodshed, broke out on different occasions. He died in June, 1848, and was succeeded by his son, the present grand-duke, Louis III., born June 9, 1806.

The grand-duchy of Hesse-Darmstadt consists of two large portions, which are separated from each other by a long strip of land, extending from east to west, belonging to Hesse-Cassel and the city of Frankfurt. It is situated between 7° 50' and 9° 40' E. long., and between 49° 12' and 51° 20' N. lat. The northern portion is bounded W. by Prussia and Nassau; N., E., and S. by Hesse-Cassel. The southern portion is bounded N. by Nassau, Frankfurt, and Hesse-Cassel; and on the other sides by Bavaria and Baden. The area of the whole is 3237 square miles, and the population in 1861 was 856,907.

Divisions.—The grand-duchy is divided into three provinces:—

I. STARKENBURG (322,744 inhabitants) contains 22 towns, 24 market villages, and 382 other villages. Darmstadt is the capital of the grand-duchy. [DARMSTADT.]

II. RHEINHESSEN, that is, RHENISH HESSE (234,491 inhabitants), contains 10 towns and 180 villages. The chief town is Mainz. [MAINZ.]

III. OBERHESSEN, or UPPER HESSE (229,672 inhabitants), contains 34 towns, 10 market villages, and 510 other villages. The chief town is Giessen. [GIESSEN.]

For the three years previous to 1855, the popula-

tion decreased to the number of 17,910; since then there has been a gradual increase. The illegitimate births amount, on the average, to above fifteen per cent.

Face of the Country, Soil, Climate, &c.—A large part of the surface of the country is mountainous. The banks of the Rhine, and the Wetterau, which contain about 400 square miles, are pretty level; the remainder of the country is traversed by branches of the Vogelsgebirge, the Odenwald, Taunus, and the Westerwald. Hesse-Darmstadt is on the whole an agricultural country. The soil is about the most fertile and best cultivated in Germany. The chief productions are corn of all kinds, likewise maize, flax, hemp, hops, tobacco, pulse, potatoes, wines, both white and red, garden vegetables and fruit, and timber. The southern districts, in which most of the fruit is grown, are specially noted for the excellence of their wines. Rhenish Hesse is nearly destitute of timber. The valleys of the Odenwald and Vogelsgebirge are well adapted to the breeding of cattle, of which there are large numbers. Swine are kept chiefly in Upper Hesse and Starkenburg. Mining is not carried on so extensively as might be expected: it is confined to copper, iron, coals, salt, and brown coal. Cobalt, basalt, lime, sandstone, marble, and slate, are found in different parts of the grand-duchy. The chief rivers are the Rhine (2500 feet broad at Mainz), and the Main, and next to these the Lahn, the Schwalm, the Nidder, the Ohm, and the Itter. The climate is cold, except in the valley of the Rhine.

Manufactures, Trade, &c.—The chief manufactures are of woollens, cottons and linen, leather, and hardware. There is also a trade in silks, paper, chemical products, and metals to a small extent. The most considerable manufacturing and trading town is Offenbach, which has two annual fairs. Mainz is the principal place for the transit trade. The exports consist of the agricultural productions of the country and of some manufactures. The imports are principally colonial and manufactured goods. Hesse-Darmstadt joined the Prussian commercial league in 1828.

The country is well supplied with good roads, and has also about 120 miles of railway. The steam navigation of the Rhine, Main, and Neckar affords still more extensive means of communication, but has the disadvantage of being partly or wholly closed in the winter months.

Constitution and Revenue.—The constitution bears date December 17, 1820; but was somewhat modified in 1848, and again in 1856. The legislative power is vested, in part, in two Chambers, called the Upper and Lower House of Representatives. The former is composed of the princes of the reigning family, of the heads of a number of noble houses, the Roman Catholic bishop, the chief Protestant superintendent, the chancellor of the University of Giessen, and a number of life-members, not exceeding ten, nominated by the grand-duke. The Lower House consists of six deputies of noble landowners; ten deputies of towns; and thirty-four representatives of villages and rural districts. The latter are chosen in a tripartite mode of election—the original voters first polling the ‘electors;’ these, in their turn, choosing ‘deputies,’ and these again the final repre-

sentatives. The Chambers have to meet at least once every three years. On certain occasions, both houses vote together, as when a proposition of the government has been accepted by one house, and refused by the other, and a final decision is to be arrived at.

The revenue amounts to about 750,000*l.* per annum, and the expenditure to nearly the same amount. The public debt is 1,300,000*l.*, the greater part of which was incurred for the establishment of state railways. The late grand-duke, Louis II., found his allowance of 581,000 florins, or 48,417*l.*, quite insufficient for his wants, and for many years there was a struggle between the government and the representatives of the country about the payment of the grand-ducal debts. These were ultimately discharged out of the public funds; but in 1855 the civil list was found to be in debt again to the amount of 1,100,000 florins, or 91,666*l.* The Chambers refused to pay this new debt; but after long debates it was agreed on ultimately to discharge the amount provisionally, deducting it gradually from the grants of the civil list. The latter was raised, at the same time, to 625,000 florins, or 52,083*l.*, besides allowances to the princes and the grand-ducal court, amounting altogether to 751,800 florins, or 62,650*l.*

Army.—The army is formed by conscription; the men serving for a nominal term of six years, of which two are in the reserve. The actual number of soldiers under arms does not amount to more than six or seven thousand, but in theory the following troops are supposed to exist on the ‘peace-footing’—Four regiments of infantry, 8851; two regiments of cavalry, 1420; one brigade of artillery, 1239; total 11,510 men. Previous to the French revolution, the landgraves had never more than 4000 men in their service, which number they increased to 9000, after having obtained the title of grand-duke.

Church and Education.—Hesse-Darmstadt has a good University at Giessen. There are also superior schools and various literary and scientific societies in the chief towns, and at least one elementary school in each commune. Public instruction has made rapid progress of late, especially in the province of Rhenish Hesse.

The members of the Lutheran church number 398,807; the Calvinists, 29,200; the United Evangelicals, 167,534; the Roman Catholics, 217,405; the Mennonites and other Christian sects, 3,925; and the Jews, 28,759. Three Protestant superintendents and a Roman Catholic bishop, at Mayence, direct the ecclesiastical affairs of the population.

In the reigning family of Hesse-Darmstadt, all the divisions of the Christian faith are represented. The grand-duke is a Lutheran, his eldest brother a Calvinist; his second brother and wife are Roman Catholics; his youngest sister, the empress of Russia, is a member of the Greek church; and the consort of his nephew, Princess Alice, a member of the church of England.

Hesse-Darmstadt supplies a contingent of 7227 men, with a reserve of 3000, to the federal army, occupies the ninth place in the German confederation, and has three votes in the *Plenum*, or full council, and one vote in the limited council. It is a limited monarchical state, and the succession is

hereditary in the female line in default of male issue. (*Statesman's Year Book*, London, 1866; *Almanach de Gotha*, 1866; Von Klöden's *Erdkunde*.)

HESSE-HOMBURG was a part of the landgraviate of Hesse-Darmstadt, till it came, in 1596, into the possession of Frederick I., youngest son of George I. Frederick Charles Louis succeeded to the government in 1751. In 1806, on the foundation of the Rhenish Confederation, he was obliged to give up the sovereignty to Hesse-Darmstadt, on which he became dependent. The Congress of Vienna, however, in 1815, not only restored to him the sovereignty of his ancient principality of Hesse-Homburg, but added to it the lordship of Meissenheim, on the other side of the Rhine. The landgrave therefore is now a sovereign prince, and was unanimously received in the year 1817 as a member of the German Confederation.

On the death of the last landgrave in March, 1866, the territory reverted to the grand ducal house of Hesse-Darmstadt, and Prince Louis of Hesse, the husband of the Princess Alice, became its ruler. The annual income is 150,000 florins, or 12,500*l.*, in great part derived from the sale of mineral waters, and the profits of the Homburg gaming-tables, which, however, Prince Louis will probably abolish.

The area of Hesse-Homburg is only 106 square miles, and it contains altogether but 26,817 inhabitants. The contribution to the confederated army is 333 men, with a reserve of 100. The public revenue in 1863 was 45,000*l.* and the expenditure 43,000*l.*, the debt at that time being 82,000*l.*

The whole legislative and executive authority is centred in the landgrave, who governs through a ministry, divided into five departments, including a secretary for war.

Divisions.—I. The circle of Homburg, which contains thirty-two square miles, and 13,111 inhabitants. The chief town, Homburg vor der Höhe, is situated 10 miles N. by W. from Frankfort-on-the-Main, under an eminence, on which the palace of the landgrave is built. The population in 1861 was 6987. The town is charmingly placed amidst the forest-clad hills of Taunus. It is much frequented for its mineral springs and baths, but it has the inglorious distinction of surpassing all the other gambling dens of Germany in the magnitude of its transactions. Various attempts have been made to suppress the gambling saloons, which are open at all hours of the day and night; but they yield such a large proportion of the revenue of the state that at present they exert their baneful influence as actively as ever.

II. The circle of Meissenheim, which contains seventy-four square miles, and 13,706 inhabitants. It lies between the Prussian province of the Lower Rhine, the Bavarian circle of the Rhine, and the principalities of Lichtenberg and Birkenfeld. The chief town, Meissenheim, contains 2758 inhabitants.

The former of these circles is a fruitful district lying on the slope of the Taunus mountains, and produces grain, wine, and timber: the latter is mountainous, and yields large quantities of coal and iron, and some excellent wine.

Hesse-Homburg is represented by Hesse-Darmstadt in the limited council of the Diet, but it has

one independent vote in the *Plenum*, or full council. The established religion is Protestant, and about 20,000 of the inhabitants belong to it.

HESSE-NES, commonly called ESSENES, one of the three great sects into which the Jews were divided in the time of Christ. They are not mentioned in the New Testament, but it has been conjectured that they are alluded to in Matt. xix. 12, Col. ii. 18, 23. Many particulars concerning the customs and religious opinions of this sect are given by Josephus and Philo.

The Essenes generally lived at a distance from large towns, in communities which bore a great resemblance to the monkish societies of later times. They had all things in common, ate at a common table, and were exceedingly abstemious, never partaking of food before sunset. They were clothed in white garments, abstained from wine, and generally led a life of celibacy. They sent gifts to the Temple, but never offered any sacrifices there. The Essenes were exemplary in their religious duties, and were particularly distinguished by their rigid observance of the Sabbath-day. They believed in the immortality of the soul, but not in the resurrection of the body, and maintained the absolute predestination of all events: they held the Scriptures in the greatest reverence, but considered them as mystic writings, and explained them allegorically. They also appear to have possessed sacred books, which explained the peculiar doctrines and practices of their sect.

The origin of this sect is uncertain, and their numbers were never considerable: according to Philo and Josephus, there were only 4000 in Palestine.

It has been supposed, with considerable probability, that the early Christians derived many of their customs and opinions from the Essenes.

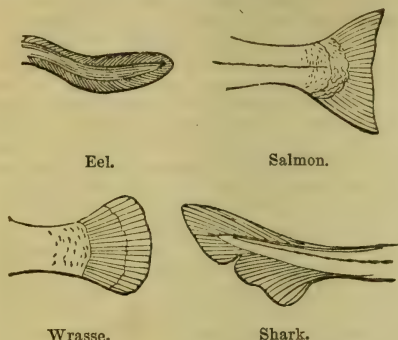
HESY'CHIUS, the name of the supposed author of a valuable Greek lexicon, which contains chiefly short explanations of unusual Greek words, or forms of words, and technical terms. It was not known until the sixteenth century. The first edition was that of Aldus, 1513, folio; the most complete, that of Alberti, 1746, 2 vols. folio, of which the second volume was published by Ruhnkens in 1766. This edition has a copious body of Prolegomena, containing all that can be said concerning this author.

HESYCHIUS, named the Illustrious, of Miletus, lived in the sixth century, and wrote a universal history in six parts, from Belus down to his own age. Some extracts of it have been preserved, which, with an abridgment of the 'Lives of the Philosophers,' chiefly from Diogenes Laertius, are edited in one volume by Meursius, 1613. (Photius, *Bibl.*, 69.)

HETEROBRANCHIATA, M. De Blainville's name for the fourth order of his *Acephalophora*. The first family (*Ascidians*) is divided into two tribes:—1, Simple *Ascidians*, and 2, Aggregated *Ascidians*. The second family consists of the *Salpaceans*, and is also divided into two tribes:—1, The Simple (*Biphora*, &c.), and 2, the Aggregate (*Pyrosoma*).

HETERO'CERCAL, the term chosen by M. Agassiz to express a peculiar form of the tails of fishes, which affords a very obvious, and, as far as yet appears, a very correct indication of the geological age of formations. Among existing fishes the

tail is either simple, as in the eel; bifurcate, as in the salmon; expanded to a round figure, as in the wrasse; or unequally bilobate, as in the shark. It is to this latter irregular form of tail that the term Heterocercal is applied: the others, by way of distinction, are called Homocercal.



The peculiarity of the heterocercal fishes is that the vertebral column runs along the upper caudal lobe: in the other forms of tail it is symmetrically placed with respect to the posterior finny expansion. M. Agassiz has found this peculiarity of the tail, which is least common among living fishes, and confined to particular groups, to belong to every species of fishes, of whatever group, and however differing in other respects, which occur in strata older than the oolitic system, while in and above that system homocercal forms appear. It is therefore a characteristic of geological time; and, among the conjectures as to the relations of this form to physical conditions of the surface or laws of the animal economy, we prefer the opinion that it is one among several marks of the sauroid character of the fishes which lived in early geological periods. Some of the fishes of the oolitic rocks exhibit a slight inequality of the lobes of the tail, and some difference in the arrangement of the scales thereon, but without (we believe) the characteristic continuation of the vertebral column into the upper lobe. These may be thought to mark the gradual transition from the heterocercal to the ordinary types of structure. Lepidosteus, with sharks, and other cartilaginous fishes of the existing creation, which were ranked by Linnæus as 'Amphibia Nantes,' thus appear the few surviving representatives of organic forms which, in earlier periods of the history of the globe, were exclusively predominant. The heterocercal tail appears in the young of several well-known homocercal forms.

HETEROCERUS, a genus of pentamerous coleopterous insects established by Bosc. Latreille places it in his second section of his family *Clavicornes*, and forms of it a tribe under the name of *Acanthopoda*, on account of the flattened broad limbs armed with spines. These beetles have small oval depressed bodies, and eleven-jointed antennæ, the last six articulations forming a cylindrical club. They live in sand or mud, by streams or among marshes, burrowing in the ground by means of their spinous tibiae. When disturbed or alarmed they come out of their holes. The larvæ live in the same

situations with the perfect insects. Several species are found in Britain.

HETEROGANGLIATA. The *Heterogangliata* of Professor Owen comprise all the *Mollusca* of Cuvier, with the exception of the *Cirripeda*.

HETEROGENEOUS. [HOMOGENEOUS.]

HETEROMERA, the second section of coleopterous insects in the arrangement of Latreille, including such as have five articulations in the first four tarsi, and four in the two posterior. They are all vegetable feeders. Latreille divided the *Heteromera* into four groups: 1st, the *Melasoma*; 2nd, the *Taxicornes*; 3rd, the *Stenelytra*; and 4th, the *Trachelides*.

HETEROMYS, a genus of Rodents, which, in M. Lesson's opinion, may be advantageously used, though M. Desmarest proposed it without adopting it. The genus is described as having the cheek-pouches of the Hamsters, the general form of the body and tail of the rats properly so called, and the dorsal flattened spines of *Echimy*s, Geoff. Example, *Heteromys Thompsonii*, Lesson. Habits and size of a rat. Locality, the island of Trinidad.

HETEROSCHII ('other-shadowed'), an old astronomical term for persons living in such parts of the earth that their shadows at noon are always turned contrary ways.

HETMAN, a title given to the chief general of the old Polish armies; and now applied, by the czar of Russia, to the chief general of his Cossack forces.

HEUCHE'RA, a genus of plants belonging to the natural order *Saxifragaceæ*, and consisting of about sixteen species. *H. Americana* is a native of North America, where it has obtained, on account of its astringent properties, the name of Alum Root. It contains tannin, and it is to this principle that its astringent character is to be ascribed. The other species contain tannin, but are not used for any purpose in the arts or medicine.

HEVELIUS, JOANNES, or more properly JOANNES HEVEL, a Polish astronomer of great eminence, was born at Danzig, of a noble family, January 28, 1611. He applied himself almost exclusively to the study of astronomy. In 1641 he built an observatory in his own house, and furnished it with a quadrant and sextant of three and four feet diameter, together with large telescopes constructed by himself. His scientific pursuits did not, however, preclude his being elected consul in 1651, to which distinction his rank in society and philosophic character entitled him, and of which he continued to discharge the duties to the time of his death. In 1647 he published a description of the moon, under the name of 'Selenographia,' to which was added a representation of the other planets as seen by the telescope. In 1654 appeared his treatise 'De Motu Lunæ Libratorio,' in the form of a letter to Riccioli, wherein he gave an explanation of the libration of the moon. To these succeeded various other works, and in 1673 the first part of the 'Machina Cœlestis' was published. It was this last work which gave rise to a public controversy between Hevelius and Dr. Hooke. Hevelius always imagined that better observations could be made with plain sights than with telescopes. Hooke recommended the use of the latter. Halley was requested by the Royal Society of London to visit Hevelius at Danzig, and judge of

the goodness of his observations. This voyage, which was made in 1679, produced a report from Halley highly favourable to Hevelius. In 1679 he sustained considerable loss by the destruction of his house and observatory by fire. The whole of his instruments and library were destroyed, including most of the copies of the second part of his 'Machina Cœlestis,' which had only been published that year. This second part is now extremely rare. This accident appears only to have had the effect of increasing his ardour in the pursuit of astronomy, for he shortly after erected a new observatory, though on a less magnificent scale, and by 1685 he had another volume of observations ready for publication. He had now been occupied forty-nine years as an observer, and had attained sixty-three years, the climacteric, as it used to be called, of life, for which reason this volume (the last published during his lifetime) is entitled 'Annus Climactericus.' His posthumous works are 'Firmamentum Sobieskianum' (1690) and 'Prodromus Astronomiæ' (1691). He died at Danzig, universally respected, in 1687-88, and in his seventy-sixth year.

HEXACHORD, a name given by the ancient Greeks to a lyre of six strings; also to a scale of six sounds. The term hexachord was also applied to a system of musical scales now disused.

HEXAGON, a figure of six sides.

HEXAHEDRON, a solid of six faces.

HEXA'METER (ἑξ, 'six,' μέτρον, 'measure') is the most common form of dactylic verse. [DACTYLICS.] It consists of six feet, either dactyls or spondees, with no limit in their arrangements, except that the fifth is usually a dactyl, and the sixth invariably a spondee. Great part of the beauty of a long poem written in this measure depends on the varied cadences which may be produced by varying the cæsura. [CÆSURA.]

HEXAPLA, the plural of ἑξαπλοῦς, which means 'six fold,' was an edition of the Scriptures of the Old Testament prepared by Origen, which exhibited, in addition to the original Hebrew text, six Greek versions in as many parallel columns; namely, the Septuagint, that of Aquila, that of Symmachus, that of Theodotion, one found at Jericho, and one found at Nicópolis in Epirus. It also comprehended a seventh version of the Psalms. The Hebrew text was besides given both in Hebrew and in Greek characters: so that, properly speaking, there were eight columns in all, whence the work is sometimes called Origen's Octapla. Only some fragments of Origen's Hexapla remain, which have been collected and published by Montfaucon under the title of 'Origenis Hexaplorum quæ supersunt,' 2 vols. folio, Paris, 1713.

HEXHAM. [NORTHUMBERLAND.]

HEYDEN, JOHN VAN DER, a Dutch painter of external architecture, born at Gorcum in 1637 (some say 1640). The value of his early works is enhanced by their being adorned with figures by A. Van de Velde. He died in 1712 at Amsterdam.

HEYLIN, PETER, born in 1600 at Burford, in Oxfordshire, studied at Oxford, where he took his degree of D.D. He gave lectures on history and cosmography in that university; and afterwards, in 1625, he published his 'Microcosmos,' or description of the globe. Heylin was appointed chaplain in ordinary to King Charles I. On the restoration of

Charles II. he was made sub-dean of Westminster. He died in 1662. He wrote a number of works on the religious and political controversies of the times; among others, a 'Defence of the Church of England;' a 'Life of Bishop Laud;' a 'History of the Tithes,' and a 'History of the Sabbath.'

HEYNE, CHRISTIAN GOTTLOB, born at Chemnitz, in Saxony, in 1729, studied at Leipzig, and distinguished himself as a classical scholar. The chair of eloquence and poetry in the University of Göttingen having become vacant by the death of J. M. Gesner, Heyne was appointed to it in 1763. The department to which Heyne particularly applied himself was that of classical criticism and the illustration of the writings of the ancients, by showing how they ought to be studied with reference to the manners and character of their respective ages. He published his ideas on these subjects in his notes to the 'Bibliotheca' of Apollodorus, and afterwards in numerous dissertations inserted in the Transactions of the University of Göttingen. Heyne's 'Opuscula Academica,' 6 vols. 8vo., Göttingen, 1785-1815, contain many learned and valuable disquisitions on ancient history. Heyne published editions of Homer, Pindar, Diodorus Siculus, Epictetus, Virgil, Tibullus, &c., all enriched with ample commentaries. His 'Antiquarische Aufsätze,' in 2 vols., are essays on the history of ancient art. Heyne died at Göttingen at a very advanced age, in July, 1814. His life, which has been written at some length by his son-in-law Heeren (Göttingen, 1813, 8vo.), contains an account of the difficulties that this scholar had to encounter in early life.

HEYWOOD, JOHN, one of our earliest dramatic writers, lived in the first half of the sixteenth century. He was a favourite at the court of Queen Mary, but in the reign of Edward VI. he was accused of plotting against the government. He retired to the continent, and died about 1565, at Mechlin, in Brabant. Heywood's dramatic pieces 'may properly and strictly,' says Mr. Collier, 'be called Interludes—a species of writing of which he has a claim to be considered the inventor.' The earliest of them, 'A mery Play between the Pardoner and the Frere, the Curate and Neybour Pratte,' was not printed till 1533, but must have been written before 1521. In Dodsley's Old Plays will be found his 'Play called the Foure P.P., a new and a very mery Enterlude of a Palmer, a Pardoner, a Potycary, a Pedlar.' Among other productions bearing his name was a posthumous volume of 'Woorkes,' 1576, 4to., which contains proverbs in verse, and six hundred epigrams. In respect of them, and to distinguish him from a later play-writer, Thomas Heywood, he is not unfrequently called the 'Epigrammatist.'

HEYWOOD, THOMAS, a well-known dramatist who lived in the reigns of Elizabeth, James I., and Charles I. Of all his pieces about twenty-four are left, of which 'A Woman killed with Kindness,' published in Dodsley's Collection, is much admired.

HIBERNATION, the term used to indicate the winter sleep of certain warm-blooded animals. As the season approaches the temperature of their blood is lowered, and they gradually pass into the hibernating lethargy. The marmot, the bear, and the bat furnish examples. During hibernation the animal takes no food, breathes only at comparatively

long intervals, has its heat diminished, and all its vital functions reduced. The phenomena of hibernation are also observed in most reptiles and in some insects.

HIBERNIA. [IRELAND.]

HIBISCUS, a genus of plants of the natural family of *Malvaceæ*. The species, upwards of 100 in number, of this genus are chiefly herbaceous, though of a large size, but a few are perennial and arboreous. They abound in the hot parts of Asia and America, and also in Africa and the tropical islands. A few extend into Europe, North America, and the Cape of Good Hope. The species are remarkable, like the family to which they belong, for abounding in mucilage, and for the tenacity of the fibre of their bark, whence several are employed for many economical purposes in the different countries where they are indigenous.

The abundance of mucilage in some of the species renders them useful as articles of diet, as the unripe fruit of *H. esculentus*. So in India *H. longifolius* is similarly employed, and much approved of by many Europeans. The calyxes of *H. sabdariffa* as they ripen become of a red colour and are pleasantly acid, whence in the West Indies the plant is called Red Sorrel. The calyxes are employed there, as well as in India, for making tarts; and a decoction of them, sweetened and fermented, makes a cool and refreshing drink, much used in the West Indies. *H. Syriacus* and *H. Rosa-Sinensis* are known as ornamental plants.

The species of *Hibiscus* are chiefly useful for the tenacity of their fibre, and hence several are employed in rope-making. Thus *H. cannabinus* is cultivated everywhere in India in the rainy season for this purpose; and its fibre is often imported into Europe as a substitute for hemp. In the island of Otaheite rope and string are manufactured from the bark of *H. tiliaceus*, which is also made into matting of a white colour, and of different degrees of fineness. Almost all the species possess sufficient tenacity of fibre to be used for cordage, whips, &c. They also abound in mucilage, which renders them serviceable as articles of diet.

Hibiscus abelmoschus, so called from *hab-al-mooskh*, the Arabic name of its musk-scented seeds, is now often named *Abelmoschus moschatus*, and formed into a new genus. Its seeds are said to be added to coffee in Arabia, and are in India employed as a cordial medicine.

HICCUP, or **HICCOUGH**, a spasmodic movement in the throat, caused by some internal derangement of the stomach. When a breath is taken, a sudden constriction of the glottis prevents its ingress, and simultaneously something rises in the throat which causes exhalation, and produces a peculiar sound in the larynx. The convulsions usually last only a few minutes, but cases have been known of hours' and even days' duration.

Simple remedies will sometimes cure hiccup, as holding the breath, eating a piece of ice, strong pressure at the waist or wrist, but in severe attacks chemicals, such as ammonia, camphor, or chloroform, must be resorted to.

HICKES, **GEORGE**, an English divine and philologist, was born June 20, 1642, at Newsham, in Yorkshire. He was sent to Oxford. In 1665 he

became M.A., and in 1679 D.D. at Oxford, having received the same degree the year previous from the University of Glasgow.

Between 1679 and 1683 he had several preferments, and in August of the latter year was made dean of Worcester. In 1688 he refused to take the oaths of allegiance, and was eventually deprived. He was subsequently consecrated suffragan bishop of Thetford by Archbishop Sancroft. He died December 15, 1715.

The work which goes by the name of his 'Thesaurus, or Treasure of the Northern Tongues,' in three volumes folio, Oxford, 1705, is that which is most likely to sustain his literary reputation.

HICKORY. [CARYA.]

HIDAGE, among our Anglo-Saxon ancestors, an extraordinary tax payable on every hide of land. Thus when the Danes invaded England, in 994, King Ethelred levied a tax by hides on all his lands, in order to enable the inhabitants to arm in defence of the kingdom. From every 310 hides sufficient was then raised, in provisions, money, and materials, to furnish one ship.

HIDALGO, in Spain, a man of noble birth.

HIDES. [LEATHER.]

HIDGELLE, a district of British India, in the presidency of Bengal, between lat. 21° 36' and 22° 22' N., and long. 87° 22' and 88° 12' E. It is inclosed by the river Hooghly, Bay of Bengal, Balasore, and Midnapore. The area is 1014 square miles, and the population 133,265. It is watered by the Hooghly, Roopnarain, Russoolpoor, and the Hulses; and has a great extent of sea-coast. Some parts are overgrown with jungle, affording harbour for tigers, leopards, and other fierce animals. Turtle, oysters, crabs, and prawns abound on the sea-coast. The climate is moist and unhealthy; and fevers, ague, and dysentery prevail. The chief crops are rice, millet, mustard, tobacco, sugar-cane, pulse, castor-oil plant, sweet potatoes, cocoa-nut palm, and the toddy-palm. There are also some salt-works.

HIERACIUM, a genus of plants belonging to the natural order *Compositæ*. There are nineteen British species of this genus, but none of them are valuable on account of the properties they possess.

HIERARCHY, literally 'a sacred government,' and generally applied to the whole ecclesiastical establishment of a church in all its gradations and orders. The word is strictly applicable only to episcopal churches, such as the Roman Catholic and Anglican, in each of which the hierarchy consists of bishops, priests, and deacons. These constitute what is commonly called the hierarchy of divine right; while those offices which are established solely by ecclesiastical ordinance, such as primates, patriarchs, metropolitans, cardinals, archdeacons, &c., are distinguished as the hierarchy of ecclesiastical right or jurisdiction.

HIERES. [HYE RES.]

HIEROCHLOE, a genus of grasses belonging to the *Phalacideæ*. One species only of this genus, the *H. borealis*, has been found in Great Britain.

HIEROCLES, the name of several Greeks:—

Hierocles, a lawyer, wrote a work on veterinary medicine, addressed to Cassianus Bassus, of which three chapters are preserved in the sixteenth book of

the 'Geopónica,' published by Needham, Cambridge, 1704, pp. 424, 425.

Hierocles, who probably lived in the sixth century, was the author of a work entitled 'Synecdēmos' (συνεκδήμος), that is, 'a travelling companion,' which gives an account of the provinces and towns of the Eastern Empire. The 'Synecdēmos' is printed by Wesseling in his 'Vetera Romanorum Itinera,' Amsterdam, 1735.

Hierocles, præfect of Bithynia, and afterwards of Alexandria, wrote two books against Christianity, entitled 'Truth-loving Words to the Christians.'

Hierocles, a celebrated Alexandrine philosopher of the fifth century, wrote a Commentary upon the Golden Verses of Pythagoras, which is still extant; and also a Discourse on Foreknowledge and Fate, of which Photius has preserved large extracts. A complete edition of his works was published by Needham, Cambridge, 1709. The Discourse on Foreknowledge and Fate was translated into French by Regnaud (Lyon, 1560).

There is also another work, entitled 'Asteia' (ἀστεία), containing an account of the ridiculous actions and sayings of pedants and silly persons.

HIEROGLYPHICS, a compound Greek word meaning 'sacred engravings,' generally applied to the representations of animal and other forms sculptured on the monuments of Egypt, by means of which the Egyptians expressed their language. The ancient Greek authors call this mode of writing *hieroglyphic* or *hierographic*, and attribute its invention to Thoth, the Egyptian Hermes. According to these authorities, it was the most ancient mode of writing known to mankind. It was called by the Egyptians *Neter tu*, or 'sacred words,' and was particularly used in all inscriptions relating to the gods, temples, and public events. Above 1000 different symbols appear on examination of the monuments to have been employed, and future observations will probably still further augment their number. They are arranged with great precision on the monuments, generally in horizontal or vertical lines, with all the animals and symbols of the same inscription facing in the same direction, whether to the right or to the left; sometimes, however, they are placed in the area or field, and dispersed amongst the figures or scenes they are intended to illustrate. They have been divided into six classes:—1. Sculptured and not painted; 2. those which are sculptured and painted; 3. *linear*, or drawn in outline; 4. drawn in outline and painted; 5. *polychrome*, or those painted with many colours; 6. *monochrome*, or those painted in one colour. Those carved on stone are generally executed in a peculiar kind of sculpture called *cavo rilievo*, in raised relief below the surface, but sometimes in bas-relief. The linear hieroglyphics are drawn with a carbonaceous black or a vermilion red ink on papyri, linen, slices of stone, wood, and other materials.

Hieroglyphics appear in use on the walls of the earliest tombs, and even scrawled on the blocks of stone of the great pyramid built by Cheops, and they continued to be employed till the time of Caracalla, during a space of almost 3000 years, but subsequently were superseded by a more cursive writing called the Demotic, and finally, on the triumph of Christianity, by the modern Coptic. Crude notions of the nature

of the hieroglyphs prevailed till Dr. Young, in 1818, first gave out the idea that they were used as sounds in royal names. He recognized the name of Ptolemy on the Rosetta stone; and the removal by Banks of a small obelisk from Philæ in 1822, enabled Champollion to compare the names of Cleopatra and Ptolemy, when it was seen, from the recurrence of the same hieroglyphics in the same places, as if they were used as sounds, that this was their true employment, and that the signs were purely alphabetic, not syllabico-alphabetic. By an extension of the decipherment, the names and titles of the Ptolemies, Roman emperors, and native monarchs were readily discovered.

Since the time of Champollion, who published a grammar in 1836, and 'Dictionary of Hieroglyphics' in 1841, the study has been pursued by Rossellini, Salrolini, Leemans, Lepsius, Brugsch, De Rouge, Birch, Goodwin, Layard, Hincks, and others.

The general result of their inquiries has shown that all hieroglyphic inscriptions, from the most remote to the latest periods, consist of two classes of characters, the first called by the Egyptologists *ideographs*, or symbols representing ideas, not sounds; and *phonetics*, or hieroglyphics employed as letters of the alphabet. The great body of the inscriptions are composed of phonetics, to the extent of four-fifths at least of each entire text; and they are easily distinguished by their constant recurrence. They are, however, fewer in number than the ideographs. The lapidary inscriptions are almost all religious, historical, or sepulchral. Even verse or rhythm has been found, and the expressions are often flowery with oriental imagery, antithesis, and metaphor.

Besides the Egyptians, the ancient Ethiopians also carved hieroglyphics on their pyramids and public monuments. At Nineveh, Koyunjik, and even in the isles of the Greek archipelago, objects have been found with hieroglyphical inscriptions not in the Egyptian language—perhaps unmeaning imitations, like the obelisks erected by the Roman emperors.

The term hieroglyphics has also been applied to the writings and paintings of the ancient Mexicans, by which they depicted the various occurrences of life. A symbolical system of pictorial writing prevailed in Central America and Yucatan before their conquest by the Spaniards.

Astrologers and almanac makers of modern days applied the word hieroglyphics to the symbolical pictures by which they pretended to show the events likely to happen in the course of the year.

For the principal works on hieroglyphics the reader is referred to Young, 'Account of Discoveries in Hieroglyphical Literature,' Lond., 1820; Champollion, 'Précis du Système Hiéroglyphique,' Paris, 1824; Grammaire Egyptienne, Paris, 1836; Birch, 'Introduction to the Study of Hieroglyphics,' Lond., 1837; Chabas, 'Papyrus Magique d'Harris,' 1861.

HIEROGRAMMATISTS, among the ancient Egyptians, certain priests who presided over religion and learning. Their especial duties were to expound religious mysteries, and preserve the history and hieroglyphics of the land.

HIERON I. succeeded his brother Gelon, as tyrant or ruler of Syracuse, 478 B.C. After the death of Theron, prince of Agrigentum, Hieron defeated his son, Thrasydæus, who was soon after expelled by

his countrymen. Hieron took Naxos and Cátana, and, having driven away the inhabitants from both towns, he replaced them by Syracusan and Peloponnesian colonists. His chariots repeatedly won the prize at the Olympic Games, and his success on those occasions formed the theme of some of the odes of Pindar, who was his guest and friend. Æschylus, Simonides, Bacchylides, and Epicharmus were also well received at the court of Hieron, who was fond of the society of learned men. Hieron died at



Coin of Hieron I. British Museum. Silver.



Reverse.

Cátana, 467 B.C., and was succeeded by his brother, Thrasybúlus.

HIERON II., son of Hierocles, a wealthy citizen of Syracuse, and a descendant of Gelon, served with distinction under Pyrrhus, in his Sicilian campaigns. After Pyrrhus had abandoned Sicily, the Syracusan troops chose Hieron for their leader, and the senate and citizens ratified the choice, 275 B.C. By marrying the daughter of Leptines, a man of influence among the aristocratic party, he secured their support. Having led the army against the Mamertines, a band of Campanian mercenaries, whom he defeated, the main body of them returned to Syracuse, where, through the influence of Leptines, he was proclaimed king, B.C. 270. The Mamertines of Messana, being threatened by Hieron and the Carthaginians, applied to the Romans for assistance. The Consul Appius Claudius marched to Rhegium, and having passed the strait in the night, unobserved by the Carthaginian cruisers, he surprised Hieron's camp, routed the soldiers, and obliged Hieron to seek for safety in flight. The consul next attacked the Carthaginian camp with the same success, and this was the beginning of the first Punic War, 264 or 265 B.C. In the following year the Romans took Tauromenium and Cátana, and advanced to the walls of Syracuse, when Hieron obtained peace on condition of paying 100 talents of silver, and supplying the Roman army with provisions. He punctually fulfilled his engage-

ment, remained faithful to Rome during the whole time of the war, and by his supplies was of great service to the Roman armies. Hieron was included in the peace between Rome and Carthage, by which his territories were secured to him, and he remained in friendship with both states. The period which elapsed between the end of the first and the beginning of the second Punic wars, from 241 to 218 B.C., was most glorious for Hieron and most prosperous



Coin of Hieron II. British Museum. Copper.



for Syracuse. Commerce and agriculture flourished, and wealth increased to an extraordinary degree. Hieron paid particular attention to the administration of the finances, and issued wise regulations for the collection of the land tax, which remained in force throughout Sicily long after this time. He embellished and strengthened Syracuse, and built large ships. Archimedes lived under Hieron's reign. When the second Punic War broke out, Hieron continued true to his Roman alliance. He lived to see the battle of Cannæ, after which his own son Gelon embraced the part of the Carthaginians. Gelon, however, died, not without suspicion of violence, and Hieron himself, being past ninety years of age, died shortly after, 216 B.C., leaving the crown to his grandson, Hieronymus.

HIERONYMUS, grandson of Hieron II., king of Syracuse, succeeded him on the throne at the age of fifteen (B.C. 216). The court of Syracuse, which under Hieron was orderly and respectable, soon became as profligate as it had been under the younger Dionysius. After the battle of Cannæ, Hieronymus declared war against the Romans, but a conspiracy broke out among his soldiers, and he was murdered, after a reign of thirteen months. On this news a popular insurrection took place at Syracuse, the daughters and grand-daughters of Hieron were murdered, and royalty was abolished.

HIEROPHANTES, a name applied to the high priests of the Eleusinian mysteries, who for many ages were chosen from the family of the Eumolpidae. The term was also applied to the priests or priestesses who had the care of the sacrifices and sacred things.

HIERRO. [CANARIES.]

HIGH BAILIFF, an officer who discharges min-

isterial duties, such as serving writs, &c., in certain liberties and parishes out of the jurisdiction of the sheriff.

HIGH COMMISSION COURT, a tribunal established by Queen Elizabeth under the authority of a clause in the Supremacy Act (1 Eliz. c. 1), which exercised arbitrary power in matters of faith and in ecclesiastical concerns, as the Star Chamber did in civil affairs. The commissioners were forty-four in number, of whom twelve were ecclesiastics; and three commissioners constituted a quorum. It exercised its powers without control, and was authorized to resort to the rack, to torture, inquisition, and imprisonment, and to proceed, not upon information, but at discretion, upon rumour and suspicion.

In 1641, this court and the Star Chamber were both abolished. James II. issued a new commission, but the Revolution swept away this arbitrary institution.

HIGH CONSTABLE. [CONSTABLE.]

HIGH-PLACES, a term frequently mentioned in Scripture history as applying to certain elevated places or eminences, where the idolatrous ceremonies of the Assyrians, Phœnicians, and other early Asiatics were performed; and where the use of religious temples was deemed irreligious and unlawful.

HIGH PRESSURE STEAM ENGINE. [STEAM ENGINE.]

HIGH SEAS, a term meaning the open sea, or that which is common to all countries. As a rule, every country has exclusive sovereignty over the sea to the extent of three miles from its shore; beyond that distance, and at any part which is more than three miles from any other country, is not the property of any particular country, and is technically termed the high seas. The rule as to the sovereignty within three miles is strictly observed with regard to fishing, except where special arrangements are made, but does not in any way restrict navigation.

HIGH TREASON. [TREASON.]

HIGH WYCOMBE. [BUCKINGHAMSHIRE.]

HIGHGATE. [MIDDLESEX.]

HIGHLANDS, the name given to the chief mountainous districts of Scotland. It is customary to speak of the *Northern Highlands* and the *Southern Highlands*. The former include tracts on the borders of Caithness, large portions of Sutherland, Ross, and Inverness shires, and Perth, Argyll, and Stirling shires. The latter take in part of Berwick, Peebles, Selkirk, Dumfries, Lanark, and Wigton shires. The chief ranges in the north are the Grampians and Ochils, in the south the Pentlands, Lammermoors, and the Lowthers.

HIGHWAY. [WAY.]

HILARION, SAINT, the founder of monastic institutions in Palestine, was born at Tabatha, about 291. His parents, who were heathens, sent him at an early age to Alexandria, to pursue his studies. Having been converted to the Christian religion, he resolved to retire from the world. Accordingly, on his return to Palestine, he divided among his relatives the property which his parents had left him, and retreated at the age of fifteen to the desert country south of Gaza. After remaining in this place for twenty-two years, during which time he practised the greatest austerities, his reputation for sanctity became so great, that numbers resorted to him in order to

be cured of their diseases. He afterwards went to Egypt, and successively visited Sicily, Dalmatia, and Cyprus, where he died about the year 371.

HILARIUS, a native of Sardinia, was made deacon of Rome about 354. He is frequently mentioned by Jerome ('Adv. Lucif.') as a rigid Luciferian, a sect which derived its name from Lucifer, bishop of Cagliari, in Sardinia, who separated from the church on account of the absolution that had been granted to those Catholics who had become Arians during the reign of Constantius. Hilarius wrote several works in favour of the opinions of Lucifer, and is generally supposed to have been the author of a Commentary on thirteen of St. Paul's Epistles, which is usually printed with the works of St. Ambrose.

HILARIUS, SAINT, was born at Poitiers, of which place he was afterwards made bishop about 354. He is distinguished in ecclesiastical history by the active part which he took against the Arians during the reign of Constantius. He died in the year 367.

The most important of Hilarius' works are:—1, 'Twelve Books concerning the Trinity;' 2, 'A Treatise on Synods,' addressed to the bishops of France and Britain, in which he gives an account of the creeds which had been adopted by the Eastern churches since the council of Nice; 3, 'Three Discourses addressed to Constantius,' on the Arian Controversy; 4, 'Commentary on St. Matthew;' 5, 'A Commentary on the Psalms.' These commentaries are entirely taken from the commentaries of St. Augustin.

HILARIUS, SAINT, was born in 401, and became bishop of Arles (Arles) in 429, on the death of Honoratus. Hilarius was distinguished by the holiness of his life and his zeal for monastic institutions; but he is more known in ecclesiastical history on account of his controversy with Leo, bishop of Rome. He died in 449. The writings of Hilarius are lost, with the exception of a life of Honoratus, a letter to Eucherius, and a poem upon the beginning of Genesis, which are published by Quesnel at the end of Leo's works, Paris, 1675. His life of Honoratus has also been published by Genebrard, Paris, in 1578.

HILARIUS, a native of Sardinia, succeeded Leo I., or the Great, as bishop of Rome in the year 462. He had been employed by Leo in important affairs; among others he was sent as legate to the council of Ephesus, in 449, against the Eutychians, and was well versed in matters concerning the discipline of the church, which he displayed great zeal in enforcing. Hilarius died at Rome in 467.

HILARODI (Gr. *ἡλαρός*, 'to exhilarate,' from *ἡλάρος*, 'cheerful,' and *ὄδῳ*, 'a song'), among the early Greeks, a kind of itinerant poet-musicians, who went about reciting or singing little amusing poems or songs, generally accompanied with some instrument. They were not unlike the wandering bards of our early history. Their dress was white, and their heads were usually crowned with golden fillets. In the course of time they were introduced on the regular stage.

HILARY TERM, a name said to be derived from St. Hilarius, bishop of Poitiers, and now applied to the English law term during which the law courts

hold their sittings at Westminster in *banco*. It commences on the 11th and terminates on the last day of January.

HILDBURGHAUSEN. [SAXE MEININGEN.]

HILDEBRAND. [GREGORY VII.]

HILDESHEIM, a government in the kingdom of Hanover, consisting of the principality of Hildesheim, which forms the most southern part of Hanover Proper; of the principalities of Göttingen and of Grubenhagen, which form an isolated portion of Hanover, lying between Brunswick, Hesse-Cassel, and Prussian Saxony; and of the county of Hohnstein, another isolated district which lies S.E. of the preceding, and extends southwards from the Brunswick circle of Blankenburg into the Erfurt division of Prussian Saxony.

The area of the principality is 1750 square miles, and the population in 1866 was 366,766.

In the south the surface of the principality of *Hildesheim* is traversed by branches of the Harz. The soil is stony and not generally fertile. In the centre and north the surface is undulating, and the soil rich and fertile. The principal rivers are the Innerste, Leine, Ocker, Ecker, and Fuhse. The climate is healthy. The agricultural products are corn, garden vegetables, fruit, flax, hops, and timber; the mineral products are iron, coal, and salt. Linen is the principal manufacture.

The principal town is *Hildesheim*, the capital, which stands on the Innerste, and is a place of considerable extent, but very irregularly built. It is 18 miles S.E. of Hanover, on the railway to Harburg. The number of inhabitants at the last census was 17,134, of whom one-third were Roman Catholics. It is divided into the old and the new towns. There are seven gates; the ancient ramparts have been levelled and converted into public walks. The town is the seat of a Roman Catholic bishop. The cathedral, founded in 818 by Louis the Pious, has ten altars, very fine paintings on glass, magnificent bronze doors covered with bas-reliefs, and numerous antiquities, among which is a pillar of greenish marble, said to have been a Saxon idol, which now supports an image of the Virgin. There are three other churches, a consistory, and a college, belonging to the Roman Catholics; a Lutheran college and several chapels, deaf, mute, and lunatic asylums, numerous public schools, a council-hall, treasury, &c. There is a trade in coarse linen cloths and yarn, and large cattle fairs are held here. The other towns are—*Gosler*. [GOSLER.] *Peine*, N.E. of Hildesheim, which stands on the Fuhse, and has 3000 inhabitants: *Bokenem* on the Nette, a branch of the Innerste; population, 2500: *Alfeld*, on the right bank of the Leine, which has 2800 inhabitants; and *Elze*, a few miles W. of Hildesheim; population, 2146.

GÖTTINGEN and GRUBENHAGEN are described in separate articles.

The county of *Hohnstein* is covered by the Harz mountains, except towards the south, where it comprises a portion of the Goldene-Aue, which is fertile in corn, and well cultivated. The mountains are covered with forests or with pasture; great numbers of cattle are reared. Iron, copper, cobalt, manganese, coal, marble, limestone, &c., are among the minerals; but iron mines only are worked. The county is divided into two districts, named from the villages

of *Neustadt* and *Ilfeld*. Near *Neustadt* are the ruins of the castle of Hohnstein, from which the county is named.

HILL, AARON, was born at Beaufort Buildings, in the Strand, 1684–85. He was educated at Westminster School, and in his sixteenth year Lord Paget, who was a relation of his mother's, provided him with a tutor, with whom he travelled through a great part of the East. Having subsequently lost his kinsman's favour, he was engaged by Sir William Wentworth as his travelling companion through Europe. On his return he wrote in 1709 a History of the Ottoman Empire, and about the same time was made 'master' of Drury Lane Theatre. At this time he wrote his first tragedy of *Elfrida*. He died in 1749–50.

Aaron Hill wrote about fifteen dramatic pieces, of which only two are now remembered, '*Alzira*' and '*Zara*,' both of which are adaptations from Voltaire.

HILL, SIR JOHN, was born about 1716, and began life as apprentice to an apothecary in London, in which capacity he gained that knowledge of botany which is his only claim to honourable notice; though, being possessed of lively parts, industry, and impudence, he managed to obtain in his lifetime no little notoriety. He pushed his way into fashionable life; published a fashionable and scandalous newspaper called the *Inspector*; made, puffed, and sold quack medicines; and yet found time to compose a great number of works, many very voluminous, principally on botanical subjects. Hill obtained a Scotch diploma of medicine, and assumed the title of Sir John in virtue of a Swedish order of knighthood presented to him by the king of Sweden. He died in 1775. The following are some of his most considerable works:—'*History of the Materia Medica*,' 4to., 1751; '*General Natural History*,' 1748–52, 3 vols. folio; '*British Herbal*,' 1756, folio; '*Vegetable System*,' 1759–75, 26 vols. folio; '*Constitution of Timber from its Early Growth*,' folio, 1770.

HILL ROWLAND, a preacher of eccentric genius and apostolic zeal, sixth son of Sir Rowland Hill of Hawkestone, was born August 23, 1744. Educated at Eton and St. John's, Cambridge, he was ordained in 1774 to the curacy of Kingston in Somersetshire. Having for his friends Berridge and Whitfield, he entered upon a course of itinerancy, preaching in villages, and paying religious visits to prisons and work-houses. In 1782 he laid the first stone of Surrey Chapel, London, opened it in the following year, and was minister of that favourite place of worship for fifty years. He was one of the founders of the Bible Society, the Tract Society, and the London Missionary Society. He was also one of the earliest and most effective promoters of Sunday schools; and a powerful advocate of Dr. Jenner's method of inoculation. His preaching was in a style peculiarly his own, being often unable to restrain his drollery in the pulpit; and many anecdotes are told of his eccentricities. It savoured nothing of art, nothing of the schools, hardly any thing of study, but was all nature. He died April 12, 1833, and was buried under his own pulpit at Surrey Chapel.

HILL, ROWLAND, VISCOUNT, a distinguished English general, second son of Sir John Hill of Hawkestone, Shropshire, and a nephew of the cele-

brated preacher his namesake, was born August 11, 1772. He entered the army as ensign in the 36th, was aide-de-camp to Lord Mulgrave, General O'Hara, and Sir D. Dundas, successively. On the 1st January, 1800, he was appointed full colonel, and was in active service with his regiment in Egypt under Sir Ralph Abercrombie. He served in the campaigns of 1809, 1810, and 1811, under the duke of Wellington, and displayed such great talents as a commander that he was made a G.C.B., and elevated to the peerage in 1814. He commanded a division at Waterloo, and aided in the final repulse of the French; in the *melée* his horse was shot under him, and he narrowly escaped with his life. In 1827 he declined the offer of chief command of the army in India, but succeeded the duke of Wellington as commander-in-chief of the whole army in 1828. He presided at the Horse Guards until August, 1842, when failing health compelled him to offer his resignation, and Her Majesty, in recognition of his long and faithful services, raised him to the rank of viscount. He died at his seat of Hardwicke Grange, Shropshire, on the 10th December, 1842.

HILL, SIR ROWLAND, K.C.B., founder of the system of penny postage, was born at Kidderminster in the December of 1795. In 1832 he published his first pamphlet of note, entitled 'Home Colonies; sketch of a plan for the gradual extinction of pauperism, and for the diminution of crime.' In it was broached the scheme, often resuscitated since, for the settlement of able-bodied paupers on waste lands, by the cultivation of which the expense of their support would be saved to the state; and the theory was supported by references to the success of a similar experiment in the case of the paupers of Holland and Belgium. After this Rowland Hill was appointed secretary of the South Australian Commission, and aided in founding the colony of South Australia. It was in 1837 that he printed for private circulation his celebrated pamphlet, 'Post-office Reform, its importance and practicability,' and after gathering opinions and suggestions, he gave it to the public. The reforms proposed in the pamphlet included in their results increased speed in the delivery of letters, greater facilities for their despatch, and a simplification of the operations of the post-office. But their chief feature was the establishment of a uniform rate of a penny for each half ounce, whatever might be the distance traversed by the letter. He predicted that by the adoption of his suggestions, not only would enormous advantages be bestowed upon the public, but a net revenue of more than a million sterling would be procured from the post-office. Towards the end of 1838 a committee of the House of Commons reported in favour of the plan. On the 12th of July, 1839, a resolution was carried in the House approving of it, and an Act of Parliament embodying it was passed. The founder of the new system was appointed to the Treasury at a salary of 1500*l.* a year to superintend the execution of his plans; but after three years his services were dispensed with by the ministry of Sir Robert Peel. A public testimonial to Mr. Hill was proposed in 1844, and resulted in the presentation to him of the sum of 15,000*l.* In 1846, on the resumption of office by the Whigs, Rowland Hill was appointed secretary to the postmaster-general, and in 1854 sole secretary

to the post-office. This situation he resigned in February, 1864; the full salary attached to it being, however, continued, on account of his vast exertions in the cause of postal reform, for which also he was made a knight commander of the Bath, March, 1860.

HILLAH. [BABYLON.]

HILLIARD, NICHOLAS, limner, jeweller, and goldsmith to Queen Elizabeth and to James I., was born at Exeter in 1547. His father, Richard Hilliard, was high sheriff of Exeter and Devonshire in 1560.

There are many miniatures, especially of ladies, by Hilliard extant. He painted Mary queen of Scots, Elizabeth several times, James I., and Prince Henry. He had for twelve years the exclusive privilege of painting and engraving the portraits of the royal family. He died in 1619.

HILTON, WILLIAM, R.A., was born at Lincoln on the 3rd of June, 1786. His father, who was a portrait painter, died in 1822. Hilton was placed with J. R. Smith, the engraver, in London, in 1800; he obtained about the same time admission into the Royal Academy as a student, and in 1803 he exhibited at the Academy exhibition a picture of banditti, of extraordinary merit for so young a man. His early works were followed by a series of noble compositions, which greatly distinguished him from the majority of his brother labourers. However, neither his subjects nor his style were popular.

In 1814 he exhibited 'Miranda and Ferdinand bearing a Log,' and he was elected an Associate of the Academy in the same year: he was elected a member in 1820, when he exhibited his picture of 'Ganymede,' which he presented to the Academy as his diploma piece. In 1825 he exhibited his 'Christ crowned with Thorns.' Two years afterwards he succeeded Fuseli as keeper of the Academy, a post which he held until his death, December 30, 1839, in his fifty-fourth year.

Hilton died in possession of his best pictures. 'Sir Calpeine rescuing Serena,' exhibited in 1831, was purchased by subscription from Hilton's executors, for 500 guineas, and was presented to the National Gallery, where it now hangs. There are two works by Hilton in the Vernon Collection—'Rebecca with Abraham's Servant at the Well,' exhibited in 1829; and 'Edith and the Monks searching for the Body of Harold,' exhibited in 1834.

HIMALAYA MOUNTAINS, or *Himmäleh Mountains*, extend along the northern boundary of Hindustan, and they constitute likewise the northern boundary of the valley of Assam. They are situated between 27° and 35° N. lat., and 73° and 98° E. long. The entire length of the range is 1500 miles, and the breadth varies between 100 and 160 miles.

The range lies between two plains, a low and level one, drained by the Ganges and the Brahmapootra, and extending along its southern declivity, and the elevated table-land of Tibet, which lies to the north-east and north of the range. The mountains terminate on the plain of the Ganges, in a wall-like range from 4000 to 5000 feet high, which, however, is frequently broken by gaps through which the rivers escape that carry off the water collected in the interior of the mountain region.

The enormous masses are separated from each other by valleys, of which the best known are those

of Cashmere, the Indus, and the Sutej. During the summer these upper elevations are covered with a vigorous vegetation, and are used by the inhabitants of the lower valleys as pasture-ground; but during the greater part of the year they are buried in snow, and uninhabited. Through the valleys lie the few roads by which the plain of the Ganges communicates with the countries on the table-land of Tibet. Some of the mountain ranges are continually covered with snow. Their elevation varies considerably. The mean altitude is from 16,000 to 18,000 feet, but nearly fifty of the peaks are now known to be over 23,000 feet, including Mount Everest—the highest in the world—which is 29,002 feet.

These mountains have their southern or Indian base clothed with a dense and almost impenetrable jungle, which separates them from the plains of India. This belt diminishes in breadth as we proceed northwards, until it altogether disappears to the north of the Jumna, where, in the country of the Sikhs, cultivation is carried on close to the foot of the mountains. We have here the characteristics of a tropical climate, and with it tropical or Indian vegetation. The decrease of temperature being gradual as we ascend mountains, so is the disappearance of tropical forms in the Himalayas. Indian trees and shrubs soon disappear. On reaching the height of 5000 feet, scarcely any but European forms are visible. There is little change in the thermometer from night to morning, or from day to day, or week to week; and the temperature does not vary 10° of Fahr. for three months, or from the middle of June to the end of September. It is in those months that rice is cultivated in these mountains, as well as other tropical grains, together with a species of arum, which is one of the principal articles of the chiefly vegetable diet of the hill-people. [HINDUSTAN.]

Notwithstanding the apparent barrenness of much of the country on the declivities of the Himalayas, nowhere are the flocks of cattle more conspicuous for number and variety. The cold and dry atmosphere is particularly favourable to the shawl-goat. The sheep and goat are both used as beasts of burden, and the dog is of a large size, and, like the others, furnished with fine wool under the upper shaggy hair.

Himálaya is a Sanscrit word, compounded of *hima*, 'cold, or frost, or snow,' and *alaya*, 'abode.' (Wilson's 'Sanskrit Dict.'). The resemblance of the first part of the compound to the name of the Hæmus (Balkan), to the Greek *cheima* (χείμα), and the Latin *hiems*, is obvious. The Greek and Roman geographers were acquainted with this enormous mountain-range under the general name of *Imaus* or *Emodus*.

HIMANTOPUS, the generic name for the Long-legged Plover, or Stilt. [PLOVERS.]

HYMERA, a city in Sicily, was founded by the Zancleans of Mylæ in Sicily (Strab., vi. 272), and after existing for 240 years was destroyed by the Carthaginians, and its ornaments carried off. The inhabitants who survived established themselves at Thermæ, near the site of the ancient town (Cic., 'In Verr.,' ii. 35), and enriched their new abode with such works of art as they had saved from the wreck. Upon the capture of Carthage, Scipio restored to the people of Thermæ, of Gela, and other Sicilian towns,

those monuments of art of which they had been plundered in their wars with Carthage.

HIMMEL, FRIEDRICH-HEINRICH, a German composer, the reputed son of Frederic William II., of Prussia, was born in the duchy of Brandenburg in 1765. He was intended for the church, and studied theology in the University of Halle, but became so skilful in music that the king encouraged him to pursue the art as a profession, and settled on him a pension. He chose Naumann as his guide, with whom he made such progress that in two years he produced the oratorio of 'Isacco.' He then travelled into Italy, and at Venice brought out a pastoral opera, 'Il Primo Navigatore.' In 1794 he succeeded Reichardt as kapell-meister at Berlin, and in the following year produced his 'Semiramide.' The operas on which his fame chiefly rests are 'Fanchon das Leiermädchen' (Fanchon the Lyre-maiden), and 'Die Sylphen' (the Sylphs). His death took place at Berlin in 1804.

HINCMAR was born in France in 806. He was of a noble family, and nearly related to Bernard, count of Toulouse. At a very early age he was placed under the care of Hilduin, abbot of St. Denis. His talents and high birth brought him under the notice of the Emperor Lewis, the Meek. Hilduin, having fallen under the displeasure of his royal master was banished from the court, and retired to Saxony, accompanied by Hincmar. On the death of Hilduin, his successor Lewis again introduced him to the court of the emperor, who presented him with the government of the abbey of Notre Dame at Compiègne and St. Germer. Ebbonius, archbishop of Rheims, having been deposed, Hincmar was elected by the clergy and people to succeed him.

In 857 Hincmar composed his first great work on Predestination, the preface of which is the only part extant. A few years afterwards he wrote a second treatise on the subject of Predestination, which has been preserved.

In the year 862, and for several succeeding years, we find Hincmar engaged in controversy with the pope, to whose interference in temporal matters he offered a strong resistance. Some years after, however, Hincmar exercised the same firmness in defending the rights of the church against the encroachments of regal authority that he had shown in opposing the Roman pontiff.

Hincmar died December 21st, 882, at Eprenay, where he had gone to escape from the Normans, who were pillaging and overrunning the province. His works have been collected in two volumes folio by the learned Sirmond, Paris, 1645; and another volume was added to this collection by Cellot, in 1658.

HIND, the female of the stag or red deer. The term is also sometimes improperly applied to other species of deer.

HINDOO ARCHITECTURE. [HINDUSTAN.]

HINDUSTAN, that is, in the Persian language, the country of the Hindus, or Hindoos, is the name which has been adopted by geographers to designate that part of India, or the East Indies, formerly called the Peninsula within the Ganges, which extends from Cape Comorin to the Himalaya Mountains. As the long declivity of this extensive mountain-chain slopes towards the plains of Hindustan,

the Himalaya mountains are properly included in Hindustan. The seas which surround it on the S.E., S., and W., and the mountains which inclose it on the N.W. and N.E., mark distinctly its boundary on these sides. Hindustan extends from $8^{\circ} 4'$ to 35° N. lat., and from 66° to 92° E. long. Its length, north to south, is about 1900 miles, and its breadth along the parallel of 25° is about 1600 miles. The area, as deduced by the recent trigonometrical survey, is 1,309,200 square miles, or nearly twenty-five times that of England and Wales. This trigonometrical survey was designed by the late duke of Wellington, and commenced shortly after the fall of Seringapatam, and is without a parallel for extensiveness and accuracy. The coast-line of Hindustan amounts, according to a recent calculation, to about 4000 miles. Beginning with the innermost corner of the Bay of Bengal, to Chittagong, the coast for about 320 miles is traversed by the numerous mouths of the Ganges. Contiguous to the Hooghly branch of the Ganges, is the open Bay of Balasore, with a coast of 120 miles, terminating at Cape Palmyras. From this point the coast stretches S.W. to the mouth of the Kistna, about 420 miles, and is without harbours, except that of Coringa, near the mouth of the Godavery. From the mouth of the Kistna, S. by W., to Cape Calymere, about 430 miles, no harbour occurs, even for vessels of moderate size. From Cape Calymere, W.S.W., to Cape Comorin, about 160 miles, there is only the small harbour of Tuticorin. The coast, which stretches N.N.W., and afterwards nearly N., between Cape Comorin and the innermost corner of the Gulf of Cambay, about 1150 miles, contains a great number of small and several very good and safe harbours. The coast-line of the peninsula of Gujerat, about 380 miles, has several harbours for vessels of moderate size. The coast-line of the island of Cutch extends about 150 miles. The coast intersected by the several mouths of the Indus extends as far as Cape Monze, about 150 miles, but it cannot be approached by vessels of more than fifty tons' burden, except at the harbour of Kurrachee, which admits vessels of moderate size.

Physical Features, Climate, Productions, &c.—NORTHERN INDIA, the more strictly continental portion of the country, is comprised between the river Nerbudda on the south, and the chain of the Himalaya. It has very varied superficial features—mountains, plateau and lowland, forest, river, and waste—each developed upon a scale of great magnitude. There are plains of the richest alluvial soil, intersected by a network of grand streams, refreshed seasonally with abundant rains, bathed in the intensest sunshine, and clothed with bright green verdure; there are sandy or stony tracts, flats of hard baked clay, where the mirage is often observed; and there are salt morasses, the haunts of porcupines and vast flocks of aquatic birds.

The high mountains are on the borders, as the Himalaya, the natural boundary between India and Tibet. These are the loftiest highlands of the globe, culminating at the height of nearly five miles and a half, or 29,000 feet, above the level of the sea. A grass-covered marshy tract, followed by a belt of dry forest land above it, marks the approach to the outer edge of the elevated region. Both districts are

extremely unhealthy, inhabited by countless wild animals. They skirt the Siwalik hills, and other sub-Himalayan ranges of moderate elevation, on which are placed the sanitarium for troops. Passing these, the surface ascends rapidly, but the stupendous heights of the great northern barrier are eighty or ninety miles from the exterior ridge. Their aspect in the distant view is often not more magnificent than extraordinary, owing to clouds completely hiding the lower slopes from sight. Hence the peaks appear projected against the clear blue sky without a visible solid basement, either wholly silvered with snow, or partly patched and tipped, or, where the inclination is too precipitous for snow to find a resting place, their naked pyramidal masses of gneiss and granite are exhibited. Other important highlands, but of far inferior elevation, the Sulaiman mountains, run from north to south beyond the Indus, and, with the Hala range, form the western boundary of the country from the Beloochee and Afghan territories. Their loftiest summit, Takht-i-Sulaiman, or 'Solomon's Throne,' rises to 11,000 feet. On the southern side, parallel to the river Nerbudda, the Vindhya mountains form a line of separation between northern and southern India, but nowhere exceed the height of 6000 feet. These natural boundaries, respectively on the north, west, and south, inclose minor ridges, with the table-lands of Malwa and Rajasthan, and the vast lowland plains which stretch in a huge curve between the mouths of the Ganges and the Indus, along the course of the rivers. Of these plains, the Gangetic is a region of exuberant fertility, while that of the Indus has a diversified character, and embraces the sterile district of the Indian Desert, extending from the Punjab to the Runn of Cutch.

Among the rivers, the first place is due to the *Ganges*, as well from its utility as its magnitude, and from being within the limits of India from source to mouth, while the rival systems of the Brahmaputra and the Indus have a foreign origin. It chiefly traverses a north-eastern alluvial flat, stretching from the Punjab to the Bay of Bengal, on which the great water-course and its numerous tributaries, some of which exceed the Rhine in length and volume, are spread out like the intersecting veins of a leaf. Its basin is the best cultivated and most densely peopled portion of the whole country. The river is deemed specially sacred by the natives, whose dreams of an auspicious future existence are closely connected with the consignment of their ashes to its bosom. It issues from a bed of snow in the Himalaya, at the height of 13,800 feet above the sea, and makes a very rapid descent to a low level. This is gained at Hurdwar, upwards of 1300 miles from the mouth, where the river begins to be navigable for light passenger boats, and for larger craft about 100 miles lower down. But the navigation is carried on with difficulty, owing to rapids and shifting shoals, to avoid which, as well as to irrigate a district which has often been scourged with drought and famine, the great Ganges Canal has been constructed. At Allahabad, 840 miles from the sea, where the stream receives the Jumna, it is about a mile across, but varies greatly in breadth and depth through the whole of its course according to the season. At about 280 miles from the coast, branches are thrown

off on the right bank, several of which unite to form the *Hooghly*, on which Calcutta is seated, while the grand trunk passes on to link itself with the system of the *Brahmaputra*. The two great rivers commingle in a highly complex manner, ramify in numerous channels over an extensive area, divide it into islands by their intersection, and discharge themselves by at least twenty mouths. This deltoid region is swampy and unhealthy, densely clothed with trees and jungle, hence called the *Sonderbunds*, or woods. In these the tiger prowls and the rhinoceros roams, while the waters swarm with huge crocodiles. The *Brahmaputra*, 'offspring of Brahma,' has the upper part of its course in Tibet, but forms in the lower the eastern frontier in relation to India proper. Owing to the periodical rains, and coincident meltings of the snow in the Himalaya, both rivers are annually in flood, inundate vast tracts of country, and bring down an enormous quantity of sediment, which discolours the sea to the distance of sixty miles from the shore.

The *Indus* traverses the north-western side of the country, and has a longer flow than the Ganges, with a less extensive basin, somewhat prominently distinguished by arid features. It rises on the northern side of the Himalaya, at the height of 18,000 feet, proceeds at first to the north-west, but breaking through the mountains, inverts its course to the south-west, receives the waters of the Punjab, or 'five rivers,' collected into a single channel, and descends to the Arabian sea through several mouths. The river has a lengthened navigation, but owing to its inconstancy and general want of depth, its navigable value is far inferior to that of streams of scarcely half the magnitude. The flood-tide rushes into the *Indus* with impetuosity, and forms a *bore*, owing to the confined space. The water rises in a ridge of several feet, which is swept along with great violence, endangering craft on the surface, and inundating the low grounds on the margin. The ebb takes place as suddenly; and thus vast tracts are rapidly converted into navigable expanses and flats of mud. Parallel with the river on the eastern side, and diverging from it hundreds of miles, is the Indian Desert, which embraces upwards of 150,000 square miles. It is not entirely sterile, but contains at intervals tracts of cultivable land; and the sandy portions are generally overgrown with coarse grass and jungle shrubs after the rains. But this vegetation perishes completely in the hot months, and the true desert aspect is exhibited. Southward lies the Runn of Cutch, a remarkable flat district bordering the Gulf of Cutch, and through the greater part of the year without weeds or grass, sustaining only a few tamarisks. But during the monsoon, when the sea runs high, its waters are driven over it, leaving shallow salt-lakes behind; and the general surface receives a saline incrustation from the subsequent evaporation. SOUTHERN INDIA, the peninsular portion of country, called by the natives the *Deccan*, consists of an immense central plateau, broken by river-valleys into a series of table-lands, which range in elevation from 2000 to 3000 feet. They advance in height from north to south, and have a gradual slope from west to east, in which direction the important rivers have their course. Between this high country and the sea are lowland tracts, commonly distinguished as

the coast of Coromandel on the eastern side, and the Malabar coast on the western. The plateau has chains of mountains on its edges, called the Eastern and Western Ghauts, which run parallel to the shores, and converge southerly in the wild tract of the Neilgherries, or Blue mountains. This district contains the highest point of the peninsula, the peak of Dodabetta, which rises to 8760 feet, and is the seat of the principal sanitarium, owing to the temperate climate. Further south, the highland region is broken by the sharply defined valley or gap of Palghat, beyond which hilly ridges rise again, clothed with woods, and are continuous to Cape Comorin. The word *ghaut*, *gate*, is of Sanscrit origin, and refers to the terrace-like passes by which the ranges are crossed. The Western Ghauts form a lofty chain, through which no streams of the slightest consequence find their way from the central region to the sea. They present a very steep face towards the ocean, press closely to its border at various points, and contribute to give a bold character to the coastline, which has many convenient harbours. The Eastern Ghauts are lower, and are much less continuous, offering channels through which nearly all the drainage of the interior is poured. They are also at a much greater distance from the shore, which is uniformly low and without harbours, and exposed to the roll of a violent and dangerous surf. The *Godavery* (*Godávári*), the largest river, has a course of rather more than 850 miles. It rises in the Western Ghauts, and passes to the Eastern, flowing through them with such a gentle descent that the navigation is not interrupted, either up or down. The *Kistna* and *Kaveri* are next in importance, following the same general direction. The *Nerbudda*, on the north border of the peninsula, is the largest westward-bound stream, entering the Gulf of Cambay after a course of 800 miles. Neither Northern nor Southern India contains any extensive lakes, and the number of small size is few compared with the magnitude of the area. This is the chief exception to the oft-repeated remark, that the country may be regarded as an epitome of the whole earth.

The valleys and mountain-slopes are profusely adorned with splendid vegetation, varying from tropical to alpine forms according to the elevation, and combining all the materials requisite for utility, beauty, and luxury. The cocoa-nut palm, the palmyra palm, and other varieties of the tribe, tall bamboos, jungle grasses, tree ferns, and arborescent flowering-plants, are eminently characteristic of the flora at the lower levels, where heat and humidity combine their influence. Timber of the highest value is supplied by the teak, sandal-wood, satin-wood, ebony, and sapan trees; and in the belt of forest which skirts the southern base of the Himalaya remarkably fine trees are found. The greatest botanical variety is of course seen in the grand mountain-region, owing to the different climates met with ascendingly. From the height of 5000 to 8000 feet, oaks and rhododendrons compose the main mass of the forest—the latter not shrubs as with us, but trees of considerable size, bearing their splendid purple flowers. In association with them are the cypress, ash, birch, elm, holly, hornbeam, alder, and several laurels. Still higher, up to 11,500 feet, most of the preceding occur, but other objects are more prom-

inent, as pines, yew, horse-chestnut, walnut, maple, hazel, and the magnificent deodar. At a greater elevation, a few trees struggle for existence in a stunted condition, and with a deformed aspect. Shrubs grow at the height of 15,200 feet, and herbaceous plants at a loftier altitude, till you reach the point where all vegetable life ceases, and the eternal snow and azure sky alone are present.

The objects of cultivation to supply the daily wants of the natives, and meet the demands of commerce, illustrate by their diversity the bounty of nature in supplying vast tracts of deep black vegetable soil, with the other condition of seasonal rains and a high temperature to render it prolific. They include rice, the staple food, with other cereals; the sugar-cane, cotton-plant, mulberry tree for the silk-worm, poppy for opium, tobacco, indigo, coffee, and cinnamon; various medicinal shrubs, and flowering plants for perfumes; with an immense variety of fruits, among which the pine-apple, pomegranate, plantain, guava, melon, banana, and cocoa-nut are the most common. Several of the preceding are known ancient products of Indian agriculture.

The Greeks of Alexander's expedition noticed that garments of fine cotton were ordinarily worn by the great men of the country, either wrapped round the shoulders, or enveloping the head as turbans. The general food, pillaus made of rice, also attracted attention, as well as the mode of planting the rice in water, with the distillation of a strong spirit from it, the arrack of the natives. They remarked also the sugar, calling it honey made from canes, without the assistance of bees. We have the word 'sugar' from its Sanscrit name *sukkhar*, as also 'sugar-candy' from *sukkhar kund*.

In our own time the objects of culture have been increased by the growth of tea on the southern face of the Himalaya, with a success which has changed the aspect of entire districts, and is likely to convert a belt of country along the whole range into a large tea-plantation. The plant occurs there in the wild state, and was noticed in Nepal as far back as the year 1816, but was pronounced by some to be a camelia. It is probably the parent stock of all the varieties raised in the old tea-producing districts, China and Japan, since the wild shrub is not known in either of those countries. More recently, the Peruvian-bark trees have been introduced, in order to secure a supply of quinine independent of South America. The plantations on the Neilgherry hills succeed perfectly, and the bark thus grown is found to contain precisely the same alkaloids as the natural produce on the slopes of the Andes.

The fauna, like the flora, is distinguished by a great number of species, and the profusion of individuals. It includes also a remarkable proportion of animals of large size, and of the dangerous class. The elephant roams wild, but is very generally domesticated, carrying rajahs on state occasions, and obediently drudging in the service of the humblest menials. The rhinoceros is found in the secluded forests of Bengal; the lion occurs chiefly in the north-western provinces, Rajpootana and Guzerat; the tiger is general, from the jungles of the lowest levels up to the region of the snows and glaciers. Leopards, panthers, bears, hyenas, wolves, lynxes, and jackals are the more ordinary beasts of

prey. The wild ass inhabits the great sandy desert, and the camel is there the usual beast of burden, an office which the ox performs elsewhere. Monkeys abound everywhere, being held in religious respect by the natives, a distinction enjoyed also by the buffalo, wild and tame. The goat of Cashmere, a variety of the common species, is renowned for its very long, fine, and silky hair, of which the high-priced shawls are made. Reptiles comprise the poisonous cobra da capello, or black-hooded snake, the formidable python, and the gavia, or Gangetic crocodile. The birds, of which many are noted for splendid plumage or curious habits, are extremely numerous. Insect life is intensely developed as a consequence of the profuse vegetation, and includes myriads of the annoying or destructive class, such as locusts, white ants, and mosquitoes; the butterflies display the most gorgeous colours and forms.

From the earliest historic date Hindustan has been renowned for its mineral wealth, but entirely in relation to the possession of gold and gems. The precious metal occurs in a state of minute diffusion in many alluvial soils, and in the sands of many rivers; and some richly-auriferous reefs of quartz rock are known. Precious stones of great beauty and variety are also occasionally found, as diamonds, rubies, amethysts, chrysolites, topaz, beryl, and many others. Both iron and copper ores appear to be abundant along the base of the Himalaya. Rock-salt is plentiful in the Punjab. Coal is obtained in seven different localities, but the only field of importance at present known is the Burdwan, in the lower part of the valley of the Ganges. No coal-field has yet been discovered in the north-west provinces, or in Oude, the Punjab, or the Presidencies of Bombay and Madras, where it will be prudent to conserve the forests in the absence of native fossil fuel. But it is not unlikely that the geological survey of the country, now (1866) in progress, will develop within its limits a coal-producing power in some degree commensurate with its area, and adequate to the supply of its wants. The annual consumption at present, chiefly in manufactures and by vessels leaving the ports, may be estimated at 800,000 tons, towards which Hindustan contributes rather more than one-half, and the remainder is sent out from England.

The climate, generally, is distinguished by three well-marked seasons, the cool, the hot, and the rainy, which divide the year. The cool season extends from October till towards the close of February; the dry, hot season follows, and continues till the beginning of June; the great rainy season succeeds, and lasts with occasional intermissions till October. But during the cool period the heat is still great by day, though slight frosts occur in the elevated districts for an hour or two before sunrise, and a thin ice is formed. The greatest heat prevails on the lowlands of the Coromandel and Malabar coasts, and through the north-western sandy region. At Bombay the mean annual temperature is 84°, at Madras 83°, at Calcutta 77°, and at Delhi 72°. The monsoon winds are the peculiar features of the climate, but are common to the neighbouring regions from Africa to the Malay peninsula. They blow periodically from the south-west and north-east, maintain the same direction for nearly half the year, and regu-

larly succeed each other. The south-west monsoon commences about the middle of April, and continues till September. It brings on the great rainy season to the Malabar coast and the Gangetic plain, owing to the masses of vapour blown up from the ocean being arrested by the Western Ghats and the Himalaya mountains. The showers descend in deluges, and commence with violent thunder storms. The north-east monsoon follows with less decided features, and brings a rainy season to the Coromandel coast, usually lasting about two months. At different stations the rain-fall varies greatly in its amount. In the valley of the Ganges it does not differ much from that of Great Britain, being 64 inches annually at Calcutta, 41 at Benares, 27 at Allahabad, 20 at Delhi, and 32 inches at Meerut. But the quantity in other situations is enormous, amounting at Darjeeling, among the sub-Himalayas, to 122 inches, and at Mahabaleshwar, a sanitarium connected with Bombay, to 250 inches. Among the Cossya hills, in the valley of the Brahmaputra, but beyond the bounds of India proper, the annual fall is ascertained to be 610 inches, which is equal to 50 feet.

The political divisions of this great region, though extremely numerous and complex, may be arranged in five main sections:—1. The British Territory under the direct government of the crown; 2. Protected or Tributary States, which have native rulers, but are entirely subject to British control; 3. Independent States; 4. French and Portuguese possessions; 5. The island of Ceylon, a separate colony of Great Britain. The territory subject to direct British rule embraces considerably more than half the entire area of the country. The first and second of the above sections may be merged in one grand division, constituting British India, which comprehends the whole region from Cape Comorin to the Cyclopean walls of the Himalaya, with the exception of the comparatively insignificant tracts which are independent, or held by the French and Portuguese.

All the principal states and their chief towns are described in separate articles, and full particulars on every matter of general interest relating to British India will be found in the article **INDIA, BRITISH**.

Inhabitants of Hindustan.—A complete census of the people of Hindustan has not yet been taken. It was to have been done in 1861, but owing to the agitation occasioned by the mutiny, it was deemed inexpedient. Official estimates return the number of strictly British subjects at about 155,000,000. To these, it is supposed, must be added 40,000,000 for the inhabitants of protected states and independent territories, thus making a grand total for the entire population of nearly 200,000,000. In classifying this immense aggregate, Mr. Montgomery Martin conceives that aboriginal races, known by various names, and greatly scattered, number 20,000,000. The Mohammedans he reckons at from 12,000,000 to 15,000,000; the Sikhs, on or near the Sutlej, at about 2,000,000; the Jains or Buddhists, widely diffused, at 5,000,000; Hill tribes and sundry others at 8,000,000; the remainder, 150,000,000, being Hindus of the Brahmanical creed.

The aboriginal races are known by the various names of Konds, Bheels, Santals, Mairs, Koles, Bengies, Dornes, and Bhâts. They are found in

jungles, forests, mountainous districts, and the outskirts of towns; were formerly prone to live by plunder, and committed frightful excesses to obtain it, but many have been reclaimed by the care of the government, and now faithfully serve it as efficient soldiers and armed police.

Under the modifying influence of different climate, food, and other external circumstances, operating for ages, the Hindus have ceased to be a homogeneous people. Their diversities in appearance, character, habits, and language are now as great as those which exist among the various nations of Europe. In general, the figure is slight, graceful, and admirably proportioned, but muscular and athletic on the high table lands; the face is oval, and the features regular; the eyes and hair are black; the skin is soft and polished; the complexion varies from the deepest olive to a light transparent brown.

An indigenous form of municipal government of great antiquity is an interesting feature in the social life of the Hindus. Each of the *villages*, meaning thereby a district of varying extent analogous to a township, is under the jurisdiction of a head-inhabitant, called the *potail*. He acts as chief magistrate, arranges disputes, sees to the collection of taxes, and appoints the *chokeydars*, watchmen or police. Several other functionaries are recognized as of public utility, as the priest, the schoolmaster, the musician, and the dancing-girl, all of whom are paid at the expense of the community. Under this simple form of municipal government, the inhabitants have lived from time immemorial. The boundaries of the village have been but seldom altered; and though the villages themselves have been sometimes injured, and even desolated, by war, famine, and disease, the same name, the same limits, and even the same families have continued for ages! The indigenous rural police is effective in rendering petty thefts comparatively rare, and the poorer classes are content with the system, as it is from such minor offences that they principally suffer. But owing to the great extent of the country, with wild and uncivilized people in almost every part of it, some of whom are fiercely fanatical, an army of civil and military police is required for the repression of heinous crimes, and the maintenance of public order.—(Milner's *Gallery of Geography*, London, 1864.)

Ancient India as known to the Western Nations.—Commerce between India and the western nations of Asia appears to have been carried on from the earliest historical times. The spicery which the company of Ishmaelites mentioned in Genesis (xxxvii. 25) were carrying into Egypt, must in all probability have been the produce of India; and in the 30th chapter of Exodus, where an enumeration is made of various spices and perfumes, cinnamon and cassia are expressly mentioned, which must have come from India or the islands in the Indian Archipelago. This trade appears to have been carried on by means of the Arabs, who brought the produce of India from the modern Scinde or the Malabar coast, to Hadramaut in the south-western part of Arabia, or to Gerra on the Persian Gulf, from which places it was carried by means of caravans to Petra, where it was purchased by Phœnician merchants. Indian articles were also brought from the Persian Gulf up the Euphrates as far as Thapsacus, and thence carried

across the Syrian desert into Phœnicia. Europe was thus supplied with the produce of India.

The conquest of Idumæa by David gave the Jews possession of the harbour of Ezion-geber on the Red Sea, from which ships sailed to Ophir, bringing 'gold and silver, ivory, apes, and peacocks.' (1 Kings ii. 28; x. 11, 22.) Ophir was probably an emporium of the African and Indian trade in Arabia. The Arabian merchants procured the gold from Africa, and the ivory, apes, and peacocks, from India.

The produce of India was also imported into Greece by the Phœnicians in very early times. Many of the Greek names of the Indian articles are evidently derived from the Sanskrit. Thus the Greek word for pepper, *pepperi* (πέρρι), comes from the Sanskrit *pippali*; the Greek word for emerald is *smaragdos* or *maragdos* (σμάραγδος or μάραγδος), from the Sanskrit *marakata*. The name of cinnamon was introduced into Greece together with the article. (Herod., iii. 111.) Cinnamon is not Sanskrit. It is generally said that the Greeks obtained their tin, by means of the Phœnicians, from the Scilly Islands or Cornwall, but there is no direct proof of this; and it appears probable, from the Sanskrit derivation of the word, that the Greeks originally obtained their tin from India.

The western nations of Asia appear to have had no connection with India, except in the way of commerce, till the time of Darius Hystaspes, in B.C. 521. (Herod., iv. 44.) Darius, it is said, subdued the Indians, and formed them into a satrapy, the tribute of which amounted to 360 talents in gold. (Herod., iii. 94.) The extent of the Persian dominions in India cannot be ascertained.

The knowledge which the Greeks possessed respecting India, previous to the time of Alexander, was derived from the Persians; and such was the origin of the information contained in the third book of Herodotus (98-105). Herodotus had also heard of some of the natural productions of Hindustan, such as the cotton plant and the bamboo; but his knowledge was very limited. Ctesias, who lived at the court of Artaxerxes Mnemon for many years, has given us a fuller account than Herodotus of the manners and customs of the Indians, and of the natural productions of the country. He had heard of the war-elephants, and describes the parrot, the monkey, also cochineal, and other articles.

The expedition of Alexander into India first gave the Greeks a correct idea of the western parts of India. Alexander did not advance farther east than the Hyphasis; but he followed the course of the Indus to the ocean, and afterwards sent Nearchus to explore the coast of the Indian Ocean as far as the Persian Gulf. After the death of Alexander, Seleucus made war against Sandracottus, king of the Prasii, and was the first Greek who advanced as far as the Ganges. His expedition was the means of giving the Greeks a more correct knowledge of the eastern parts of India than they had hitherto possessed; since Megasthenes and afterwards Daimachus resided for many years as ambassadors of the Syrian monarchs at Palibothra (Sanskrit, *Pataliputra*), the capital of the Prasii. From the work which Megasthenes wrote on India, later writers, even in the time of the Roman empire, such as Strabo and Arrian, appear to have derived their principal

knowledge of the country. The Greek kingdom of Bactria, which was founded by Theodotus, or Diodotus, a lieutenant of the Syrian monarchs, and which lasted about 120 years (B.C. 255-134), appears to have comprised a considerable part of northern India.

After the foundation of Alexandria in Egypt, the Indian trade was almost entirely carried on by the merchants of that city; but few ships appear to have sailed from Alexandria to India till the supposed discoveries of the monsoons by Hippalus; and the Arabians supplied Alexandria, as they had formerly done the Phœnicians, with the produce of India. The monsoons must have become known to European navigators about the middle of the first century of our era, since they are not mentioned by Strabo, but in the time of Pliny were well known. Pliny has given us ('Nat. Hist.,' vi. 23) an interesting account of the trade between India and Alexandria, as it existed in his own time.

We have another account of the Indian trade written by Arrian, who lived in all probability in the first century of the Christian era, and certainly not later than the second. [ARRIANUS.] The 'Periplus of the Erythrean Sea' contains the description of the coast from the Red Sea to the western parts of India, and also gives a list of the most important exports and imports.

The knowledge which the ancients possessed of India beyond Cape Comorin was exceedingly vague and defective. The Romans never extended their conquests as far as India, nor visited the country except for the purposes of commerce. We read of embassies to Augustus Cæsar, sent by the Indian princes Pandion and Porus, and also of an embassy from the island of Ceylon to the Emperor Claudius.

We may form some idea of the magnitude of the Indian trade under the emperors by the account of Pliny (vi. 23), who informs us that the Roman world was drained every year of at least fifty millions of sesterces (upwards of 400,000*l.*) for the purchase of Indian commodities. The articles imported by the Alexandrine merchants were chiefly precious stones, spices and perfumes, and silk.

In the time of the Emperor Justinian, an Alexandrine merchant of the name of Cosmas, who had made several voyages to India, and afterwards turned monk, wrote a work still extant, entitled 'Christian Topography,' in which he gives several particulars respecting the Indian trade. Alexandria supplied the nations of Europe with Indian articles till the discovery of the passage round the Cape of Good Hope by Vasco de Gama in 1498. But the western nations of Asia were principally supplied by the merchants of Basra, which was founded by the caliph Omar near the mouth of the Euphrates, and soon became one of the most flourishing commercial cities in the East. In addition to this, a land trade, conducted by means of caravans which passed through the central countries of Asia, existed from very early times between India and the western nations of Asia.

History.—First period: From the earliest times to the Mohammedan Conquest.—The materials for the history of this period are very few and unsatisfactory. The only ancient history written in the Sanskrit language hitherto discovered, is a chronicle of the kings of Cashmere, entitled 'Raja Taringini,'

of which an abstract was given by Abulfazl in the 'Ain-i-Akbery.' The original Sanskrit was obtained for the first time by English scholars in the present century, and was published at Calcutta in the year 1835: an account of the work is given by Professor Wilson in the fifteenth volume of the 'Asiatic Researches.' But this chronicle gives little information respecting other parts of Hindustan.

The invariable tradition of the Hindus points to the northern part of Hindustan as the original abode of their race, and of the Brahmanical faith and laws. It appears probable, both from the tradition of the Hindus and from the similarity of the Sanskrit to the Zend, the Greek, and Latin languages, that the nation from which the genuine Hindus are descended must at some period have inhabited the central plains of Asia, from which they emigrated into the northern parts of Hindustan. But whatever opinion may be entertained respecting the origin of the Hindus, the Hindus never regarded the southern part of the peninsula as forming part of Aryavarta, or 'holy land,' the name of the country inhabited by genuine Hindus. Aryavarta was bounded on the north by the Himalaya, and on the south by the Vindhya mountains (Manu, vi. 21-24); the boundaries on the east and west cannot be so easily ascertained.

Hardly any thing is known of the history of Hindustan till the Mohammedan Conquest. After the overthrow of the Greek kingdom of Bactria by the Tartars, B.C. 126, the Tartars (called by the Greeks Scythians, and by the Hindus Sakas) overran the greater part of the north-western provinces of Hindustan, which remained in their possession till the reign of Vicramaditya I., B.C. 56, who, after adding numerous provinces to his empire, drove the Tartars beyond the Indus. This sovereign, whose date is pretty well ascertained, since the years of the Samvat era are counted from his reign, resided at Ayodhya and Canoj, and ruled over almost the whole of northern Hindustan from Cashmere to the Ganges. We also read of two other sovereigns of the same name, Vicramaditya II., in 191, and Vicramaditya III., in 441. The most interesting event in this period of Hindu history is the persecution of the Buddhists, and their final expulsion from Hindustan. [BUDDHA.] During this period many of the islands of the Indian Archipelago were colonized both by Brahmans and Buddhists.

Christianity is said to have been introduced into Hindustan in the first century. The first Christians who settled in any number in Hindustan appear to have been Nestorians, who went to the Malabar coast for the purposes of commerce. When Vasco de Gama arrived at Cochin, he found a great number of Christians, who inhabited the interior of Travancore and Malabar, and who had more than a hundred churches.

Second Period: History of the Mohammedan States.—The earliest invasion of the country by the Mohammedans was probably made in the latter part of the tenth century by Sabuktaghin, a Tartar soldier, who had been proclaimed by the army monarch of Ghizni. He passed the Indus, laid waste the province of Lahore, and returned to Ghizni laden with plunder. But he made no permanent conquests. He died in 997, and was succeeded by his son, the celebrated Sultan Mahmud, who is usually regarded as the first Mohammedan conqueror of Hindustan. He died in

1028, and was succeeded by his son Massud. Massud and his successors were unable to prosecute their conquests in the country, in consequence of the formidable enemies they possessed at home. Several Tartar tribes, denominated Seljukides, from the name of their leader, had been invited by Mahmud to settle in Khorasan. In the year 1171 Yeasuddin, king of Gaur in Khorasan, conquered all the countries west of the Indus which were subject to the monarchs of Ghizni, and compelled the reigning sultan to take refuge in Lahore. Lahore was taken by Mohammed, brother of Yeasuddin, in 1184, and Khosrou II., the last monarch of the house of Sabuktaghin, was put to death.

The Hindus, however, received no benefit from this change of dynasty. In 1191 Mohammed marched farther east, and, though he was at first defeated by the Hindu rajahs, he finally conquered the greater part of the northern provinces. In 1193 Delhi was taken, and made the seat of the Mohammedan government in India. Mohammed succeeded his brother Yeasuddin. The Gaurian dynasty ended in 1289, after having lasted 117 years.

The dominion now passed into the hands of the Afghans. During the reign of Firoz II., who succeeded Kai-Kobad, the Mohammedans first undertook the conquest of the Deccan. The invasion of Timur (Tamerlane) in 1398 overturned the already tottering power of the monarchs of Delhi. Timur did not remain in Hindustan more than a few months. In the reign of Ibrahim II., Baber, a descendant of Timur, invaded Hindustan, and put an end to the Afghan dynasty. In 1526 he took Delhi, and was the founder of the Tartar dynasty, or, as it is usually but erroneously called, the Mogul dynasty. Baber was succeeded by Humaïun, who had a troubled reign, and it was not till the accession of Akbar in 1556 that the Tartar (or Mogul) dominion in Hindustan was placed upon a firm basis. Akbar died in 1605, and was succeeded by his son Selim, who took the title of Jehanghir, i.e., 'conqueror of the world.' During the reign of Jehanghir, Sir Thomas Roe arrived at the court of Agra, and obtained from the emperor many advantageous grants to the East India Company. Jehanghir was succeeded in 1627 by Shah Jehân, during whose reign a great part of the Deccan was conquered by his son Aurungzebe. Shah Jehân was thrown into prison by Aurungzebe, in which he died at the age of seventy-four, January 21, 1666. He was succeeded by Aurungzebe, who had been proclaimed emperor in 1659. Aurungzebe was the last powerful sovereign that ruled over the Mogul empire of Hindustan. After the death of Aurungzebe in 1707, the Mogul dominion rapidly declined. The last sovereign, Shah Alum II., at last became the pensioner of the East India Company, which succeeded to the power of the Mogul emperors.

Third Period: History of the European Conquests.—The Portuguese were the first nation of Europe that obtained any dominion in Hindustan. Vasco de Gama landed with three ships at Calicut on the 20th of May, 1498. The Portuguese rapidly acquired extensive power in the country, and by their numerous settlements along the Malabar coast, especially at Goa and Diu, they monopolized the commerce with Europe. In the beginning of the seventeenth century, the English, Dutch, and French began to

make settlements along the coast; and the Portuguese lost their dominions almost as rapidly as they had acquired them.

The Dutch never acquired much political power in Hindustan, though at one time they carried on the greater part of the Indian trade. The French made several settlements, the chief one being at Pondicherry, of which they acquired possession in the latter part of the seventeenth century, and which soon became one of the most splendid European establishments in the country. [PONDICHERRY.]

For a history of the commencement and progress of British power in Hindustan, the reader is referred to the articles BENGAL and EAST INDIA COMPANY; and for the modern history of British India to INDIA, BRITISH. Much information will also be found under the names of the various presidencies and states, and of the Governors-general.

Languages.—The numerous languages spoken in Hindustan at the present time may be divided into two great classes: the one consisting of those languages which are derived from the Sanskrit, and which are spoken in the northern and central provinces; and the other comprising those languages which are unconnected with the Sanskrit, and which are spoken in the southern parts of the peninsula. The Sanskrit was the ancient tongue of the people, in which their sacred books are written, and though not now vernacular, it is cultivated by the learned. The chief dialects are Hindi, the language of the non-Mohammedan population; Hindustani, the most popular and widely used—it is Hindi corrupted by a mixture of Arabic and Persian words; the Bengali; Punjabi; Mahratti; Gujeratti, &c. But in many localities the English language is making progress, being taught in schools sustained by the government, and in mission seminaries.

The members constituting the family of languages which may appropriately be called the dialects of southern India are the high and low *Tamil*; the *Telugu*, grammatical and vulgar; *Carnātaca*, or *Cannādi*, ancient and modern; *Mālyāḷma*, or *Malayāḷam*; and the *Tuluva*, the native speech of that part of the country to which in our maps the name of Canara is confined. Besides these there are a few local dialects of the same derivation, such as the *Cōdugu*, a variation of *Tuluva*, spoken in the district of that name called by us Coorg. The groundwork of all these languages is the same.

There are also many mountainous parts and forests in the northern provinces of Hindustan inhabited by numerous tribes, who do not profess the Brahmanical faith, and who speak a language entirely unconnected with Sanskrit. These tribes, who are known by the names of Bheels, Gondas, and Puharees, inhabit the mountainous tracts in Candeish, Malwa, Rajpootana, Gondwana, and the Rajmahal hills in Bengal.

Castes.—The division of the Hindus into classes or castes, with fixed occupations, existed from the earliest times: the word caste is derived from the Portuguese word *casta*, 'race,' or 'lineage;' in Sanskrit they are called *varnas*, that is, 'colours.' The most ancient portion of the Vedas alludes to such a division; and in the laws of Manu, the Ramayana, the Mahabharata, and all the other Sanskrit works of the greatest antiquity, we find the system of castes fully developed.

All the Hindu writings recognize only four pure castes: Brahmins, Kshatriyas, Vaisyas, and Sudras. Pliny ('Nat. Hist.,' vi. 19) appears to have heard of the same number; but Megasthenes, from whom Arrian, Strabo, and Diodorus Siculus derive their account, mentions seven classes:—1, Philosophers; 2, agriculturists; 3, herdsmen and hunters; 4, handicraftsmen and artisans; 5, warriors; 6, public inspectors; 7, royal councillors. But Megasthenes has evidently separated into distinct classes individuals belonging to the same class: the public inspectors and royal councillors belonged without doubt to the Brahmanical class, as well as the philosophers; the agriculturists, herdsmen, and hunters, to the Vaisyas; and the handicraftsmen and artisans, to the Sudras.

The following extract from the 'Jatimala,' a Sanskrit work on Hindu castes, gives the common Hindu tradition respecting the origin of each caste. 'In the first creation by Brahma, Brahmanas proceeded, with the Veda, from the mouth of Brahma. From his arms Kshatriyas sprung; so from his thigh Vaisyas, from his foot Sudras, were produced: all with their females. The Lord of Creation, viewing them, said, "What shall be your occupations?" They replied, "We are not our own masters; O God, command us what to undertake." Viewing and comparing their labours, he made the first tribe superior over the rest. As the first had great inclination for the divine sciences (*Brahme veda*), therefore he was Brahmana. The protector from ill (*Kshagate*) was Kshatriya. Him whose profession (*Vesa*) consists in commerce, which promotes the success of wars for the protection of himself and mankind, and in husbandry and attendance on cattle, he called Vaisya. The other should voluntarily serve the three tribes, and therefore he became a Sudra; he should humble himself at their feet.'

A strong line of demarcation is drawn between the first three castes and the Sudras. The former are allowed to receive instruction from the Vedas, and are considered to have been born again in a spiritual sense, whence they are called regenerate. A Sudra, on the contrary, is not reckoned among the regenerate, and would, according to the ancient Hindu law, be put to death for reading the Vedas.

The caste which at present exists in Hindustan is very different from the above. With the exception of the Brahmins, the pure castes have disappeared; and the present class distinctions have had their origin in guilds, possession of property, particular districts, peculiar creeds, and similar accidental circumstances. Among the lower classes, caste has degenerated into a fastidious tenacity to the rights and privileges of station. They bind themselves to do certain things, and take care they will not exceed their particular duty. Men of all castes have risen to power, and those who lose caste can easily regain it, or at any rate, take a place in the next lower class. The caste of converts to Christianity is not now recognized by the missionaries. In fact, the modern system of caste is very similar to the social differences of the various classes in England. (Irving's 'Theory and Practice of Caste.')

Religion and Philosophy.—It is erroneous to suppose that the Hindus have always professed the same faith. The sects into which the Hindus are divided

in the present day are of modern origin; and the system of theology taught by these sects differs very much from the ancient religion of the people.

The whole of Indian theology is professedly founded on the Vedas, which are four in number: the Rig-, Yagur-, Sama-, and Atharvana-Veda. Only a small portion of them has hitherto been known to Europeans; and our principal information about them is a dissertation by Mr. Colebrooke, in the eighth volume of the 'Asiatic Researches.' A few of the hymns of the Rig-Veda were published, with a Latin translation, under the title of 'Rig-Vedæ Specimen,' by the late Dr. Rosen.

The original worship of the Hindus appears to have been addressed to the elements. In the Mantras, or prayers, which form the principal portion of the Vedas, Indra, or the firmament, fire, the sun, the moon, the air, the spirits, the atmosphere, and the earth, are the objects most frequently addressed. The mythology of the Vedas personifies the elements and the planets, and thus differs from the more recent legendary poems, which inculcate the worship of deified heroes.

The Vedas undoubtedly teach the belief of one supreme God. The deities invoked appear, on a cursory inspection of the Veda, to be as various as the authors of the prayers addressed to them; but according to the most ancient annotations on the Indian Scriptures, these numerous names of persons and things are all resolvable into different titles of three deities, and ultimately of one God. The name of this supreme deity, omnipotent, omniscient, and omnipresent, is *Brahmâ*, who is no longer an object of worship, but merely of devout contemplation. His attributes are represented by the three personified powers of creation, preservation, and destruction, which, under the respective names of *Brahmâ*, *Vishnu*, and *Siva*, form the *trimurti* (that is, 'three forms'), or triad of principal Hindu gods. These deities are sometimes represented singly with their respective attributes, and sometimes with one body and three heads. It would be impossible in our limits to give any account of the numerous inferior deities, which are said to amount, according to the computation of the Hindus, to 330 millions.

The worship of these gods, as well as of numerous others, which was once very popular in Hindustan, has almost entirely disappeared, in consequence of the exclusive worship which is paid to *Vishnu*, *Siva*, *Satki*, and a few other deities, by the religious sects of the Hindus of the present day. Each sect maintains that the god which it worships unites in his person all the attributes of the deity. The exclusive worshippers of *Vishnu*, *Siva*, &c., must not be confounded with the orthodox worshippers of these deities. Few Brahmans of learning will acknowledge themselves to belong to any of the popular divisions of the Hindu faith; they acknowledge the Vedas, Puranas, and Tantras as the only orthodox ritual, and regard all practices not derived from these sources as irregular and profane. Some of these sects appear to have arisen in great measure in opposition to the Brahmanical order; their teachers are frequently chosen from the lower castes, and the distinction of caste is in a great measure lost in the similarity of schism. (Wilson, 'On the Religious Sects of the Hindus,' in 'Asiatic Researches,' vol. xvi.)

A belief in the transmigration of souls forms an important tenet in the Hindu faith. It is the great object of Hindu worship to obtain a state of future existence, which is supposed to be effected by a reunion of the spiritual nature of man with that primitive spirit which pervades all nature, and which receives the souls of men, when they have been purified, into its essence. The prevailing notion of the means by which an individual may accomplish this object is, by subjecting the body to sufferings and privations, and withdrawing from all intercourse with mankind.

The Hindus have various philosophical systems which they consider to be orthodox, that is, in accordance with the theology and metaphysics of the Vedas; and others which are deemed heretical, as incompatible with the doctrines of their holy books. The professed design of all these schools is 'to teach the means by which eternal beatitude may be attained after death, if not before it.'

An account of the philosophical tenets of the Hindu sects is given by Mr. Colebrooke in his essay 'On the Philosophy of the Hindus,' in the 'Transactions of the Royal Asiatic Society,' vol. i., pp. 19-43; pp. 92-118; pp. 349-361; vol. ii., pp. 1-39; reprinted in his 'Miscellaneous Essays,' vol. i., pp. 227-325. See also Kennedy on the 'Vedanta System,' in the third volume of the 'Transactions of the Royal Asiatic Society.' [BUDDHISM.]

Arithmetic, Algebra, and Astronomy.—The reader is referred to the articles ALGEBRA; ARITHMETIC; ASTRONOMY; and VIGA GANITA, in this work.

Medicine.—Professor Wilson remarks that there is reason to conclude, from the imperfect opportunities of investigation we possess, that in medicine, as in astronomy and metaphysics, the Hindus once kept pace with the most enlightened nations of the world, and that they attained as thorough a proficiency in medicine and surgery as any people whose acquisitions are recorded, and as indeed was practicable, before anatomy was made known to us by the discoveries of modern times. It might easily be supposed that their patient attention and natural shrewdness would render the Hindus excellent observers, whilst the extent and fertility of their native country would furnish them with many valuable drugs and medicaments.

A variety of medical treatises were translated from the Sanskrit into Persian and Arabic; and there is reason to believe that the Arabs derived their principal knowledge of surgery and medicine from the Hindus.

Manufacture and Arts.—It is evident from the most ancient Sanskrit works, as well as from the testimony of the Greeks who visited the country, that the useful and fine arts had attained a considerable degree of perfection among the Hindus in very early times.

Hindustan has always been distinguished for the number and excellence of the substances which it contains for dyeing colours; and the beauty and brilliancy, as well as durability, of the colours were as celebrated among the Greeks and Romans as among ourselves.

In painting the Hindus have not attained much proficiency: their artists draw with great accuracy, but they have no knowledge of perspective. With regard to music, their instruments are numerous;

but their compositions are confined to a few simple melodies, 'many of which possess,' according to Sir W. Ouseley, 'the plaintive simplicity of the Scotch and Irish, and others a wild originality pleasing beyond description. Counterpoint seems not to have entered at any time into the system of Indian music.' The Hindus lay claim to the invention of the game of chess.

In the International Exhibition held at London in 1862, splendid specimens of Hindu workmanship were displayed. Fine woven fabrics, magnificent tapestry, rich embroideries and brocades, carpets of exquisite colours, gold and silver ornaments, inlaid work, carved furniture, and numerous other choice articles, testified to the patient industry and skill of the Hindus. Their tools are, however, of the rudest description, and the arts and manufactures have made but little progress for the last thousand years.

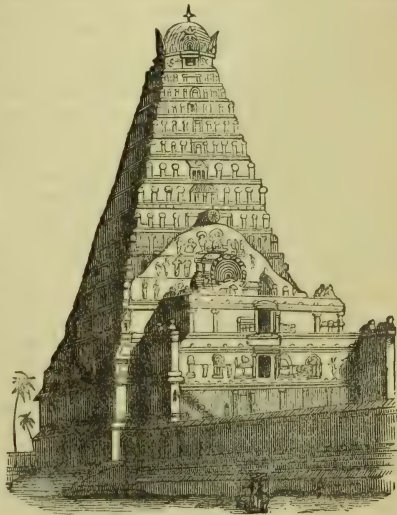
Architecture.—The architecture of the Hindus has hitherto been little studied by professional men. In the absence of plans, elevations, sections, and other details, it will be useful to call attention to some of the resemblances and distinctions existing between Hindu and Egyptian architecture. If there existed no other resemblance between the architecture of the two regions, there would be a decidedly strong one in their hypogæa, or subterranean cavern-structures hewn out of the solid rock. Of these works of exstruction, as they may be called, whose antiquity, at the most moderate computation, extends to several centuries before the Christian era, the most remarkable are those on the island of Elephanta, near Bombay; at Kennerly in that of Salsette; those at Elora, near Dowletabad; and those at Carlee, not far from Poonah. [ELEPHANTA; POONAH; SALSETTE.] Many of those excavations are of prodigious extent, being composed of a series of apartments and recesses cut out of the rock, amounting in some instances to an almost incredible number. While colossal statues and sculptures display themselves within these cavern-temples and on their walls, elaborate embellishments of detail are frequently given to the columns, which appear capriciously put together, it being impossible to determine where their pedestals terminate and their shafts commence, or how much of the shafts belong to the capitals. In this respect the Hindu style, at least this earliest class of it, differs materially from that of the Egyptians, where the shafts have no pedestals, and scarcely anything like a distinct base, but where the capital is plainly distinguishable from the rest of the column.

It is difficult to form any sort of classification, either architectural or chronological, of these excavated temples; but there is one obvious distinction, that in some of them the ceiling is quite flat, as at Elephanta; in others hollowed out, so as to resemble more or less a regular vaulting, as in the temple-cave of Kennerly, in Salsette, and that at Carlee, near Poonah. The ground-plan of an arched temple of Buddha at Elora is exactly similar. Afterwards this form of roof appears to have been elaborated with great industry and skill, for that of the Temple of Mahadéva at Nadone exhibits a perfect model of the most ancient style of dome in the East, and is probably anterior to anything of the kind in Roman architecture. The stones are placed so as gradually

to project one beyond the other, the apex being closed by a circular key-stone. The principle, therefore, is that of a horizontal instead of a radiating pressure, and the edges of all these pressures being rounded off, the spectator sees, on looking up, a vault composed of gradually diminishing circles or annular courses of masonry.

In this respect, then, even the earlier Hindu style presents a marked difference from that of the Egyptians, whose edifices are all covered with flat horizontal ceilings. On the other hand, the affinity between the architectural taste of the two peoples is strongly marked by the prevalent use of colossal statues placed against piers or walls; by the use of caryatid figures, or such as serve as columns; by the general disposition of the sacred buildings; and by the profusion of inscriptions and symbolic sculptures on the walls.

On examining the Hindu works of construction, or edifices erected above ground, we can hardly avoid being struck by the prevalence of pyramidal masses and forms, as exhibited in pagodas or towers. The Egyptian structures of this kind bear a much closer resemblance to natural or rudely constructed prototypes than do those of the Hindus. The gopuras,



Pagoda at Tanjore.

or pagoda towers erected over the gateways leading to temples, are indeed pyramidal in their general form, but infinitely more complex than, not the pyramid alone, but anything else we meet with in Egyptian architecture. Neither do they terminate in a point or mere platform, but have generally a great deal of ornament bestowed on their summit, which sometimes assumes, not inelegantly, the form of a crown. Besides this, they differ from the pyramid in being of far loftier proportions. Of a domical termination, if not exactly a dome, we have an example in the great pagoda at Tanjore, which is considered one of the finest specimens of the kind in India.

There is another class of Hindu monuments,

namely, the temples erected by the Jains, or chief sect of the Buddhists. Some of these were erected long prior to the Christian era, and are distinguished alike by chasteness and beauty of design, and by rich and exquisite finishing. (Ferguson's *Hand-book of Architecture*.)

HINGE, a kind of joint, upon which doors, gates, shutters, box-covers, &c., are made to turn in the act of opening and shutting. Hinges are constructed in a great variety of forms; but in most of the commoner kinds the action is that of a hollow cylinder working round a fixed central pin. In Collinge's patent hinges, which are peculiarly adapted for hanging large heavy doors and gates, the principal rubbing action is between a hollow cap and an accurately turned sphere, formed, as it were, upon the end of the pin, a cavity being provided for the reception of a supply of oil to lubricate the rubbing surfaces. Redmund's rising hinges are frequently used for hanging room-doors in houses of superior character. In ordinary door-hinges the hollow cylinder which works round the axis or central pin is divided transversely into two or more portions; but in the rising hinges, instead of the hollow cylinder being divided transversely at right angles, it is divided by spiral or rather helical lines. The result of this contrivance is, that when the door is opened it is lifted up a little from the floor by the sliding upon one another of the inclined helical surfaces; so that, although the door may shut very close to the floor, it rises when opened to a sufficient height above the floor to allow its lower edge to clear the carpet. Other forms of hinges are very numerous, and of late years there has been a revival of the elaborately ornamented mediæval hinges, in connection with Gothic architecture.

HINNITES. M. DeFrance gave this name to a few fossil species of *Conchifera monomyaria*, which occur in supracretaceous strata; one (*H. Dubuissonii* of Sowerby) is found in the English crag.

HINNY, a word derived from the Latin, *Hinnio*, 'I neigh,' and used to designate the produce of the horse and a she-ass, as the word *mule* does the hybrid of the he-ass and the mare.

HIP. [SKELETON.]

HIPPA, HIPPA TRIBE, *Hippides* of Latreille, *Hippians* of M. Milne-Edwards, the latter of whom thus describes these crustaceans belonging to his family of *Pterygura*:—The tribe is composed of a limited number of small anomourous crustaceans, which appear to be especially framed for burrowing in the sand, and which present extraordinary forms. The carapace is longer than it is wide, and very convex transversely, presenting always on each side a great lamellar prolongation, which more or less covers the base of the feet; it is truncated posteriorly, and appears to be continuous with the anterior portion of the abdomen, which is very wide and lamellar laterally. One of the pair of antennæ is always very long. The external jaw-feet do not present a conformation like that which is observable in the greater part of the crustaceans treated of in the prior part of M. Edwards' system; they have neither flagrum (fouet) nor palp, and their last three joints are very well developed. The sternum is linear, and the feet are imperfectly extensible; those of the first pair are monodactylous or subcheliform, and those of the two or three succeeding pairs are

terminated by a lamellar joint proper for burrowing. The posterior feet are filiform, semi-membranous, recurved forward, and hidden between the lateral parts of the carapace and base of the preceding feet. The penultimate ring of the abdomen is always furnished with a pair of false feet, terminated by two more or less oval ciliated blades or laminae; but these appendages have a forward curvature, and are not applied against the seventh segment so as to form with a fan-shaped caudal fin, as in the *Macrura*. The vulvæ are on the first joint of the third pair of feet. The branchiæ are disposed on a single line, and inserted by a peduncle which rises near the lower third of their internal surface. This tribe is divided into three genera, *Remipes*, *Albunea*, and *Hippa*.

As examples we may mention *Remipes testudinarius*; length of carapace 15 lines; locality, the coast of New Holland. *Albunea Symnista*; length of carapace 10 lines; locality, the seas of Asia. *Hippa emerita*; length from 1 inch to 15 lines; locality, the coasts of Brazil.

HIPPA'LIMUS, a genus of zoophyta proposed by Lamouroux. Goldfuss supposes that it may be included in his genus *Scyphia*. It is fungiform and pediculated, with pores on the upper surface only, and a deep central pit. From the blue marls of the department of Calvados.

HIPPARCHUS, the first astronomer on record who really made systematic observations, and left behind him a digested body of astronomical science. He was born, according to Strabo, at Nicæa in Bithynia, and was alive, as appears from his observations preserved by Ptolemæus, in the interval 160–125 B.C.; but neither the year of his birth nor that of his death is recorded. His astronomical observations were probably commenced in Bithynia, and certainly continued at Rhodes; whence he is called by some authors the Bithynian, and by others the Rhodian, and some even suppose two astronomers of the same name, which is certainly incorrect.

The writings attributed to Hipparchus are all lost except a commentary on Aratus, written probably when he was young, since he does not mention any of his subsequent discoveries, and the results of observation are not so correct as those of his catalogue.

The following summary is from the preface to Delambre's 'History of Ancient Astronomy,' in which work will be found the most complete account of the labours of Hipparchus. The bias of this historian seems to be, to add to Hipparchus some of the fame which has been generally considered due to Ptolemæus, for which he gives forcible reasons. 'Let no one be surprised at the errors of half a degree which we attribute to Hipparchus, seemingly with reproach. It must be remembered that his astrolabe was nothing but an armillary sphere, of no great diameter, and with very small subdivisions of a degree, as well as that he had neither telescope, vernier, nor micrometer. What should we do even now if deprived of these helps, and if we knew neither the refraction nor the true altitude of the pole, on which point, even at Alexandria, and with armillæ of every sort, an error of a quarter of a degree was committed? At this day we dispute about a fraction of a second; they could not then answer for any fraction of a degree, and might be wrong by a whole diameter of the sun or moon. Let

us rather think of the essential services which Hipparchus rendered to astronomy, of which science he is the true founder. He was the first who gave and demonstrated methods of solving all triangles, whether plane or spherical. He constructed a table of chords, of which he made nearly the same use as we now do of our tables of sines. He made many more and much better observations than his predecessors. He established the theory of the sun in such a manner that Ptolemæus, 263 years afterwards, found nothing to change. It is true that he mistook the inequality of the sun's motion: but it can be shown that his mistake arose from an error of half a day in the time of the solstice. He himself avows that he may have been wrong by a quarter of a day; and we may always safely suppose that, without impeachment of an author's integrity, his self-love may halve the error which he is really liable to commit. He determined the first inequality of the moon (the equation of the centre), and Ptolemæus found nothing to change in his result: he gave the mean motion of the moon, and that of the apogee and nodes, in which the corrections made by Ptolemæus were slight, and of more than doubtful goodness. He had a sight of the second inequality (the evection); it was he who made all the observations necessary for a discovery, of which the honour was reserved for Ptolemæus; a discovery which he had not perhaps time to finish, but for which he had prepared everything. He showed that all the hypotheses of his predecessors were insufficient to explain the twofold inequality of the planets; he predicted that none would be successful which did not combine the two hypotheses of the excentric and epicycle. He had not the proper observations, because they require more time than the duration of the longest life; but he made them ready for his successors. We owe to his catalogue the important knowledge of the retrograde motion of the equinoctial points. We might, it is true, have derived this knowledge from much better observations, made within the last hundred years; but we should then have had no proof that this motion remains sensibly the same through a long course of ages; and the observations of Hipparchus, by their number and their antiquity, and in spite of the errors which we are obliged to admit, give important confirmation to one of the fundamental points of astronomy. It is to him that we owe the first discovery of this phenomenon. He also invented the planisphere, or the method of describing the starry heavens upon a plane, and of deducing the solution of problems in spherical astronomy by a method often more exact and convenient than that of the globe itself. He is also the father of real geography, through the happy idea of marking the position of towns in the same manner as that of the stars, by circles drawn through the pole perpendicularly to the equator, that is, by latitudes and longitudes. His method, by means of eclipses, was for a long time the only one by which the longitude could be determined; and it is by means of the projection of which he was the author that we now make our maps of the world and our best geographical maps.

HIPPELAPH, an animal of the deer kind, in Norway, about the size of the elk, and partaking of the nature of the horse and the stag.

HIPPIAS. [PISISTRATUS.]

HIPPOBOS/CIDÆ (Gr. *hippos*, 'a horse,' and *bosco*, 'to feed'), a family of dipterous, viviparous insects, the type of the family being the *Hippobosca*, or Horse-fly. They are generally known by the name of Forest-flies, the young of which undergo their first metamorphosis in the womb of their parent, and are brought forth in the pupa state.

HIPPOBRO'MA, a genus of plants belonging to the natural order *Lobeliaceæ*. *H. longiflora* is the only species. It is a native of Jamaica, St. Domingo, Cuba, and Martinique, in damp places and by the side of streams. This is one of the most poisonous of plants. If the juice only accidentally touches the lips or eyes, it produces a burning inflammation.

HIPPOCAMPUS. A genus of pipe fishes of singular construction and peculiar habits; the upper parts having some resemblance to the head and neck of a horse in miniature, which has suggested the English name sea-horse. When swimming they maintain a vertical position.

HIPPOCASTANÆÆ, (from *hippocastaneum*, the specific name of the horse-chestnut), a subdivision of the order *Sapindaceæ*.

HIPPOCRATEA, a genus of the natural family of *Hippocrateaceæ*, so named after Hippocrates, and which might therefore be expected to contain many useful or medicinal plants. But it is not so. The species consist of moderate-sized trees, which are found in the hot parts of the world, as in the tropical parts of America, in Sierra Leone, the warmer parts of India, and the island of Timor.

HIPPOCRATEA'CEÆ, a small natural order of exogenous plants. The species are woody, and often climbers; they inhabit Africa, the Mauritius, and the tropical parts of America. In general they are of no importance for economical or medical purposes. One species bears an eatable fruit, and another has oily seeds with sweet taste.

HIPPOCRATES was born at Cos, B.C. 460. His family followed the pursuit of medicine for near three hundred years, and produced seven physicians, who attained considerable celebrity, and who are supposed to have written the numerous treatises which are commonly attributed to Hippocrates alone. Before their time the knowledge of medicine was either confined to the priests, who employed their skill in maintaining their influence over the people, and carefully concealed the little knowledge they possessed, or was merely followed as a subordinate pursuit by the philosophers of the day. It is to the Asclepiadæ that the science of medicine is indebted for a separate existence, and the great progress which it made in their hands after this separation sufficiently proves the wisdom of their proceeding.

The most celebrated of the family was the subject of the present notice, Hippocrates, the son of Heraclides and Phænarete, who is supposed to have been the author of this important revolution in medicine. His medical studies were pursued under the superintendence of his father and of Herodicus; and he is said to have had for his masters in philosophy Gorgias of Leontini, the celebrated sophist, and Democritus of Abdera, whose cure he afterwards effected. We are told that he spent some time at the court of Perdiccas, king of Macedonia, and visited Thrace and Scythia; and it is probable that these statements are

true, as mention is made in his writings of several towns in Thrace. (Suidas, *Ἰπποκράτης*.)

The principles of Hippocrates were those of rational empiricism. He did not attempt to form his theories from *à priori* reasoning, but he observed the phenomena of nature, and deduced from them such conclusions as these phenomena would justify. That he adhered to this principle in all cases, however, is not to be supposed. He taught that the body is composed of four primary elements—fire, water, earth, and air; that these elements, variously combined, produce the four cardinal humours, and these again the different organs of the body. These doctrines are principally developed in the treatise 'On the Nature of Man.' His knowledge of anatomy seems to have been very limited. The superstitious respect which was paid to the remains of the dead among the Greeks, prevented him from acquiring any knowledge on this subject by dissection of the human body. He gives such descriptions of the bones as show that he had indeed studied the subject, but not acquired any very accurate knowledge. In his pathology he confines himself principally to the investigation of the remote causes of diseases, without entering into any speculations on their nature. However, he explains inflammation by the passage of blood into those parts which did not previously contain it. He paid great attention to the effects of changes in the external conditions of life, namely, air, warmth, moisture, food, upon its phenomena, and those of disease. He recommended that particular attention should be paid to the state of the seasons.

Among the doctrines of Hippocrates, that of critical days, upon which he supposed the evacuation of the morbid matter when concocted to take place, is the most remarkable. Of the indications to be drawn from examination of the pulse Hippocrates was not aware, and the word *sphygmus* (*σφυγμῖς*) is usually employed by him to denote some violent pulsation only. We must not forget that Hippocrates asserts that auscultation may be employed to distinguish between the presence of pus and serous fluid in the cavity of the pleura. The statement is in itself incorrect, but the fact of his having actually practised auscultation is no less interesting.

Hippocrates appears also to have introduced some valuable improvements in the treatment of disease. In fevers and acute diseases he confined his patients to a liquid diet, but not so strictly as some other physicians, whom he charges with starving their patients to death. In his general treatment he employed purgatives, some of which were of the most violent character, as the black and white hellebore and elaterium, which generally produce excessive vomiting at the same time. He mixed up a little theory with his treatment; for he would not allow purgatives to be employed unless the humours were duly concocted. To relieve the head in certain diseases he was accustomed to make use of sternutatories. In acute affections, when the disease was violent, he employed bleeding, and recommended that blood should be taken from as near the affected part as possible. This was the origin of the doctrine which recommended bleeding in pleurisy from the arm on the side affected. He also made use of cupping glasses, with and without scarification. Certain

diuretic and sudorific medicines also entered into his pharmacopœia, and he was not ignorant of the virtues of the poppy.

In the time of Hippocrates the distinction between medicine and surgery had not been made, as we find among the works usually attributed to him in the list of Erotian, treatises on fractures, on ulcers, and on wounds of the head.

It appears that consultations were not unknown in the time of Hippocrates, for in the latter part of the 'Præcepts' he says that a physician ought not to be ashamed to call in the assistance of another, if he finds himself at a loss in the treatment of his patient. The oath which he administered to his pupils shows the high sense he had of the duties and responsibilities of a physician. The pupil is made to swear 'that he will reverence his teacher as a father, and his descendants as brethren; that he will use his art to the benefit of his patients, and never to their injury or death, even if requested by them; that he will never attempt to procure abortion, that he will be chaste, and never divulge any professional secrets.' Hippocrates wrote in the Ionic dialect, though the island in which he was born was originally colonized by the Dorians. His style is remarkably concise, so as to render his meaning at times somewhat obscure, and it would appear that he occasionally makes his statements too general, in order to avoid loading his writings with exceptions. The high estimation in which his works have been held is proved as well by the general reputation of his name, as more especially by the numerous commentaries on them which have been published in all ages. His knowledge of anatomy and physiology, and of the processes which go on in the body during health and disease, was extremely deficient; but in the accuracy with which he observed the symptoms of disease, and in the fidelity of his descriptions, he has rarely, if ever, been surpassed. It is upon these grounds that he has justly obtained the title of 'the Father of Medicine,' and will at all times continue to command the respect of his medical descendants.—(Sprenghel, *Histoire de la Médecine*, tome i.)

HIPPOCREPIS, a genus of plants belonging to the natural order *Leguminosæ* and tribe *Hedysarææ*. *H. Balearica*, Minorca Horse-shoe Vetch, is a native of the island of Minorca. It is a very pretty plant, worthy of cultivation, but requires the greenhouse in winter. *H. comosa*, common Horse-shoe Vetch, is a native of Europe, and is found on dry chalky banks in Great Britain. It is also found in the north of Africa.

There are seven or eight more species of Horse-shoe Vetch. They are all worth cultivation on account of their beauty.

HIPPODROME (Gr. *hippos*, 'a horse,' and *dromos*, 'a race-course'), a large inclosed space set apart by the ancient Greeks for their horse and chariot races. There appears to have been little substantial difference between the Greek hippodrome and the Roman circus, except that, from the Romans not having been accustomed to allow more than four chariots to compete at once, the circus was made much narrower than the hippodrome. Bearing this distinction in mind, and that the number of chariots which ran necessitated a more complicated arrangement of the *carceres*—they being placed along a line formed like

the prow of a ship, with the apex towards the area, and each of the sides 400 feet long—a sufficiently clear conception of the form and character of the hippodrome will be obtained by a reference to the article CIRCUS.

The term hippodrome has been given to a circus constructed at Paris in 1845, and also to a large field used for a race-course in the plain of Longchamp near Boulogne.

HIPPOLYTE-DU-FORT. [GARD.]

HIPPOLYTUS, a bishop and ecclesiastical writer of the third century, whose name has acquired importance in connection with a recently discovered treatise, edited, with explanations and dissertations, by Chevalier Bunsen. The discovery of this treatise was somewhat remarkable. It was found among various other MSS. brought from Mount Athos to Paris in 1842, and deposited in the royal library there. It was designated as a 'Book on all the Heresies,' but without any author's name. M. Emmanuel Miller, a functionary of the institution, was attracted to it by some fragments of Pindar that it contained. On examining it he formed the conclusion that it was a lost production of Origen; and under this impression the Oxford University press agreed to publish it. It appeared in 1851. It was soon after its publication carefully studied by Bunsen; and the conclusion at which he arrived regarding it was that it was a genuine production of the third century, but that its author was not Origen, but Hippolytus. Various scholars—Dr. Duncker and Dr. Jacobi in Germany, and Dr. Wordsworth in England—have confirmed this conclusion. The character and position of Hippolytus have become much better known than before, in connection with the inquiry excited by the recovery of this treatise. He was a Roman ecclesiastic and bishop of Portus, the harbour of Rome on the northern bank of the Tiber, lying opposite to the ancient Ostia. In the third century this appears to have been a place of some commercial importance, and of considerable population. The great metropolis of the world brought ships from all maritime countries into its harbour, and especially many Greek sailors and merchants. Among this trading Greek population Hippolytus lived and laboured. A Roman ecclesiastic, he was yet Greek in speech and Greek in his mode of thought. He was a disciple of Irenæus, bishop of Lyons, who again was a disciple of Polycarp of Smyrna, who had seen and conversed with the apostle John. While occupying an independent position in his own bishopric, he was directly connected with the Roman church as a member of its presbyterial council. In the ninth book of the recovered treatise on Heresies, Hippolytus gives us a somewhat lively account of the religious and ecclesiastical state of Rome in the middle of the third century. According to this account it by no means presented the picture of unity which many would fain attribute to the early Roman church. Two of the Roman bishops, Zephyrinus and Callistus, are accused of favouring the heresy of Nœtus—a kind of early unitarianism; and it is evident, moreover, that various scandals were abroad as to the latter of these bishops. Hippolytus appears as an earnest and energetic churchman and defender of the faith. The pupil of Irenæus, he was the friend and precursor of Origen in the

speculative and critical study of Christian doctrine, and in oratorical talent. In his 'Refutation' of the heresies of his day he shows an enlightened acquaintance with the course of Grecian speculation, as well as with the meaning and application of scripture. He was, according to Bunsen, one of the first preachers in the Roman church. Before his time preaching had been merely a popular exposition of the Gospel of the day. He enlarged this exposition into the formal homiletic address, in which he treated of Christian topics in an elaborate and scientific manner.

HIPPO'MANE MANCANILLA, the Manchineel-tree, is a tree of very considerable size, and of a handsome aspect, belonging to the natural order *Euphorbiaceæ*, and among the most poisonous of all known vegetable productions. When the fruit is ripe, it is a fleshy yellowish-green round body, very like a European crab-apple. The tree is common in the West India Islands, although pains have been taken to extirpate it. In some places it forms thick woods, as upon Sandy Island, near Tortola. The whole plant abounds in a milky juice of the most venomous description. Dropped on the skin, it produces a sensation of severe burning, followed by a blister; and the fruit, when bitten, causes dangerous inflammation of the mouth. According to Sir Robert Schomburgk, it is dangerous to sleep beneath the tree, and rain passing through the branches blisters the skin of a person below them. The wood of this tree is represented to be of fine quality, handsome, and well suited for cabinet-makers' purposes.

HIPPO'NYX (Gr. *hippos*, 'a horse,' and *onyx*, 'a claw'), a genus of Limpets, of the tribe *Scutibranchia*, in which the shell is patelliform.

HIPPO'PHAE, a genus of plants belonging to the natural order *Elaeagineæ*. The only species of this genus is the *H. rhamnoïdes*, which is a small shrub found on the east and south-east coasts of Great Britain, and other parts of Europe. The acid berries yielded by this plant are often eaten as a salad both in this country and in France. This plant also yields a colouring matter, which is used for dyeing yellow. Although in this country the berries are innocuous, they seem to exert a deleterious influence, or are supposed to do so, in some of the countries of the south of Europe.

HIPPOPOTAMUS, the Roman name for the River Horse, and retained by modern zoologists as the generic appellation of a limited group of bulky pachydermatous animals, restricted in the present day, as far as we know, to Africa.

'The Hippopotami,' says Cuvier, 'have four toes on each foot, nearly equal, and defended by small hoofs; six grinders on each side above and below, of which the first three are conical, the posterior three crowned with two pairs of bold elevations, which wear down by attrition, when the form of a trefoil is exhibited on their crowns; four incisors in each jaw, of which the uppermost are short, conical, and recurved, the inferior are long, cylindrical, pointed, and directed obliquely forwards; one canine on each side above and below; the superior is straight, the inferior very massive and recurved, both wearing themselves by attrition against each other. These animals have the body very massive, destitute of hair, the limbs very short, the belly almost dragging

on the earth, the head enormous, terminated by a large swollen muzzle which covers the array of their huge anterior teeth. The tail is short, the eyes and the ears small. The stomach is divided into several sacculi. They tenant rivers, feeding on roots and other vegetable matters, and display much ferocity and stupidity.'

Elsewhere Cuvier remarks that there is no animal that requires to be more studied at different ages than the hippopotamus, in order to acquire a perfect knowledge of the molar teeth, which change their form, their number, and their position: and, in his 'Ossemens Fossiles,' he goes into minute details of their changes.

When Cuvier wrote, only one living species of hippopotamus was known. M. Desmoulins, however, from examination of skulls and bones from South Africa and from Senegal, has demonstrated that there are certainly two, which are respectively designated *H. Capensis* and *H. Senegalensis*. Moreover, he suggests that the hippopotamus of the Nile may possibly be distinct from either of these. Be this as it may, in habits, manners, and form the Hippopotami of all parts of Africa agree with each other. They inhabit the banks and beds of the larger rivers and the inland lakes of Africa, from the Gariep to the upper Nile and its tributary branches. It is not, however, exclusively restricted to fresh waters, for it is marine as well as fluvial; and Dr. Smith thinks it difficult to decide whether it gives preference to the river or the sea for its abode during the day. When the opportunity of choosing the river or the sea existed, he found that some selected the one and some the other.



Hippopotamus.

The hippopotamus is little inferior in bulk to the elephant, though lower in stature, owing to the shortness of its thick pillar-like legs. The head is ponderous, and the great thick lips are studded with wire-like bristles. The mouth is wide; the nostrils open on the top of the swollen muzzle; and the small eyes are situated high on the head; hence by raising only a small section of the head above the surface of the water, the animal can breathe and look around, the body remaining submerged. The hide is of immense thickness, being upwards of two inches deep on the back and sides; it is extremely dense, and is manufactured by the natives of various districts, both of northern and southern Africa, into shields, whips or scourges, and other articles. Be-

tween the skin and the flesh a layer of fat intervenes, which is salted and eaten as a delicacy by the Dutch colonists of South Africa, by whom it is termed Sea Cow's Speck (bacon). The flesh also is said to be excellent.

The general colour of the hippopotamus is dusky brownish-red, passing on the sides and limbs into a light purple red or brown; the under parts, the lips, and the eyelids are light wood-brown, with a tinge of flesh colour; the hinder quarters are freckled with spots of dusky brown. The hairs which fringe the tail and ears are black, the bristles on the muzzle yellowish-brown. The male considerably exceeds the female in size. The period of gestation is not ascertained. A single young one only is produced at a birth.

The hippopotamus is to a great extent nocturnal in its habits; during the day it remains under its fluid canopy, rising every five or six minutes for the purpose of respiration. At night it comes on land to feed, at least in districts fully inhabited by man, and often travels to a considerable distance in quest of some favourite diet. It visits the plantations of grain, trampling down as much as it consumes, and doing great damage. Burckhardt states that in Dongola it is a dreadful scourge to the inhabitants, who lack the means of destroying it. The hippopotamus is wary, and indisposed to act on the offensive, yet, in districts where the sound of a musket is seldom heard, it shows but little fear of man. When attacked and wounded, the hippopotamus becomes exceedingly furious, and, if on land, rushes opea-mouthed on its aggressor. But the danger from the vengeance of this animal to boats and their crew on the water is far greater.

We need not attempt a laboured exposition to prove that the hippopotamus was known to the ancients, although it may be admitted that some of the descriptions of the older writers, as Herodotus, Aristotle, Diodorus, and others, are more or less incorrect. Scarus, during his ædileship, exhibited one of these animals at Rome. Augustus exhibited one on his triumph over Cleopatra, and at subsequent periods under the later emperors they were introduced into the Roman amphitheatre. Commodus showed five on one occasion. The hippopotamus is very tolerably delineated on the Prænestine Pavement.

Fossil Hippopotami.—The remains of fossil hippopotami occur abundantly in the tertiary series. They are most common in the pliocene period of Lyell, and are frequently met with in the superficial beds of gravel, clay, and sand, termed by some diluvial, in the ossiferous caverns, osseous breccia, &c. They are also found in some of the beds of the miocene period.

HIPPURIC ACID, an acid obtained from the urine of cows and horses, and somewhat analogous in character to benzoic acid. Its composition is $C^{20}H^9O^6N^1$. Its combinations with other bodies have not been extensively examined.

HIPPURIS, a genus of plants belonging to the natural order *Haloragææ*. Three species of this genus have been described. Of these, *H. vulgaris*, the common Mare's Tail, is found abundantly throughout Europe and North America. It is found in ditches and lakes, and is very common in Great Britain in stagnant waters and slow streams.

HIPPURITES, in Zoology, a name given by

Knorr and Schroeter to a fossil coral (*Cyathophyl-
lum ceratites*, Goldfuss) of the Eifel transition lime-
stone. Guettard also used this title for a lamelliferous
coral. By Lamarck, Defrance, and other writers, this
name is given to a somewhat problematical group of
fossils found in limestones of the oolitic age which
flank the Alps in the Untersberg, near Salzburg, at
Regensburg, &c., in the chalk of Perigord, Alet, &c.
Lamarck places Hippurites with Belemnites and
Orthoceratites, among the Cephalopoda. Latreille
takes nearly the same view. Rang introduces the
genus among the *acephalous Rudista* (singular bivalve
shells), according to the views of De Blainville.

HIPTAGE, a genus of plants of the family of
Malpighiaceae, better known by the name *Gertnera*.
The genus contains only two species: one, *H. Mada-
blota*, which is common in the forests of many parts
of India; the other, *H. obtusifolia*, is found in China,
but commonly cultivated as an ornamental plant in
India.

HIRCIC ACID, obtained from goat's fat, is a
liquid at a temperature of 32°: it is lighter than
water, smells of the goat, is insoluble in water, and
forms soluble salts with potash and barytes.

HIRCIN, a principle similar to butyrine, which
exists in goat's fat and in mutton suet, combined
with olein.

HIRE, LA. [LAHIRE.]

HIRING, is the contract by which property or
labour is employed for a limited time for some con-
sideration or reward. For full information on the
various kinds of hiring the reader is referred to the
articles CARRIER, LODGINGS, SERVANTS, SHIPS,
TENANT and LANDLORD.

HIRUDINE (Lat. *hirudo*, 'a leech'), a family
of *apodous anelides*, of which the *Hirudo* is the type.

HIRUNDINIDÆ. [SWALLOWS.]

HISINGERITE, a mineral of a dull black colour,
found in Sweden, and so called in honour of Hising-
er, who first analyzed it. It has an earthy fracture,
capable of being cut with a knife. Its specific
gravity is 3.04; and its constituent parts are—proto-
xide of iron, 47.80; silica, 27.50; alumina, 5.50;
oxide of manganese, 0.77; water, 11.75.

HISPANIA. [SPAIN.]

HISPANIA/LA, *Hispaniola, Española* (i.e., Little
Spain), known also under the names of SAINT
DOMINGO and HAYTI, is one of the Great Antilles,
or larger islands of the West Indies. It extends from
68° 30' to 74° 30' W. long. Its length is about
360 miles. It lies between 18° and 20° N. lat.; but
a promontory on the southern coast projects about
20' beyond 18° N. lat. The area is 28,000 square
miles, being somewhat less than that of Scotland.

Hispaniola is the most fertile island in the West
Indies. Its surface exhibits a great variety on rather
a large scale. Near the centre of the island there is
a mountain-knot, called Cibao, whose elevation does
not fall short of 8000 feet. Ranges of mountains,
which rise from 2000 to 5000 feet, occupy the greater
part of the island, but contain between them exten-
sive valleys and plains. In the eastern part of the
northern plain are extensive savannahs, or natural
meadows; but towards the west the soil is fruitful.
At the eastern extremity is the lake called Laguna
de Henriquillo, which is fifty miles in circuit. The
country is watered by numerous rivers.

The coast, which is about 1200 miles in length,
has a great number of harbours, some of which are
spacious, deep, and safe. Near Cape St. Nicolas is
the port of St. Nicolas, which is six miles long, and
capable of holding a large fleet. The harbour of the
town of St. Domingo is a very indifferent one.

The climate of Hispaniola (which is very unhealthy
for Europeans) differs considerably from that of the
other Antilles. In July begin the abundant rains
on the south coast, which continue through August,
September, and October. The winter is rather cool,
the thermometer rarely exceeding 70°, and still
more rarely descending below 60°. The northern
coast has only showers during August, September,
and October, but in December and January the rains
descend in torrents: afterwards they are moderate,
and cease entirely in April. The heat of the sum-
mer is moderated by the prevailing northern winds.
Hurricanes are frequent on the southern coast, but
they occur rarely on the northern shores.

In the last century Hispaniola was noted for its
extensive plantations of sugar, coffee, and cotton, but
they are much reduced. The principal commercial
wealth of the island is at present derived from the
forests which cover the greatest part of the moun-
tains. The timber consists chiefly of mahogany-
trees and different kinds of dyewoods.

Gold, silver, copper, tin, iron, and rock-salt are
found in the island; but the mines are now unpro-
ductive.

The exports from Hayti to the United Kingdom
in 1863 were valued at 276,610*l.*, and consisted
chiefly of cotton, coffee, logwood, and mahogany.
The imports from Great Britain in the same year
amounted to 545,192*l.*, of which cotton manufac-
tures figured for 280,609*l.*, and linen manufactures
for 147,045*l.*

The aborigines are now extinct, but a consider-
able part of the present population consists of their
descendants, mixed with the blood of Europeans and
negroes. The number of mulattoes, or descendants
of Europeans and negroes, is still greater; indeed,
they may be considered as constituting the nation.
The population is stated to be 760,000.

Port au Prince, the capital and seat of govern-
ment, is situated between the large plain of Cul de
Sac and a more narrow one extending along the
southern shores of the Bay of Gonaves. The streets
are sufficiently wide and commodious. Its com-
merce with the United States and with Jamaica
is considerable. The population in 1863 was about
21,000. The town is built chiefly of wood, and is
partially fortified. The principal edifices are—the
palace of the state, the church, arsenal, mint, lyceum,
military hospital, and courts of law. The vicinity
is marshy, and the climate unhealthy. The harbour
is a safe one, except during the hurricane months,
from August to November. It is the seat of most
of the foreign trade of the island.

San Domingo, on the southern coast, is the oldest
European establishment in America, having been
founded by Columbus in 1504. The population is
about 15,000. It has a Gothic cathedral, numer-
ous other churches, convents, hospitals, colleges, an
arsenal, lighthouse, and barracks. The harbour is
unfit for large ships.

The Roman Catholic is the established religion of

Hayti, but all others are tolerated. The army consists of about 50,000 men; and the public revenue averages about 5,000,000 francs annually, the expenditure being 500,000 francs in excess of that amount. Some years ago education and civilization were at a very low ebb, but many schools have been recently established.

Hispaniola was discovered by Columbus, and was possessed by Spain until 1697, when the western part of it was ceded to France. In 1794 the negro slaves were declared free by the French National Convention, and shortly afterwards they rose against their European governors, under Toussaint L'Ouverture, Dessalines, and Christophe, and at length succeeded in establishing a monarchy in the northern parts under Christophe, and a republic in the western under Petion. The struggle was one of the most vindictive in history—nearly the whole of the European population having been exterminated. On the death of Christophe (who killed himself during an insurrection) in 1820, the whole became united into one republic, and so continued for many years, although in a frequently disturbed state. In 1844 the inhabitants of the eastern or Spanish part of the island rose against their Haytian oppressors, and formed themselves into a republic, which was recognized by France in 1848, and Great Britain in 1850. In March, 1861, they voluntarily re-united themselves to Spain; and since that time various attempts have been made to again bring the whole island under the dominion of Spain. The western portion of the island was proclaimed an empire in 1849, but the republican form of government was re-adopted in 1859.

HISPIDÆ (Lat. *hispidus*, 'bristly'), a family of Coleopterous insects, of the tribe *Monilicornes*.

HISTERIDÆ (Lat. *histrion*, 'an actor'), a family of Coleopterous insects, of the tribe *Lamellicornes*.

HISTIOPHORUS (Gr. *histon*, 'a sail,' and *phoreo*, 'to bear'), a genus of sword-fishes, of the family *Scomberidæ*, and sub-family *Xiphianæ*.

HISTOLOGY (Gr. *histos*, 'a tissue'; *logos*, 'a discourse'), the name given to the doctrine of the tissues which make up the different organs of the animal frame. Professor Schwann classifies the fundamental tissues of the human body as follows:—

1. *Simple membrane*. Examples: walls of cells, capsule of lens of the eye, &c. 2. *Fibrous tissue*. Examples: white and yellow fibrous tissue, elastic tissue, &c. 3. *Cellular tissue*. Examples: cartilage, fat, gray nerve-matter, &c. 4. *Sclerous or hard tissue*. Examples: bone, teeth, &c. 5. *Compound membranes*. Examples: mucous membrane, skin, synovial membranes, &c. 6. *Compound tissue*. Examples: nerves, muscles, and fibro-cartilage. These, and the many subdivisions of each branch, fall to be considered by the histologist.

HISTRIONES, pantomimic actors among the ancient Romans, who were considered as inferior to the performers of the regular drama. Hence was derived the term *histrionic*, as applied to the modern stage.

HITCHCOCK, EDWARD, D.D., LL.D., an American naturalist and theologian, was born at Deerfield, Massachusetts, on the 24th of May, 1793. When only twenty-three years of age he became the head-master of the academy of his native place. A few years afterwards he received ordination, and

became the pastor of a congregation at Conway. He had previously made his debut as an author by the publication of a tragedy 'On the Downfall of Bonaparte.' He now turned his attention to the study of natural history. Acquiring a sound practical knowledge of geology, as the science was at the time understood, he published in 1823 a work on the 'Geology of the Connecticut Valley.' Two years later, the author became professor of chemistry at Amherst College. He prepared, while he held this situation, various papers upon scientific subjects, one of the most valuable of these being a catalogue of the wild plants growing in the neighbourhood of Amherst. He wrote about the same time several treatises of a more popular character. Of these perhaps the most important were 'Dyspepsia Forestalled and Resisted,' and 'An Argument for Early Temperance.' The legislature of Massachusetts had first the merit of ordering a scientific state survey on a great scale. Dr. Hitchcock was placed at the head of the undertaking. He published several reports, giving an account of the explorations made for the government; the most important of them relating to the mineralogical resources of the territory. The earliest of these was published in 1831 under the title of a 'First Report on the Geology, Botany, and Zoology of Massachusetts.' A second report followed under the same title in 1833. The most important of the series did not, however, appear until 1841, when it was published under the title of 'A Final Report on the Geology of Massachusetts,' 2 vols. royal 4to. In 1844 Dr. Hitchcock was chosen president of Amherst College. He conjoined the general superintendence of the institution with the duties of professor of geology and natural theology. Four years later he published 'Fossil Footmarks in the United States.' Between 1845 and 1849 Dr. Hitchcock delivered annually a course of 'Religious Lectures on the Phenomena of the Seasons.' They have since been published. In 1850 he was appointed by the state of Massachusetts agricultural commissioner to visit the principal countries of Europe, with the view of ascertaining what had been done by foreign governments to promote the cultivation of the soil. A year later he published his 'Report on the Agricultural Schools of Europe.' Since this period the works of Dr. Hitchcock have had a close connection with the subjects discussed in the lectures delivered by him at Amherst in his double capacity of professor of geology and natural theology, treating as most of them do of the mutual relations of these two departments of human knowledge. In 1851 he published the most popular of all his works, 'The Religion of Geology and its Connected Sciences.' This work has been frequently republished, several editions having appeared in this country. It was followed in 1853 by 'Outlines of the Geology of the Globe, and of the United States in particular,' in 1857 by 'Religious Truth illustrated from Science,' and in 1855 by an 'Introduction to a New Edition of the Plurality of Worlds.' All these works are marked by great ingenuity of thought, and are written in a graceful and attractive style. They enjoy a well-deserved popularity.

HIVE. [BEE.]

HOADLEY, BENJAMIN, born at Westerham in Kent, in November, 1676, died in April, 1761, was

successively bishop of Bangor, Hereford, Salisbury, and Winchester. He is to be regarded, 1st, as a principal writer among the divines of the English Church who are called Rational, that is, who have renounced the whole of what constitutes proper Calvinism, and have advanced more or less near to the opinions which are comprehended under the term Unitarianism; 2nd, as the great advocate of what are called Low Church principles, a species of Whiggism in ecclesiastics. It was out of a sermon of his upon the text, 'My kingdom is not of this world,' that the celebrated Bangorian controversy arose. A full account of Bishop Hoadley is given in the 'Imperial Dict. of Univ. Biography.' Mackenzie, 1865.

HOADLEY, BENJAMIN, M.D., eldest son of Bishop Hoadley, was born February 10, 1705, in London. He was admitted of Corpus Christi College, Cambridge, April 8, 1722, and received his degree of M.D. in 1729. In June, 1742, he was appointed physician to his majesty's household, and in January, 1746, was also appointed physician to the household of Frederick, prince of Wales. He was the author of 'Three Letters on the Organs of Respiration,' read at the Royal College of Physicians, London, 1737, being the Gulstonian Lectures for that year; 'Oratio Anniversaria in Theatro Col. Medicor. ex Harveii instituta, habita die 18mo Oct., 1742'; 'Observations on a series of Electrical Experiments,' 1756, 4to. Dr. Hoadley is now known chiefly as the author of the comedy of 'The Suspicious Husband,' 1747, in which Garrick was distinguished for his performance of Ranger. Dr. Hoadley died August 10, 1757, in his house at Chelsea.

HOANG-HAI, or WHANG-HAI. [YELLOW SEA.]

HOANG-HO. [YELLOW RIVER.]

HOAR FROST, a congelation of dew and mist, formed by the temperature of the atmosphere suddenly falling below the freezing point, or 32° ; or by the sudden refrigeration of the substances by which their surface moisture is converted into icy particles. Perhaps the face of nature never assumes a more picturesque or pleasing appearance than on the mornings of a strong hoar frost, when the fogs have disappeared, and the bright azure sky gleams over the productions of the earth. But on the return of the solar warmth, the scene rapidly changes, and the spicular and granular particles, of which icy dew is composed, are gradually transformed to their original moisture.

The circumstances of terrestrial radiation, chiefly, but not exclusively, nocturnal, under which the aqueous vapour of the atmosphere becomes condensed upon the bodies in contact with it, have already been discussed and explained at some length in the article DEW. If the temperature of those bodies be reduced below the freezing point of water, hoar frost is produced, the most characteristic form of which differs from dew only 'by being frozen in the moment of deposition, and therefore accreting in crystalline spiculæ.' But it occasionally happens, that after the globules of water constituting dew have been deposited, they are frozen, and become another form of hoar frost. (See Plate 'Frost,' vol. vii.)

From a series of experiments on the formation of hoar frost on various substances, made by Mr. Glaisher of the Greenwich observatory, it was found

that the spikes of hoar frost increased in magnitude in proportion to their distance from the root or stem of grass and leaves, and that the vegetable heat in that region of the plant counteracted the reduction of temperature by radiation. Mr. Glaisher also found that glass, raised one inch high above the ground, was covered with spikes one-sixteenth of an inch in length, and all arranged horizontally at the edges. On metals, such as copper, lead, zinc, tin, iron, &c., there were neither laminæ nor spikes of any kind; but *tin*, raised one inch high, was a little whitened at the edges. On sand there were spikes one-fourth of an inch in length. Chalk was covered with a mass of spikes of about the same length. Of cotton wool, every fibre was incrustated with a beautiful fringe of hoar frost, and there were also a few spikes of ice. Raw wool was richly clustered on each fibre, so as to be about six times its own size; the spikes were three-fourths of an inch in length, and piled one upon another. Sawdust was very beautifully covered with spiculæ fans, formed by several spikes emanating from the same point at all angles greater than 30° with the horizon. These spikes were connected with each other by lateral spikes or bands, the whole forming the appearance of a fan, whose extent was 120° .

The various modes of aggregation of the minute crystals of ice which constitute hoar frost are evidently dependent on differences in the texture, and in the radiating and conducting powers of these materials, and present a field for investigation hitherto little cultivated.

In England, even in the mildest parts, vegetation is liable to be affected at night, from the influence of radiation, by a temperature below the freezing point of water, every month of the year, even in July and August; and spring vegetation is often checked by hoar frost, unless the productions are protected by slight layers of straw, or a fire lighted to windward, during cold clear nights.

Ice is also formed on the stems of plants and on certain inorganic bodies, by a process very different from that resulting in the production of hoar frost, with which, however, it is popularly confounded.

[DEW; FROST, HOAR; RADIATION OF HEAT; SNOW.]

HOARE, WILLIAM, R.A., an historical and portrait painter, born at Bath about the year 1706. He studied at Rome nine years. There is an altarpiece, by Hoare, of Christ bearing the Cross, in the church of St. Michael at Bath; and another of the Lame Man healed at the Pool of Bethesda, in the Octagon Chapel, for which he received 100*l*. and a pew in the chapel. He was one of the original members of the Royal Academy. He died at Bath in 1792.

HOARE, PRINCE, who succeeded Boswell as foreign secretary to the Royal Academy, was the eldest son of William Hoare; he was professionally a painter, but is known as the author of about twenty dramatic pieces, among which are—'No Song, no Supper;' 'Lock and Key;' 'My Grandmother,' and other lively farces. He published in 1806, 'An Inquiry into the requisite Cultivation and Present State of the Arts of Design in England,' 8vo., pp. 270. He died at Brighton in 1834, aged eighty.

HOARE, SIR RICHARD COLT, Baronet, was

born the 9th of December, 1758, and died the 19th of May, 1838. In 1783 he married the eldest daughter of Lord Lyttleton, and she died in 1785, leaving one child, Henry. His father was the first baronet, and in 1787 he succeeded to the baronetcy. He travelled abroad for some years, and published the results in 1818, under the title of 'A Classical Tour through Italy and Sicily.' In 1806 he published a translation of Giralduus, with views, annotations, and a life of Giralduus. In 1807 he visited Ireland, and published a short account of his excursion. But it is as the historian of Wiltshire, his native county, that Sir R. Colt Hoare's reputation is best established.

HOBART-TOWN. [TASMANIA.]

HOBBS, THOMAS, the Philosopher of Malmesbury, so called from a small town in Wiltshire, where he was born, April 5, 1588, somewhat prematurely, from the circumstance of the portentous armada of Spain having affrighted his mother. His father was the minister of the town. He went early to Oxford; and at the age of twenty undertook the office of travelling tutor to the heir-apparent of Cavendish, Lord Hardwicke, afterwards earl of Devonshire. He travelled with his pupil through France and Italy, and he resided in the family for several years after their return to England. During this period he enjoyed the friendship of Bacon, Lord Herbert of Cherbury, Ben Jonson, and the Scotch poet Sir R. Aytoun. In 1628 he published at London a little poem on the 'Wonders of the Peak of Derbyshire;' and there also about the same time his translation of Thucydides. The merit of this translation lies chiefly in the simplicity and force of the language, in which respect it bears a creditable resemblance to the original. His object in publishing it was to bring historical warnings to bear on the minds of his countrymen, then in the ferment of civil troubles. To dissipate the grief occasioned by the early death of his late pupil, he went in 1628 to France with another, Sir Gervase Clifton's son. He there devoted much time to mathematics. But in 1631 he returned to the Cavendish family and accompanied the young lord on the grand tour, in the course of which, at Pisa, he became acquainted with Galileo. In 1637 he returned with his lordship to England. But on the breaking out of the civil war he again quitted England for Paris, and there mixed in congenial society. M. Sorbiere, Father Mersenne, and Gasendi were amongst his friends, and Descartes became his correspondent. About this time he fell sick of a fever, mortal, as he and those about him feared. In this illness he sought religious consolation, not from his Romish friends, who essayed to convert him, but from Dr. Cosin, a learned divine, and according to the ordinances of the Church of England. At Paris, in 1646, he published his work 'De Cive.' While still at Paris he had printed in London—where the press was free, *regni novitas* notwithstanding—in 1650 his treatises on 'Human Nature' and 'De Corpore Politico;' and, in 1651, his great work quaintly designated 'Leviathan.' Singular as the title of this famous book may appear, it will not seem unaccountable if we consider it as having been dictated, either by the fact that its author embodied all earthly might in the sovereign, or by the circumstance that it was considered by

his adversaries a political monstrosity. Although attached to the cause and fortunes of the exiled royal family, and intrusted about this time with the instruction of the prince, afterwards Charles II., in mathematics, his loyalty and religion were virulently impeached on account of the assumptions in his works with regard to the obedience due to rulers *de facto*, and to the supremacy of the sovereign in ecclesiastical matters. To escape assassination, he found it convenient to return to England, then under Cromwell, whom his principles allowed him, at least, to obey. Always fortunate in his intimacies, he now numbered among his friends Harvey the discoverer of the circulation of the blood, Selden the jurist, Cowley the poet, and Vaughan, afterwards chief-justice of the Common Pleas. In 1653 he finally returned to the family of Lord Devonshire, who settled upon him a small pension. In 1654 he published the letters on 'Liberty and Necessity,' detailing the controversy which he had had with Dr. Bramhall, afterwards archbishop of Armagh, while they were in France; and about the same time he commenced a polemical correspondence with Dr. Wallis, the professor of mathematics at Oxford, in the course of which Hobbes had the mortification of having not only his geometrical positions but his loyalty impugned, though happily it afforded him the opportunity of recriminating on Wallis, who had gone some lengths with the republicans. From this contest, long persisted in, Hobbes finally retreated without glory. At the restoration in 1660 he regained some portion of the royal favour, and received a pension of 100*l.* a year out of the privy purse; but the popular voice as represented in Parliament and convocations still ran against him, and in 1666 his 'Leviathan' and 'De Cive' were censured by Parliament. Soon after he was alarmed by the introduction into the House of Commons of the bill for the suppression of atheism and profaneness, which some were officious enough to tell him would be enforced against him. In 1672 Hobbes wrote his own life in Latin verse; and soon after, his translations of Homer into English verse appeared in detached parts. This was the amusement of his old age. It might on that account claim exemption from criticism, if the poem were not, as Pope said it was, below criticism. On this sharp critique Sir W. Molesworth remarks that some may, however, possibly find that the unstudied and unpretending language of Hobbes conveys an idea of Homer less remote from the original than the smooth and glittering lines of Pope and his coadjutors. In 1664 he began to study the law of England, 'looking over the titles of the statutes from Magna Charta downwards, and leaving no one unread.' He also 'diligently read over Littleton's Book of Tenures, and Sir E. Coke's Commentary; in the latter, he says, he found much subtlety, not of the law, but of inference from the law.' Some fruit of this study is seen in the 'Dialogue between a philosopher and a student of the common law.' This tractate is imbued with high prerogative notions, but contains many just strictures on the abuses of the law. It was published in 1678, together with his 'Decameron Physiologicum,' or ten dialogues on natural philosophy; and his 'Rhetoric,' a free translation of that of Aristotle. 'The Behemoth' (Monarch of the Land), containing an account of the

civil wars, was published after his death. It told too much truth, and distributed blame too freely and impartially, to be acceptable to either of the great political parties of the day. Hobbes died at Hardwicke in Derbyshire, 4th December, 1679, aged ninety-one.

HOICHE, LAZARE, born in 1768 near Versailles, of very humble parentage, enlisted in the French Guards at the age of sixteen. During the revolutionary war he served in Flanders as a lieutenant under Dumouriez. Having distinguished himself, he was rapidly promoted, and at the age of twenty-four was made general in command of the army of the Moselle. Upon incurring the displeasure of St. Just, he was thrown into prison at Paris, when his life was saved by the timely overthrow of Robespierre in July, 1794. The convention restored him to his rank, and sent him against the insurgents of La Vendée.

Hoiche now conceived the bold idea of effecting a landing in Ireland, and a fleet having been equipped at Brest with great secrecy, he embarked his troops in December, 1796; but, being separated by a storm from the rest of the fleet, he was obliged to return to France without effecting anything.

In the quarrel which took place between the Directory and the Legislative Councils, Hoiche took the part of the Executive, and began to direct some of his forces towards Paris in order to support the Directory. For this he was denounced by the Councils, and Bonaparte, meantime, having offered the support of his own army of Italy, the Directory declined Hoiche's services, and made use of Angereau to effect the coup d'état of Fructidor. Hoiche returned to his head-quarters at Wetzlar, where he was seized by a sudden illness, of which he died September 15, 1797. The symptoms of the disease gave rise to suspicions of poison. His life has been written by Rousselin in two volumes 8vo.

HOCK-TIDE, among our mediæval ancestors, a day set apart for sports and public rejoicings, in celebration of the slaughter and expulsion of the Danes, by which the country was freed from their oppression. It was the second Tuesday after Easter, and formed a kind of epoch or period from which leases or other written agreements were dated.

HODDESDON. [HERTFORDSHIRE.]

HODGES, WILLIAM, R.A., was born in London about the year 1744. His father was a blacksmith. He was a pupil of Wilson.

In 1772 Hodges accompanied Captain Cook as draughtsman on his second voyage to the South Seas; and his drawings were published in Cook's narrative. He then went to India, where he realized a considerable fortune. He was elected a member of the Royal Academy in 1787. About 1790 he made a tour on the continent of Europe, and exhibited a view of St. Petersburg at the Royal Academy in 1793. In 1795, he established a bank at Dartmouth in Devonshire, which broke two years afterwards. The shock brought on the death of Hodges, March 6, 1797.

In style Hodges imitated Wilson, but with little success. His best works are—a view of Windsor from the Great Park, and three or four views painted in India.

HODOMETER, is an instrument consisting of a

species of clockwork connected with the axle of a conveyance, and having an index and dial to show the exact distance the vehicle has traversed.

HODY, HUMPHREY, D.D., was born January 1, 1659, at Oldcombe, in Somersetshire. He was educated at Oxford, took his degree of M.A. in 1682, and was elected in 1684 a fellow of Wadham College. The works by which Hody was principally known among his contemporaries were those which he published respecting the bishops who had been deprived of their bishoprics during the reign of William and Mary for refusing to take the oath of allegiance. In 1693 Hody published 'The Case of Sees vacant by an Uncanonical Deprivation' (4to., London, 1693). He was appointed domestic chaplain to Tillotson, archbishop of Canterbury, which office he also held under his successor. He was presented with a living in London, and was appointed Regius professor of Greek at Oxford in 1698, and archdeacon of Oxford in 1704. He died on the 20th of January, 1706.

He founded ten scholarships at Wadham College, in order to promote the study of the Greek and Hebrew languages.

HOE, HORSE-HOEING. The hoe is an instrument used in gardens and in the fields for loosening the earth, and destroying the weeds between plants. It has various forms. The most common hoe consists of a blade or flat piece of iron, with an eye in which a handle is inserted at an acute angle with the plane of the blade. This hoe is used by striking the edge of it down into the ground, and the earth is moved by drawing the handle towards the workman. Another hoe has the handle at a very obtuse angle, and is used by pushing it forward and cutting off the weeds an inch or less under the surface of the ground. Hoes are made of different sizes and shapes according to the work which is to be done. When the earth is to be stirred between plants which are very near to each other, the hoe is narrow and pointed, so that the smallest weed may be taken out close to the growing plant. When the distance is considerable, the hoe is wide, and sometimes compounded of several hoes, in order to stir a greater width of earth at once.

One of the greatest improvements in practical agriculture has been the introduction of the hoe into the field for every kind of crop. Peas and beans were probably the first crops which were sown in rows for the purpose of hoeing the intervals; potatoes, turnips, and carrots were probably the next, and the good effects produced on these crops, by stirring and hoeing have led to the drilling of every other kind of produce which is apt to be injured by weeds. Hand-hoeing not having been found sufficiently expeditious on a large scale, a hoe has been invented of a larger form, to be drawn by a horse. The rows have in consequence been widened, and this has introduced the horse-hoeing husbandry. The greatest promoter of this system was Jethro Tull. [TULL, JETHRO.]

The simple horse-hoe is an instrument with a beam like a plough, and two stilts or handles, but much lighter; in this beam is inserted, instead of a coulter, the end of an iron hoe, of the proper breadth to stir the whole surface between the rows. A small wheel is generally added to keep the hoe at a proper depth in the soil.

A variety of horse-hoes have been invented of more or less complicated forms; but the object of them all is the same, viz., to stir the ground between the rows, and destroy the weeds as fast as they appear. The horse-hoe is now chiefly used in the cultivation of peas, beans, potatoes, cabbages, turnips, and carrots. (See Plates, 'Agricultural Implements,' vol. i.)

A horse-hoe, in which a framework 8 or 10 feet wide, supported on large wheels, carries twelve to twenty hoes attached to coulters hanging at intervals of a few inches from each other, is now used in the cultivation of drilled corn crops during the earlier stages of their growth. The width cultivated and number of intervals hoed at once, correspond exactly with the width and rows which had been sown at once by the drill, so that it only needs that the hoe be placed on the exact rows which were sown at one and the same time, and any crookedness or unevenness in the row will be followed by the hoes. With a hoe of this kind one horse will cultivate from six to eight acres a day.

The effect of hoeing is remarkable in very dry weather. Although the stirring of the soil would seem to extract what little moisture there might be in it, and the weeds wither on its surface, it soon appears that, on the contrary, moisture is attracted or produced, and the plants which drooped before appear refreshed and invigorated.

The operation of hoeing cannot be performed too soon after the plant has shot out its roots, because the ground may then be stirred very near the young plant without danger, and the roots will spread readily in the newly stirred soil.

The best time for hoeing stiff soils is when they are neither wet nor dry; when the surface is slightly caked, but there is moisture below it, and when the weather is dry after some rain. Light soils can be hoed at any time, and require it oftener than the heavy, especially in showery weather.

HOE'S MACHINE. [PRINTING.]

HOERBERG, PEHR, a Swedish painter, was born in a village of Småland, in 1746; his father was a private soldier and extremely poor. By the time he was twenty-two years of age, he contrived to learn so much from one painter and another in his own district, that he was enabled to maintain himself and a wife by his paintings. In 1784, in his thirty-eighth year, he became a student in the Royal Academy of Arts at Stockholm, in which he obtained two prizes, and made rapid progress. In 1790 he established himself at Olstorp in East Götaland, and in 1797 he was elected a member of the Swedish Academy, and was appointed historical painter to the king. He died in 1816.

There are eighty-seven altar-pieces by Hoerberg in Sweden, five of which are copies; his paintings altogether amount to about 700, mostly religious.

HOF, a town in the circle of Upper Franconia, Bavaria, capital of a district on the Saale, and on the Saxon-Bavarian Railway, 30 miles N. E. of Bayreuth. It was ravaged by fire in 1823, since which it has been regularly built, and it has a gymnasium and library, and manufactures of muslins, yarns, woollen stuffs, leather, and colours. There are iron mines and marble quarries in its vicinity. In 1861 the population of the town was 12,018.

HOFFMANN, FRIEDRICH, was born at Halle in Saxony, in 1660, of a family which had been engaged for two centuries in the practice of medicine. After having graduated and received his diploma at Jena, he established himself as a physician at Minden in 1682. In 1684 he travelled through Holland and England, and on his return was appointed physician to Frederick William, elector of Brandenburg, and to the garrison of Minden. In 1688 he removed to Halberstadt, and having gained considerable celebrity both by his successful practice and by his writings, he was invited by Frederick III., elector of Saxony, afterwards king of Prussia, to take the chief professorship of medicine in the University of Halle, which had just been founded. He accepted this appointment in 1693, composed the statutes of the Institution, and retained the professorship with a reputation scarcely inferior to that of his great colleague, Stahl, till 1742, the year in which he died. As a practical physician Hoffmann enjoyed a celebrity second only to that of Boerhaave, who was the contemporary professor of medicine at Leyden. His works were well known and esteemed throughout Europe, and he was admitted a member of the scientific societies of London, Berlin, Petersburg, and other cities. He was a very voluminous writer. Hoffmann's knowledge of chemistry and pharmacy was extensive, and we owe to him the discovery and first introduction of the Seidlitz waters and the purgative salt obtained from them.

The best edition of his complete works is that published at Geneva in 1748, in six vols. folio; and his best treatises are the 'Medicina Rationalis Systematica,' which occupies the first three volumes, and the 'Consiliarii Medici.'

HOFFMANN, ERNST THEODOR WILHELM (or AMADEUS, the name he assumed instead of Wilhelm), one of the most original or rather, perhaps, eccentric writers of Germany, was born January 24, 1776, at Königsberg, in East Prussia. Soon after his birth his father and mother separated and he was brought up by an uncle, by whom he was induced, against his inclination, which led him to the cultivation of music and drawing, to study the law. From 1796 to 1800 he continued to prosecute his studies with great diligence in the courts at Glogau in Silesia and in Berlin, still, however, pursuing his favourite studies at every possible interval. In March, 1800, he was appointed assessor to the government of Posen, and thence, through the patronage of General Zastrow, removed to be a judge at Plock in Poland in 1802, and to Warsaw in a similar capacity, in 1803. Hoffmann was an excellent magistrate, and highly esteemed in Warsaw; but on the entry of the French troops into that town in 1806, he found himself at once without employment, without fortune, and without the prospect of any office in his then distracted native country. He determined boldly to make his other acquisitions serviceable to his support. He taught music, wrote articles for the *Allgemeine Musicalische Zeitung*, of Leipzig, and accepted in 1808 the situation of musical director of the theatre at Bamberg. Afterwards, in 1813, he filled the same office to the Dresden theatre till 1815. After the downfall of Napoleon, and the complete restoration of the Prussian kingdom, he was upon petition readmitted as judge, and soon afterwards appointed

to a seat in the royal judiciary court at Berlin, which he filled with great credit to himself as a judge till his death on July 21, 1822.

Hoffmann was small and weak of body, but for many years he laboured with extreme ardour. Besides his professional acquirements, which were highly estimated by his colleagues, he composed the music and text of many operas: the first was the music only to Göthe's 'Scherz, List, and Rache' (Jest, Trick, and Revenge), which was performed at Posen in 1800. He also produced a number of caricatures, highly popular at the time, of the foreign invaders of his country, and especially of Bonaparte. His first series of tales appeared at Bamberg in 1814, 'Phantasiestücken in Callots Manier;' and similar tales were continued even on his deathbed. They are all distinguished by a fertile wildness of imagination, considerable humour, vivid descriptions of the beauties of nature, much insight into the inconsistencies of the human character, and sly sarcasm. His works form fifteen volumes in 18mo., of which a portion have been translated into French; but only two, 'The Sandman' and 'St. Sylvester's Night,' which appeared in *Blackwood's Magazine*, have been rendered into English.

HOFLAND, MRS. BARBARA, the well-known authoress, was the widow of Mr. Hofland, landscape painter, and daughter of Mr. Wreaks of Sheffield, where she was born in 1770. She lost her father at an early age, and at twenty-six married Mr. T. B. Hoole, a young man of high respectability, who died two years afterwards, and left her, with one child, in straitened circumstances. This obliged her to have recourse to her educational talents for the means of subsistence. She commenced her literary career in 1805, by the publication of a volume of poems by subscription, which was extensively patronized, and enabled her, from the proceeds, to establish a respectable school at Harrowgate, where she was in the habit of occasionally writing and publishing various works of a moral or amusing tendency. She afterwards contracted a second marriage with Mr. Hofland, the eminent landscape painter. But she still continued to devote herself to the pursuit of light and elegant literature. Among the principal of her works may be mentioned the novels of 'Beatrice,' 'Emily,' the 'Son of a Genius,' 'Captives in India,' 'Self-denial,' 'Adelaide,' 'Decision,' the 'Czarina,' 'Tales of the Priory,' and 'Tales of the Manor.'

Mrs. Hofland was a woman of exemplary character, who bore all the troubles and afflictions of life with enduring patience; and the best evidence of her claims as an authoress is the fact that she produced about seventy different works, of which 300,000 copies have been circulated in this country alone. In America, also, their sale has been very extensive, 20,000 copies of the 'Czarina' having been printed and sold there on its first appearance. Her works have also been translated into various continental languages. She died in 1845, and was interred at Richmond in Surrey.

HOFWYL, the name of the estate on which was established the educational institution of Mons. de Fellenberg. It is situated in a valley about three leagues from Berne, in Switzerland, and consists of a number of distinct buildings surrounded by about

250 acres of land. The founder had for his object the improvement of the condition and character of all classes of society by means of an education adapted to their respective wants. To effect this, he divided the institution into classes, of which the higher, the sons of wealthy parents, paid a large yearly sum; the second class a smaller sum; and the lowest class was received without payment. All were instructed in agriculture and the trades connected therewith, all of which were practised on the estate. All the classes also were instructed in the usual branches of school education, and even the lower class in the sciences connected with agriculture; but these were carried farther in the second class, and the highest class had a still wider range. The upper class was commenced in 1808, and the lowest was added in 1810: the middle class was not introduced till 1830. Fellenberg was enthusiastic, and succeeded in imparting much knowledge to his pupils, of whom he had usually about one hundred who paid stipends, and one hundred who were boarded, clothed, and educated for their labour. Fellenberg died in 1844, lamented and respected. It was Fellenberg's wish to have his institution adopted by the state, but this has not been done. It is, however, still carried on—Dr. Edward Müller being the principal.

HOG. The wide dispersion of the domestic hog, and its usefulness to man, need no comment. It is omnivorous, and thrives on every kind of food, vegetable or animal. The sow may bear two litters in the year, each consisting of eight, ten, twelve, or fourteen young, sometimes more.

There are several varieties of the domestic hog. Many of the older breeds closely resembled the wild animal, their primitive origin. Their size was large and their flesh good, but they fattened slowly—a great fault, since the more rapidly the hog fattens, and the earlier he can be made to increase in flesh without increasing in bone, the greater is the advantage to the breeder. The small original Chinese breed is remarkable for this quality, and also for productiveness; and when by judicious crossing the size is increased, a great point is attained. The Chinese pig is short in the head, with ears pricked up and pointing backwards, very wide in the cheek, high in the chine, and short in the leg; the young pigs make delicate roasters at a month old, and, when dairy-fed, excellent porkers at about three months old.

The breed in this country nearest to the Chinese is the Suffolk. These pigs are generally white, with pointed ears, broad chest and loin, and a compact outline. The suckling roasters and the porkers are excellent, and they make fine bacon hogs at twelve or fifteen months old.

The Essex breed approaches the Neapolitan, and is probably derived from the latter. Some are black and white, but the pure breed is black. This breed is admirable, and, when directly crossed with the Neapolitan, produces an intermixed progeny of superior qualities, fattening at an early age, and to an astonishing degree, with delicacy of flesh. The true Neapolitan hog is black, without any hair, very plump, with sharp ears. No breed can excel it in the aptitude to fatten; but it is tender, and winter litters are liable to perish from cold. It is very valuable as a cross with some of our hardier sorts, especially with the Berkshire, a noted race in the

present day in consequence chiefly of this admixture of blood. Indeed, a mixture of the Berkshire, Chinese, and Neapolitan breeds may, by careful selection, and attention to the principle of not interbreeding in one strain too far, be brought to the highest degree of perfection.

Colour is chiefly a matter of fancy, but black pigs have the thinnest skin, and suffer less from the sun in summer, and hence they are less liable to cutaneous diseases. Experience teaches that when sows and boars are too nearly related the fecundity greatly diminishes. The very large breeds are not generally considered so profitable as the smaller ones, as they do not so soon come to maturity, and cannot be profitably put up to fatten till they are eighteen or twenty months old. For delicate bacon the hogs killed at a twelvemonth old, and weighing from ten to twelve score are much preferred. It is a great mistake to suppose the hog loves dirt. If it can keep itself clean it will do so, and its wallowing in the mud arises generally from heat and itching of the skin in warm weather, which is relieved by rolling in the cold mud. If hogs have plenty of straw and clean water they will never be dirty; and nothing makes them thrive so quickly or pleases them more than being washed and curried regularly.

The fat of the hog, which is produced in a thick layer under the skin, is an article of commerce and of various uses under the name of lard. The skin is made into leather, which is particularly esteemed for saddles. The bristles are much used for brush-making.

In order to manage hogs profitably, a regular system must be pursued. Proper sties for breeding sows, boars, feeding-hogs, and porkers, must be constructed with due attention to comfort and cleanliness. Regularity in feeding, attention to the quality of the food, according to the purpose designed, increasing it from less nutritious articles to a full diet, from boiled potatoes mixed with bran, to pea-meal, barley meal, skimmed milk, &c., are points of importance. Conveniences, as boilers and outhouses, for the preparation and storing of food, are also essential, and so is due cleanliness of the troughs.

HOGARTH, WILLIAM, the celebrated satirist and painter, was born in the parish of St. Bartholomew, London, on the 10th of December, 1697. His father, originally a schoolmaster of Westmoreland, was then established in London as a printer's reader or corrector of the press. The son was apprenticed at an early age to Ellis Gamble, a silversmith, who had a shop in Cranbourn Alley, Leicester Square, and Hogarth was brought up as an engraver of crests and ciphers on metal. In 1718, however, when the term of his apprenticeship had expired, he forsook silver-engraving for the higher branch of the art on copper, and procured from the booksellers more congenial employment. His first known illustrations are the twelve small plates executed for Butler's 'Hudibras' in 1726, which have been copied for subsequent editions of that poem; and though Hogarth engraved many book-prints about this time, he found engraving such a miserable profession that he got sometimes for his plates a very little more than the value of the copper; he therefore adopted portrait-painting as his main support. In this branch of art he did much better; he ventured to take a wife in

1730; and married the only daughter of Sir James Thornhill the painter, in spite of her father's opposition. His marriage seems to have acted as a great stimulus to his exertions, for in a very few years, from an obscure engraver we find him developed into an excellent painter, without a rival in his own satirical sphere, and with few equals in the mere technical manipulations of his art. Of his several moral series of excellent pictures, produced from 1734 to 1744 inclusive, the most admirable is now in the National Gallery, known as the 'Marriage à la Mode,' in six scenes. They were sold by auction by Hogarth in 1750, when, to the painter's extreme disappointment, only one bidder appeared. To him the pictures were knocked down at 110 guineas: the frames alone had cost the painter 24 guineas. They were in 1797 bought for 1381*l.* by Mr. Angerstein, with whose collection they were purchased by the nation in 1824. The nation possesses also an excellent specimen of Hogarth's portrait-painting in the picture of himself and his dog Trump, executed in 1745, which formed likewise one of the Angerstein collection; it was bought by Mr. Angerstein after the death of Mrs. Hogarth in 1789. Another very good portrait by Hogarth is that of Captain Coram at the Foundling Hospital. Of his pictures, the 'Rake's Progress' and the 'Harlot's Progress' are, like nearly all his other works, well known from prints. In 1753 he appeared as an author. 'The Analysis of Beauty, written with a view of fixing the fluctuating ideas of taste,' was published in that year. In 1757 he was appointed sergeant painter to the king. He died at his own house in Leicester Square, October 26, 1764, and was buried in a vault at Chiswick, where he had a villa in which he generally resided in the summer. 'Hogarth,' says Walpole, 'resembles Butler; but his subjects are more universal, and amidst all his pleasantry he observes the true end of comedy—reformation. There is always a moral to his pictures. Sometimes he rose to tragedy, not in the catastrophe of kings and heroes, but in marking how vice conducts insensibly and incidentally to misery and shame. He warns against encouraging cruelty and idleness in young minds, and discerns how the different vices of the great and vulgar lead by various paths to the same unhappiness.' There are several sets of Hogarth's works published, but most are copies. The best original set is that sold by the Boydells after the death of Mrs. Hogarth, in one hundred and ten plates.—(Walpole, Nichols, Ireland, &c.) In the South Kensington Museum there are seven of his pictures, consisting of his own portrait and the series of the *Marriage à la Mode*.

HOGG, JAMES, a Scottish poet, generally known by his poetical name of 'The Ettrick Shepherd,' was a native of Ettrick Forest in Selkirkshire. According to the last of the numerous accounts which he gave of his life, he was born in 1772, on the 25th of January, the anniversary of Burns' birthday. But the parish register of Ettrick records his baptism as having taken place on the 9th of December, 1770. His forefathers for several generations were shepherds, distinguished by their integrity and skill; but his father having saved a little money, took a lease of a farm in Ettrick and commenced dealing in sheep. In the course of a few years, however, he was ruined, and lost his whole

property. The poet's mother, Margaret Laidlaw, was a woman of remarkable vivacity, humour, and spirit, but deeply imbued with superstition, and was celebrated over the whole district as a reciter of ancient ballads and traditions. Hogg was only seven years of age at the time of his father's bankruptcy, and was in consequence obliged to go to service with a neighbouring farmer as cowherd. His school education must have been very imperfect; but following an occupation which at certain seasons afforded him abundance of leisure, and living in a picturesque district famous for its historic and poetic associations, he was from early years familiar with all the legendary lore and ballad strains of the Border, as well as with the Sacred Scriptures and the usual household works of the Scottish peasant, and these have evidently exercised an important influence in the formation of his character. After serving a number of masters as a shepherd, Hogg entered at Whitsunday, 1790, into the service of Mr. Laidlaw of Blackhouse in Yarrow, father of William Laidlaw, the confidential friend of Sir Walter Scott. There he remained for nine years, had access to a considerable collection of books, and received every facility for the cultivation of his poetical genius. It was through William Laidlaw, too, that he was introduced to Sir Walter Scott, who was greatly interested in Hogg's character and history, and was ever after one of his best friends. It is difficult to say at what period the Shepherd's poetical genius first began to display itself. His first printed piece, entitled 'The Mistakes of a Night,' appeared in the *Scots Magazine* for October, 1794. In 1801 he published hastily a small collection of his verses, which he says was full of errors and imperfections, and he afterwards regretted that he had allowed these crude productions to see the light. In 1807 a volume of his songs and poems, of greatly superior merit, appeared under the title of the 'Mountain Bard,' the profits of which, and of a treatise on the diseases of sheep, amounted to 800*l*. He had previously lost all his savings as a shepherd in a sheep-farming speculation in the island of Harris; out undeterred by this failure, he now took a farm in Dumfriesshire, which proved a ruinous concern, and in three years left him penniless. Failing to obtain employment as a shepherd, he took his plaid about his shoulders, he says, and set off for Edinburgh in February, 1810, determined, since no better could do, to push his fortune as a literary man. His first effort was a collection of songs entitled 'The Forest Minstrel.' He then tried a weekly periodical called the *Spy*. In spite of all his efforts, however, it would have fared ill with him but for the unwearied kindness and generosity of Mr. John Grieve, a worthy hat manufacturer in Edinburgh, who supported Hogg through all his difficulties and privations, and suffered him to want for nothing. At length, in 1813, the publication of 'The Queen's Wake,' the best of his works, established the Shepherd's reputation as a poet on a permanent and lofty basis. It was followed by 'Madoc of the Moor,' a poem in the Spenserian stanza; 'The Pilgrims of the Sun,' in blank verse; 'The Poetic Mirror,' a collection of pieces in imitation of some living poets; 'Queen Hynde,' and other poetical pieces; and also by the 'Winter Evening Tales;' 'The Brownie of Bodsbeck;' 'The Confessions of a Justified Sinner;'

'The Three Perils of Man,' and other novels of very unequal merit. The duke of Buccleuch, in compliance with the deathbed request of his duchess in 1814, that he would be kind to the Ettrick bard, gave him a liferent of a small moorland farm at Altrive in Yarrow, where he built a cottage and went to reside in 1817. Three years later he made an advantageous marriage, and desirous once more to try his fortune as a sheep farmer, he took the large farm of Mount Bengier from the duke of Buccleuch; but by the end of his nine years' lease the poet was once more a ruined man. The remainder of his life, with the exception of a visit to London in 1831, and an occasional residence of a few weeks in Edinburgh, was spent at Altrive in the enjoyment of domestic happiness and social hospitality, presiding at Border festivities, and spending much of his time in fishing and field sports, of which he was passionately fond. The inimitable 'Noctes Ambrosianæ' kept his name constantly before the public; and though this strange miscellany of poetry, eloquence, wit, fun, and coarse humour, raised a prejudice against the Shepherd in some quarters by frequently representing him in grotesque and ludicrous aspects, yet on the other hand it conveyed an impression much too exalted of his genius, sagacity, and colloquial powers. He died, 21st November, 1835, leaving a widow and five children, and was buried in the churchyard of Ettrick.

The works of the Ettrick Shepherd have been collected since his death, and are comprised in eleven volumes. His writings, both in prose and verse, are very unequal, but they contain not a little which the world will not willingly let die. In grasp of intellect and depth of passion, Hogg was greatly inferior to Burns; but on the other hand, his genius was more discursive, playful, and fanciful. His masterpiece, 'The Queen's Wake,' is admirable, both in design and execution, and the tales and legends which it contains are worthy of a place among the lyric poetry of Scotland's greatest masters of song. 'Kilmeny' is one of the finest fairy tales that ever was conceived or penned, and its scenes of supernatural splendour, purity, and happiness, are altogether inimitable. Some of the Shepherd's songs and minor poems, such as 'The Skylark,' 'When the Kye come hame,' 'Donald Macdonald,' 'The Evening Star,' &c., will last as long as the language. The best of his prose works is 'The Shepherd's Calendar,' which contains a genuine and affecting representation of pastoral life. But Hogg had no skill either in the delineation of character or in arranging the incidents of a story, and his tales are often disfigured by coarseness and exaggeration. The Shepherd's natural character was frank, kind, simple, and enthusiastic as that of a child, generous and hospitable far beyond his means; but he was vain, thoughtless, rash, and improvident, and consequently seldom free from pecuniary difficulties. 'Requiescat in pace,' says Lockhart; 'there never will be such another Ettrick Shepherd again.'

HOGSHEAD, an ancient measure of liquids, which, not being mentioned in the Act 5 George IV., cannot now be considered as having any legal existence.

The hogshead of wine was 2 wine barrels, or 63 old wine gallons; the London hogshead of ale was 1½ ale barrel, or 48 ale gallons; the London hogshead of beer was 1½ beer barrel, or 54 beer gallons;

and the ale and beer hogshead for the rest of England was $1\frac{1}{2}$ barrel, or 51 gallons. All excise measurements being now made in gallons, the term hogshead remains in use only as the name of a large cask.

HOHENLINDEN, a small village in Upper Saxony, famous as the scene of a sanguinary battle between the French and Austrians on the 3rd of December, 1800. The former were commanded by Moreau, and the latter by the Archduke John. The battle was fought amidst drifting snow, and ended in the complete defeat of the Austrians, who had 8000 men killed and wounded, and 11,000 made prisoners, including 200 officers. They also lost 100 pieces of artillery. The French had 5000 men killed and wounded. The battle was almost immediately followed by the peace of Lunéville. It was made the subject of a fine poem by Campbell, commencing—

'On Linden, when the sun was low.'

HOHENLOHE. [JAXT.]

HOHENZOLLERN HECHINGEN and HOHENZOLLERN SIGMARINGEN, two former principalities of Germany, so called from a very ancient family of the same name, whose original seat was the ancient castle of Zollern, or Hohenzollern, which stands within two miles of Hechingen, on the road from Stuttgart to Schaffhausen. The family, which takes its origin from Count Thassilo, who died in 800, was divided towards the close of the sixteenth century into the two branches of Hohenzollern Sigmaringen and Hohenzollern Hechingen. The territory is entirely inclosed between Württemberg and Baden; its surface is mountainous, and the soil is in general stony. Corn more than enough for the consumption is raised; flax is extensively cultivated; horned cattle and sheep are numerous; and the forests abound with fine timber. There are iron mines in the northern part. The manufactures are unimportant. The principalities were made over to Prussia in 1849. The area is 451 square miles, and the population in 1861 was 64,675. From the younger or Hechingen branch, the royal family of Prussia is descended. In both principalities the inhabitants are all Catholics.

HOLASTER, a genus of fossil *Echinidæ*, proposed by M. Agassiz to include species once ranked as *Spatangi*. *Spatangus subglobosus* (Leake), *Sp. planus* (Mantell), and *Sp. hemisphericus* (Phillips), are examples. The species occur almost exclusively in the chalk formation.

HOLBEACH. [LINCOLNSHIRE.]

HOLBEIN, HANS, is considered by the Germans to be the best of their early painters next to Albert Dürer, whom he, however, excelled in portraits. He was born in 1497, at Grünstadt. He was instructed in the art of painting by his father, whom he soon excelled. Accompanying his father to Basel, Holbein painted several portraits of Erasmus, who gave him a letter of recommendation to Sir Thomas More, and he came to England in 1526. He was subsequently taken into the service of Henry VIII., and painted a large number of pictures in this country, principally portraits, for which he was munificently rewarded. Several portraits by him are in the Hampton Court Gallery. He died at London, of the plague, in 1554.

HOLBERG, LUDWIG, BARON, was born at Bergen in Norway, in 1684. Having completed his

studies at Copenhagen, he became a private tutor. He was eventually, in 1718, appointed professor of metaphysics, and in 1720 professor of eloquence at Copenhagen. He now astonished and delighted his countrymen by his Satires, and his comic poem of 'Peder Paars.' This production has acquired for its author the title of the Danish Butler.

The most formidable rival to the author of 'Peder Paars' is Holberg himself as a dramatist, for his comedies have rendered the poem only his secondary title to fame. His 'Metamorphoses,' in which he has reversed Ovid's system, transforming animals into men, instead of men into animals, is ingenious in idea and happy in execution. But that to which some have assigned the foremost place among his productions is 'Niels Klim's Subterraneous Journey,' first published in 1741, and written in Latin, but translated not only into Danish, but into almost every other European tongue. History, biography, philosophy, politics, all employed his pen by turns. He died January 27, 1754, in his seventieth year. He was created a baron by Frederick V. of Denmark.

HOLCROFT, THOMAS, born December 10, 1745.

His father kept a shoemaker's shop in Leicester Fields, London, and occasionally dealt in horses. When very young Holcroft became a stable-boy in racing-stables at Newmarket, and continued in the service of training-grooms till his seventeenth year, after which he lived a desultory life till twenty, when he married. About this time he had proceeded far enough in self-education to commit his performances to the columns of the *Whitehall Evening Post*; but this whim soon gave way to others, and in a short time he found himself an actor. In 1780, he turned author, producing first a novel, then a comedy, and afterwards some poems, which were followed in their turn by a series of plays, and by translations of French works, of which those most remembered at present are—'Tales of the Castle,' and 'The Marriage of Figaro.' The play by which he is principally known is the 'Road to Ruin.' In 1789 he lost his son, and in 1790 his third wife. Four years afterwards he was implicated in the political trials relative to the Society for Constitutional Information. He lived much in Germany and occasionally in Paris. He died March 23, 1809.

HOLCUS, a genus of grasses belonging to the tribe *Seslericeæ*. There are two British species of this genus. *H. lanatus* grows in meadows and pastures. *H. mollis* grows in thickets or open places on a light soil. The *H. cernuus* of Willdenow, and the *H. sorghum* of Linnaeus, are now referred to the genus *Sorghum*.

HOLD, is that part of a ship which lies below the water line. It extends throughout the length of the ship, and is under the lower-deck. Light and ventilation are procured through the hatchways. In men-of-war the provisions, water, and miscellaneous articles are stored in the hold—in merchant ships the cargo is usually carried there. It is sometimes divided into sections, as forehold, mainhold, and afterhold.

HOLDERNESS. [YORKSHIRE.]

HOLDING, in the law of Scotland, is a term employed in feudal law to express the nature of the right conferred by the superior on the vassal, and the relation subsisting between them. There were

originally five kinds of holding, of which three still exist.

1. *Ward-holding*, so called from the privilege resulting from it to the superior, of *warding* or being guardian of the vassal's person and estate during his minority, was the proper feudal tenure of the country. It was military in its nature and origin, and was conferred for such services as supporting the superior in war, or contributing a certain number of horses and men when he took the field. Shortly after the rebellion of 1745, this holding was abolished by the act 20 Geo. II. c. 50; and lands held ward of the crown or prince were converted into blench-holdings, whilst those held from subject superiors were changed into feu-holdings, the duties being adjusted on a uniform scale, prepared by the Court of Session.

2. *Mortification*, or *Mort-main*, when grants were made to churches, religious houses, or for pious uses, for a *reddendo*, or return of *preces et lacrymæ*. During the religious excitement produced by the Reformation this tenure was abolished, on the ground of its being superstitious. But lands may still be mortified for charitable purposes, under a holding either feu or blench, according to circumstances.

3. *Feu-farm*, was for long esteemed an ignoble tenure, though it seems to have been known at an early period of the law. It is mentioned for the first time by the Act 1457, c. 71, and was introduced for the encouragement of agriculture throughout the kingdom. The return for which a grant with this holding is given, is either services proper to, and connected with a farm, as ploughing, reaping, &c., or more commonly a yearly rent in money or grain. This is now the ordinary tenure by which lands are held; and it bears, in many respects, a strong resemblance to the Roman right of *emphyteusis*.

4. *Blench-farm* (perhaps the *feudum francum* of the Lombards), is that by which the vassal becomes bound to pay to the superior an annual elusory duty, such as a penny money, a hawk, a pair of gilt spurs, as an acknowledgment of superiority. The act 1606, c. 14, forbade the taking of money in lands held blench of the crown, when the duties were stated in the charter to be exigible in kind.

5. *Burgage-holding*, is that by which burghs-royal hold of the king the lands contained in their charters of erection. It is regarded by Sir Thomas Craig ('De Feudis,' 81, s. 36) as a species of ward-holding, and the specified services are watching and warding. As the royal burgh is the king's vassal, all burgage holders hold immediately of the crown, the magistrates in givingsasine acting, not as superiors, but merely as the king's bailies.—(Erskine, *Prin.* p. 236.)

HOLETRA (Gr. *holos*, 'entire,' and *etron*, 'the abdomen'), an order of Spiders, in which the thorax and the abdomen are closely joined, and appear as one.

HOLIDAY, a term which, legally speaking, is restricted to Christmas Day, Good Friday, and any other day appointed by act of Parliament to be kept as a fast or public thanksgiving. Bills of exchange falling due on these days must be paid the day before. In public offices and law courts, in addition to Christmas Day and Good Friday, the Queen's birthday, and in some instances other days, are kept as holidays.

HOLINSHED, RAPHAEL, was born probably

during the first half of the sixteenth century. Anthony à Wood says that he 'was educated at one of the universities, and was a minister of God's word;' it appears most probable that he was chaplain or steward to Thomas Burdet of Bromcote in Warwickshire. He died about 1580.

Holinshed is an important authority in English history. The first edition of his history is a very scarce black-letter in two vols. folio, adorned by numerous wood-cuts. The second edition omits these adornments, and has suffered also from the censorship of the times, which compelled the cancelling of several sheets. It consists of the following items:— 'Description of England,' by Harrison; of 'Ireland,' by Stanihurst; and of 'Scotland,' from the Latin of Hector Boethius, by W. H(arri)son; 'History of England,' by R. H(olins)hed; of 'Ireland till the Conquest,' from Giraldus Cambrensis, by J. Hooker (an uncle of the divine); 'till 1509,' by Holinshed; and 'till 1586,' by Hooker and Stanihurst; and of 'Scotland,' till 1571, by Holinshed, and continued by others.

HOLKAR, MULHAR RAO, was a Mahratta soldier, who, having been instrumental in extending the conquests of his nation, under the first Peshwa, towards the north of India, received a grant of land in Malwa about 1736. Ultimately one-half of that large province passed under his rule; and before his death in 1766, he had rendered himself, in all but name, independent of his titular superior. He was succeeded by his grandson, a minor; but this boy soon died, and the inheritance passed to Tuckagee Holkar, who, dying in 1797, left four sons, whose patrimony was usurped for a time by Scindia, the most powerful of the Mahratta chiefs. In 1802 Jeswunt Rao Holkar, the third son, defeated Scindia, and re-established himself in Malwa. The Marquis Wellesley, then governor-general, refused, however, to recognize his title, and in 1804 commenced a war against him, which was terminated at the end of 1805 by a peace which left to him the greater part of his dominions. The violence of his temper ultimately grew into madness; and the last three years of his life were passed in close confinement: he died in 1811. A wretched anarchy succeeded. After the final overthrow of the Mahratta power in 1818, Mulhar, the son of Jeswunt Holkar, was suffered to retain a portion of the dominions, under the protection of the British.

HOLLAND, the name generally given to the kingdom of the NETHERLANDS, but properly applicable only to the two provinces described in the next article.

HOLLAND (NORTH and SOUTH), two contiguous provinces, and the most important in the kingdom of the Netherlands, situated between 51° 45' and 53° 30' N. lat., 3° 45' and 5° 20' E. long., is bounded N. and W. by the German Ocean, E. by the Zuider-zee and the provinces of Utrecht and Guelderland, and S. by Zeeland and North Brabant. The surface is flat, and in many parts below the level of the sea, against which it is protected by the sandy downs on the west coast, and by stupendous dykes built along the shores of the Zuider-zee, the Haarlem-meer, and the banks of the principal rivers. The country is traversed by canals in all directions. A railroad passing from Rotterdam through the

Hague, Leyden, Haarlem, Amsterdam, Utrecht, and thence to Rotterdam, incloses a very important part of the province. The soil is marshy, but has some rich pastures, which support a fine breed of horses, cattle, and sheep. Gardens and orchards are carefully cultivated; barley, oats, peas, beans, mustard, and other seeds, are the chief crops in the northern part of the province; in the southern part more corn is produced. But pasturage prevails much more than arable cultivation; the produce of the dairy farms, butter and cheese, constituting the chief wealth of the landholder. A remarkable feature of the country are the *polders*, a name given to lands that are below the level of the sea or adjacent river, and, having once formed a lake or marsh, have been surrounded by dykes, and cleared of water by means of pumps worked by windmills. The lands thus reclaimed are very fertile, and some of them of great extent, as the Beemster polders, near Edam, in the northern part of the province, which are fifteen miles in circumference; the grain sown in them is sometimes destroyed by water, but rarely, for the mills are always at work, when there is any wind, lifting up the water to such a height as gives it a fall into the nearest river, canal, or sea. The effect produced on foreigners, who visit the polders for the first time, is one of surprise, not unmingled with alarm, at the apparent inversion of the natural order of things; luxuriant corn and rich grass crops growing, and fat cattle and sheep pasturing, where water should lie; while the large sails of the canal barges flit past high above dykes, houses, and trees. A few years ago the Haarlem-meer, or lake, was drained by steam-power by an English company, and more than 40,000 acres of reclaimed land are now divided into farms, under pasturage or tillage. Flowers are cultivated in the tract between Alkmaar and the Hague, but especially about Haarlem. Hemp, flax, and madder are grown. Wood, both for construction and for fuel, is scarce. The manufactures, which are chiefly carried on in the towns, are important. They consist of linen, paper, woollen cloths (for which Leyden is famous), silk, leather, tobacco, sugar, &c. The gin distilleries of Schiedam are very extensive, and have been long celebrated. Large quantities of fine lime are made from the shells gathered on the coast of the German Ocean. The fisheries on the coasts are important, and most industriously prosecuted. The sleekness of the cows and horses, and the cleanliness of the dairies in Holland, are proverbial. The horses are all tender in the hoof.

To the lover of the picturesque the aspect of Holland is tame and uninteresting. The country is one vast plain, diversified neither by mountain, hill, nor knoll. Viewed from the top of a tower or spire, it appears like an extensive marsh intersected by numberless ditches and canals. Yet even the dull monotony of this prospect is relieved by some features of great interest, meadows of wide extent and of the most beautiful verdure covered with large herds of well-fed cattle, sheets of water, clusters of trees, and in the vicinity of large towns elegant villas and parks decorated with statues and busts. Throughout the kingdom the advantages of education are enjoyed in an eminent degree; schools are established in every parish. The universities of Leyden, Utrecht, and Groningen have long been celebrated.

The Dutch may boast of attainments in letters and science, and even in the fine arts. In the former they possess the names of Erasmus, Boerhaave, and Leeuwenhoeck; in the latter those of Rembrandt, and a number of landscape and marine painters.

The Dutch are a laborious, plodding, cleanly, frugal, but upright people. In religion they are Protestant Calvinists, but they have long set the example of the most complete toleration.

NORTH HOLLAND extends north of the Haarlem-meer, and the mouth of the Old Rhine. It has an area of 966 square miles, and a population in 1862 of 554,221. The Amstel and the Vecht flow through the south-east of the province, the Zaan through its centre. The Helder Canal, by which the largest merchant vessels reach Amsterdam direct from the German Ocean without encountering the difficult navigation of the Zuider-zee, runs from Amsterdam to the Mars-diep or strait that separates the Texel from the mainland. It is 120 feet wide, 25 deep, and above 50 miles in length. The chief towns are ALKMAAR; AMSTERDAM; HAARLEM.

Amstelveen is a well-built town with 5100 inhabitants, situated between the Amstel and the Haarlem-meer, and five miles S. by W. from Amsterdam.

Broek, a village of 1200 inhabitants, composed chiefly of retired merchants and their families, is the much bepraised model of the precise neatness and punctilious cleanliness of the Dutch. In fact, it is stated to be the cleanest place in the world. The narrow lanes that intersect it are paved with bricks, strewn with sand or shell, and always clean. No horse or vehicle of any kind is allowed to pass along them. The houses are of wood, painted white and green, and roofed with glazed tiles of different colours. The front doors and windows are never opened except on great occasions, such as a funeral, a wedding, or a christening. The interiors of the houses correspond to the exterior in order, cleanliness, and tidiness; but have more the appearance of large baby-houses than of the dwellings of men. The cow-houses here are curiosities in their way; they are washed out, walls and floors, several times a day; the cows' tails are fastened to hooks in the ceiling, lest they might by accident besmear their sides with them. *Broek* is six miles N. by E. from Amsterdam; it is famous for its sweet-milk cheeses.

Edam, a town of 4024 inhabitants, stands S.E. of the Beemster polders, and near the Zuider-zee, in which it has a good harbour. The export trade in sweet-milk cheese from this port is important; the chief industrial products are salt and fish oil.

Enkhuizen, situated on a peninsula in the Zuider-zee, 28 miles N. by E. from Amsterdam, is a well-built fortified town with 5449 inhabitants. It was formerly the centre of the great deep-sea herring fishery; 400 large vessels used annually to sail from its harbour, which is now nearly choked up with sand. The town possesses nine churches, an hospital, salt-refineries, and a cannon foundry; the town-house with its lofty tower is the most imposing structure. Its commerce is composed chiefly of cattle, butter, cheese, timber, and herrings.

Helder. [HELDER.]

Hilvessum, a small town 16 miles S.E. from Amsterdam, has 1350 inhabitants, who manufacture carpets and calicoes.

Hoorn, a city and fortified seaport, on the *Zuider-zee*, eastward of *Alkmaar*, with which it is connected by a canal, is well built, surrounded by ramparts, and has 10,000 inhabitants. The great fleet of Admiral De Ruyter was built in *Hoorn*. There is still an active trade, chiefly in exports of butter, cheese, provisions, and fish. The manufactures of woollen stuffs, carpets, &c., the shipbuilding and the herring fishery, though still important, are insignificant compared with their former magnitude. Schouten, who first doubled Cape Hoorn or Horn, in 1616, and named it after his native place; and Tasman, the discoverer of Van Diemen's Land and New Zealand, were born at *Hoorn*. The large nets used in the herring fishery were first constructed here.

Medenblik, N.W. of *Enkhuizen*, on the *Zuider-zee*, had formerly an extensive foreign commerce; it has now scarcely any foreign trade, and its population is only 2450. It contains a royal naval academy, and its chief commerce is in timber and cheese. The harbour is large and good.

Naarden, a fortress on the south shore of the *Zuider-zee*, 12 miles E. from *Amsterdam*, has 2620 inhabitants, who manufacture silk and velvet. It forms the key of all the water communication of Holland, and is important for the defence of *Amsterdam*, with which it is connected by a fine canal.

Zaandam (commonly corrupted into *Saardam*), a town of, in 1861, 11,968 inhabitants, on the north shore of the *Y*, and at the mouth of the *Zaan*, which divides it into *Oost-Zaandam* and *West-Zaandam*. The houses are mostly constructed of wood, and painted; each being surrounded by a small canal and completely insulated. From a distance, the town has a most singular appearance; it seems to consist of a line of windmills, some of which are of gigantic size and have houses attached to them, extending along the *Zaan*, and forming a street nearly five miles in length. The number of these mills is variously stated, but it seems to amount to about 700; they are applied to the various purposes of grinding corn, draining the land, sawing timber, making paper, grinding tobacco into snuff, crushing rapeseed to express the oil, grinding colours for the painter, grinding stones into sand for the floors of the Dutch housewife, and grinding the volcanic substance called *trass* into dust in order to form a cement, which hardens under water, and is much used in Holland. The town is often visited for the purpose of seeing the hut in which Peter the Great worked and slept during his short stay here to learn ship-building in 1696.

To North Holland belong the islands *Marken* and *Urk*, in the *Zuider-zee*; and *Wieringen* (20 miles in circumference; population, 1800); *Vlieland* (which consists chiefly of sand hills, and has 620 inhabitants); *Ter-schelling* (14 miles long by $2\frac{1}{2}$ broad; population, 2000, residing in four villages on the south coast, and engaged in fishing), and *Texel*, at the entrance of the *Zuider-zee*.

Texel is separated from the north of the province by the *Mars-diep*; it is 12 miles long, and 6 broad, and has 4920 inhabitants, mostly shepherds and fishermen. The island is famous for its breed of fine-woolled sheep. The northern part of the *Texel* was formerly a distinct island, but has been

joined to the southern part by a sandbank since 1629; it is called *Eierland* or Egg-land, from the great number of gulls' eggs found on it. A portion of the inhabitants are employed in boat-building, and as pilots. The western coast is sheltered by dykes, which were broken through, with great damage to the country, by a storm in February, 1825. The island contains a town and several villages. Off the *Texel*, on 31st July, 1653, the English fleet, under Monk, defeated the Dutch under Van Tromp, who was killed during the action. A lighthouse was erected on the northern island in 1864.

SOUTH HOLLAND has an area of 1176 square miles, and had in 1862, 642,688 inhabitants. It lies S. of the *Haarlem-meer*, and is traversed by the Old Rhine, the *Yssel*, the *Lech*, and by the large branches of the *Maas*, which form the islands of *Voorne*, *Overflackkee*, *Goeree*, *Putten*, *Beveland*, *Ysselmonde*, *Dordrecht*, and *Rozenburg*, W. of *Ysselmonde*. The chief towns are *DELFT*; *DORT*; *HAGUE*; *LEYDEN*; *ROTTERDAM*.

Briel or *Brielle*, a well-built and fortified town, situated on the *Maas*, and on the northern shore of the island of *Voorne*, has a large and commodious harbour, and 4504 inhabitants, many of whom are pilots and fishermen. The name literally signifies a pair of spectacles, and is applied figuratively to it, as the outlook of Holland. It is the birthplace of Admirals Van Tromp and De Witt.

Delftshaven, the port of *Delft*, stands on the right bank of the *Maas*, at the embouchure of the canal that leads to *Delft* and the *Hague*; it is a place of some trade, and has shipbuilding yards, and a population of 3000. Distilling and herring fishing are also carried on here. This town was the nucleus of the Dutch republic; its capture by William de la March, in 1572, having been the first important event in the struggle between Holland and Spain. There are still military magazines here.

Gorkum, a fortified town, on the right bank of the *Maas*, and traversed by the *Linge*, a feeder of the *Maas*, is well built, and has a good trade in horses, corn, fish, agricultural produce, &c. The population numbers 9000; many of them are engaged in the salmon and herring fisheries. A court of primary jurisdiction, a college, and some learned associations have been established in the town.

Gouda, N.E. of *Rotterdam*, on the right bank of the *Yssel* at the point where it is joined by the *Gouw*, is a large fortified town, with a population of 15,000. The town has five churches, hospitals, an orphan house, Latin school, and library, with curious MSS.; very extensive tobacco-pipe factories; brickworks, the clay for the supply of which is taken from the bed of the *Yssel*; rope-walks, gin-distilleries, and breweries. The most important buildings are the town-house and the church, dedicated to St. John, which is famous for its splendid painted windows; both these buildings stand in the great square, in which markets are held. *Gouda* numbers also among its industrial products tobacco, woollen cloth, cordage, and sail-cloth; it is famous as a cheese market.

Helvoetsluis, a small town of 2000 inhabitants, important for its fortifications, its harbour, and large naval dockyards, stands in the isle of *Voorne*, on the right bank of the *Haringvliet* branch of the *Maas*, which separates *Voorne* from *Overflackkee*.

The Prince of Orange sailed from this port for England, November 11, 1688.

Katwyk, N. of the Hague, is a small place famous for the canal and the stupendous dykes and flood-gates executed by the engineer Conrad for Louis Bonaparte in 1809, to assist the Rhine in its struggles to reach the sea.

Maaslandshuis or *Maasshuis*, stands W. of Rotterdam, at the extremity of the canal that enters the Maas opposite the isle of Rozenburg, and has 5000 inhabitants, many of whom are engaged in the herring and whale fisheries. Sailcloth, ropes, leather, and fish oil are the chief industrial products.

Ryswyk, a small village near the Hague, deserves mention as the place where the famous treaty of peace was signed in 1697 between England, France, Holland, Germany, and Spain. The site of the house in which this treaty was concluded is now marked by an obelisk. Population, 2630.

Scheveningen, or *s'Gravenhagen*, on the coast, 2½ miles N.W. of the Hague, is the rendezvous, in the bathing season, of the gay world of that city, to and from which, by a tramway formed by a company, omnibuses frequently ply during the day. The road is through a straight and magnificent avenue of oaks and limes. A favourite mode of visiting the Hague from Scheveningen is by boat on the canal, the banks of which are very picturesque and pleasing, although rather monotonous. The town, in 1861, contained 6100 inhabitants, a splendid bathing establishment, and several well-managed hotels replete with every comfort and convenience.

Schiedam, a well-built town and port, with a good harbour, near the outflow of the Schie into the Maas, has numerous churches, an exchange, a grammar-school, a chamber of commerce, and manufactures, glassworks, rope-walks, building-docks, white lead works, and upwards of 150 distilleries. Schiedam is the chief seat of the manufacture of Dutch gin, commonly called Geneva. The annual produce of that spirit is enormous, and many thousands of pigs are supported by the refuse of the malt used in its manufacture. The inhabitants, many of whom are engaged in the fisheries, in 1861 numbered 15,169.

Schoonhoven, formerly famous for its salmon fishery, stands in a marshy but well-cultivated district, E. of Rotterdam, on the right bank of the Leek, which here forms a good harbour, and receives the Vlist. The population, who manufacture paper and jewellery, numbers 2660.

Vlaardingen, the head quarters of the Dutch herring fishery, for which it fits out annually about seventy boats, stands on the right bank of the Maas. It is a pretty and a well-built town, with a population of 7700.

HOLLAND, NEW. [AUSTRALIA.]

HOLLAND, PHILEMON, was born at Chelmsford in 1551, and educated there and at Trinity College, Cambridge, of which he became a Fellow. Afterwards he was elected master of the Coventry free grammar-school. He is, to the best of our knowledge, the first English translator of Livy, Suetonius, and Plutarch's 'Morals,' and the only English translator of Pliny's 'Natural History,' and Ammianus Marcellinus. He also translated Xenophon's 'Cyropædia,' and Camden's 'Britannia.' In addition to all this, he found time to study and prac-

tise physic, and reached the age of eighty-five, with unclouded faculties.

HOLLAND, SIR NATHANIEL, was the third son of Dance, the architect of the Mansion House, and the younger brother of George Dance, R.A., the architect of Newgate.

Nathaniel Dance was the pupil of Hayman. He was one of the original members of the Royal Academy. He changed his name to Holland upon his acquisition of a baronetcy in 1800, having previously married Mrs. Dummer, who was possessed of entailed estates to the value of 18,000*l.* per annum. Upon his acquisition of his title, Sir Nathaniel Holland appears to have resigned his academical diploma, for from that time he exhibited as an honorary exhibitor. He represented for some time the borough of East Grinstead: he resided at Cranbury House, near Winchester, and he died suddenly in that city, October 15, 1811, aged about sixty-eight. All his best works are chiefly in private collections. Orpheus, and Garrick as Richard III., are two of his best efforts.

HOLLAND, HENRY, held a high rank among the architects of his own time, and was greatly patronized by George IV. when prince of Wales. But we have no information as to his personal history. His finest work was the portico of Carlton House. The Pavilion at Brighton was built by him, but was transformed into its present shape by Nash. Drury-Lane Theatre, which was burnt down in February 1809, was erected by Holland, and he was also the architect of the India House. He died at his house in Hans Place, June 17, 1806, aged about sixty.

HOLLAND, HENRY RICHARD VASSAL FOX, LORD, was the only son of Stephen, second Lord Holland. His mother was Mary, daughter of John Fitzpatrick, first earl of Upper Ossory. He was born at Winterslow House, Wilts, November 21, 1773. He succeeded to the peerage when he was little more than a twelvemonth old. He was educated at Eton, and at Christ Church, Oxford, where he took the honorary degree of M.A., in right of his rank, in June, 1792.

It was in the course of a continental tour, that at Florence, in the beginning of the year 1795, he first met Lady Webster, the wife of Sir Godfrey Webster, with whom he returned to England in June 1796, and whom he married the next year, after she had been divorced from her first husband, who obtained 6000*l.* damages in an action against Lord Holland. After his marriage with Lady Webster, Lord Holland assumed, by sign-manual, her family name of Vassal, which, however, has been laid aside by his children.

He now took his place in the House of Lords. His first speech was made on the 9th of January, 1798. From this date Lord Holland took a frequent part in the debates for the next four years, being all this time one of the steadiest opponents of the administration, and seconding in the Upper House the principal efforts of his uncle Charles James Fox in the Commons.

On August 28, 1806, Lord Holland and Lord Auckland were appointed joint-commissioners for arranging the several matters in discussion between this country and the United States, with Mr. Munro and Mr. Pinckney, the United States' commissioners; and on the 27th of the same month he was sworn of

the privy council. An arrangement of the differences with America was effected after a long negotiation, but Mr. Jefferson refused his ratification, and it came to nothing. On October 15, after the death of Mr. Fox, Lord Holland was appointed lord privy seal; and he held that office for the six months longer that the Grenville ministry lasted.

In 1806, Lord Holland published 'Some Account of the 'Life and Writings of Lope Felix de Vega Carpio,' and followed it up next year with 'Three Comedies from the Spanish,' and in 1808 he edited and introduced by a preface Mr. Fox's fragment entitled 'A History of the early part of the Reign of James the Second.'

On the accession of the Whigs to power in November, 1830, he became once more a cabinet minister as chancellor of the duchy of Lancaster; and this office he held (with the exception of the ministerial interregnum of a fortnight in May, 1832, and Sir Robert Peel's four months' tenure of power from December 1834 to April 1835) till his death at Holland House on the 22nd of October, 1840. He was succeeded by his son.

HOLLAR, WENCESLAUS, was born at Prague, in Bohemia, in 1607. He was first intended for the profession of the law, but abandoned it for art. He was only eighteen when his first specimens appeared. These were a print of the 'Ecce Homo,' and another of the Virgin, with a Virgin and a Christ after Albert Dürer, with Greek verses at the bottom of the plate, executed in 1625. He removed from Prague in 1627. His views along the Rhine, the Danube, and the Neckar gained him his greatest reputation. In 1636, Howard, earl of Arundel, met with Hollar when proceeding on his embassy to Ferdinand II., and took him into his retinue. Hollar attended him to the emperor's court, and made several drawings and prints of the places through which they travelled. Lord Arundel brought Hollar to England, where he painted portraits of the royal family, and executed other subjects, of which his view of Greenwich, dated 1637, was one of the first. On the breaking out of the civil war, he experienced some vicissitudes of fortune, but eventually joined Lord Arundel at Antwerp, where he remained for several years. In 1652 he returned to England, and worked incessantly till the time of his death. The plates by him in the first and second volumes of the old edition of Dugdale's 'Monasticon,' in Dugdale's 'History of St. Paul's,' and in his 'Survey of Warwickshire,' sufficiently prove his industry. He died in London, March 28, 1677. His works, according to Vertue's catalogue of them, amount to nearly 2400 prints.

HOLLY. [LEX.]

HOLLYHOCK. [ALTHEA.]

HOLMAN, JAMES, a lieutenant in the navy, and generally known as the Blind Traveller, was born in 1787. He had the misfortune to lose his sight at the age of twenty-five, and in 1812 was appointed one of the naval knights of Windsor. When he had become accustomed to the deprivation of sight, he determined, for the purpose of amusing his mind, to undertake a journey through Europe. Accordingly he undertook a tour in 1819-21 through France, Italy, Savoy, Switzerland, and various parts of northern Germany. His travels were published, and found replete with many amusing incidents and

observations. In 1822 he undertook a voyage to St. Petersburg, and thence proceeded to Moscow, Novgorod, and Irkutsk in Siberia; but here he received an imperative order from the emperor, by which he was obliged to return. He afterwards undertook a series of voyages and travels round the world, comprehending Africa, Asia, Australia, America, &c., which were subsequently published. From South America he crossed to the Cape of Good Hope, and visited in succession Madagascar, Ceylon, Hindustan, New South Wales, Van Diemen's Land, and New Zealand. In 1843 he went to the Adriatic, and there visited Bosnia, Servia, Dalmatia, Montenegro, and other places. His series of voyages and travels excited much interest when published; but they can never be considered as reliable authorities. He died in 1857.

HOLMSUND, a small port in the Baltic belonging to Sweden.

HOLOCANTHUS (Gr. *holos*, 'entire,' and *acantha*, 'a spine,'), a genus of fishes, of the family *Chaetodonidae*, in which the pectoral and ventral fins are pointed, and the operculum armed with a strong spine at its lower angle.

HOLOCAUST (Gr. *ὅλος* 'the whole,' and *καυστός*, 'burnt'), among the classical ancients, a religious sacrifice, in which the whole instead of a portion of the victim was burnt as an offering to the gods. The custom was not dissimilar to the burnt-offering of the ancient Jews, which consisted of a bullock without blemish brought to the tabernacle of the congregation. But at the Feast of Tabernacles, during the eight days' festival, the Jews offered seventy bullocks, &c.

HOLOCENTRINÆ (Gr. *holos*, 'entire,' and *centron*, 'a spur'), a family of the *Percidæ* or *Perches*, in which the bodies are covered with sharp rough scales, or thorn-like plates, and the head is very spiny.

HOLOGRAPH, a deed or testament written wholly by the testator's own hand. By the law of England it does not matter whose penmanship is used in the making of a will or deed, provided the document be properly signed and attested; but in Scotland there is a distinction made between holograph and other deeds. For instance, no witnesses are required to attest holograph deeds or testaments. If the handwriting is disputed, evidence must be given as to whose it is.

HOLOLEPTA (Gr. *holos*, 'whole,' and *leptos*, 'thin'), a genus of coleopterous insects, of the family *Clavicornes*.

HOLOPTYCHUS (Gr. *holos*, 'whole,' and *ptyx*, 'a fold'), a genus of fossil ganoid fishes found in the coal formation. The scales of this singular animal resemble those of reptiles, and present a wrinkled appearance. 'There is nearly a perfect specimen,' says Professor Ansted, 'measuring as much as thirty inches long without the tail, and the proportions are singularly massive. The head is small; but the unclothed jaws, covered with hard enamel instead of skin, are lined with a double row of teeth; the outer range thickly set, and fringing the enamelled edge of the mouth; the inner ones wider apart, and more than twenty times as large.'

HOLOSTEUM, a genus of plants belonging to the natural order *Caryophyllææ*, and the sub-order

Alsineæ. The species of this genus are herbs with nothing to recommend them for use or cultivation. One species, *H. umbellatum*, is British. It is not a common plant, but has been found on old walls and dry places at Norwich, Bury St. Edmund's, Eye, and Yarmouth.

HOLOTHURIA (*Holothuria Family*), a race of marine animals whose particular organization is not yet fully elaborated. Cuvier places the *Holothuria* under his *Echinodermes Pédicellés*, and M. De Blainville assigns them a situation within the pale of his *Echinodermata*.

For a sketch of the anatomy of these singular beings see Cuvier ('Règne Animal,' vol. iii. p. 238). The *Holothuria* are divided into many genera very indefinitely determined.

According to M. Delle Chiaje, certain species of *Holothuria* are eaten by the poor inhabitants of the Neapolitan coast; but the Chinese regard these Sea Cucumbers, as they are called from their shape, as delicacies. Whole fleets of Malay proas visit the south coast of Australia, the north coast of Ceylon, and the west coast of New Guinea, for the purpose of procuring and salting these sluglike animals. The cargo is generally carried to Timor or Macassar, and sold to the Chinese, who meet the vessels on their return from their fishing. These animals are known under the name of Tripang and Biche de Mer. In the market of Macassar, the great staple of this fishery, not less than thirty varieties are distinguished, varying greatly in price, according to the estimation in which they are held. The ordinary size of the slug is about a span in length and two or three inches in girth, but some specimens reach nearly two feet in length and seven or eight inches in circumference.

HOLSTEIN. [SCHLESWIG and HOLSTEIN.]

HOLSTENIUS, the Latinized name of L. HOLSTE, born at Hamburg in 1595, became one of the first scholars of his time. At Paris he embraced the Roman Catholic religion. He accompanied Cardinal Barberini, the nephew of Urban VIII., to Rome in 1627. From that time he lived in the cardinal's house, was made canon of St. Peter's, and lastly librarian of the Vatican. He was sent on several missions to Germany, among others to Innspruck, to receive the abjuration of Queen Christina of Sweden. Holstenius died at Rome in February, 1661. He had collected a vast quantity of scarce books and MSS., and he left many works of his own in an unfinished state. His published works are numerous, and some of them are valuable.

HOLSWORTHY. [DEVONSHIRE.]

HOLT. [DENBIGHSHIRE.]

HOLT, SIR JOHN, lord-chief-justice of the King's Bench, was the eldest son of Sir Thomas Holt, Knt., a bencher of Gray's Inn, and a gentleman of property in Oxfordshire. Sir John was born at Thame in Oxfordshire, December 30, 1642, and was in his sixteenth year entered as a gentleman commoner at Oriel College, Oxford. His college life appears to have been unusually wild and licentious. In 1652, before he was ten years old, he had been entered upon the books of the Society of Gray's Inn, and on the 27th February, 1663, was called to the bar, and rose rapidly into notice as a first-rate lawyer and successful advocate. He was employed in most of

the state trials which the troubled times in which he lived produced, and was generally counsel on behalf of the accused. His opposition to the measures of the court brought upon him the vengeance of James II., who procured his removal from the recordership of London. Shortly after the accession of William III. (April, 1689), Sir John Holt was made lord-chief-justice of the King's Bench, in which situation he continued during the remainder of his life, although the chancellorship was offered to him on the removal of Lord Somers in 1700. Sir John Holt died in March, 1709-10, leaving behind him a high reputation for learning, honour, and integrity.

HOLY ALLIANCE, a league formed among certain of the principal sovereigns of Europe, after the defeat of Napoleon at Waterloo, on the proposal, it is said, of the Emperor Alexander of Russia. It arose from the religious feeling then prevalent of deliverance from French domination, which was considered as a consequence of the French Revolution, and Napoleon as an incarnation of evil. The act of this Alliance is reported to have been sent by Alexander, in his own handwriting, to the emperor of Austria and the king of Prussia, and signed by them. It consisted of a declaration, that in accordance with the precepts of the gospel, the principles of justice, charity, and peace should be the basis of their internal administration and of their international relations, and that the happiness and religious welfare of their subjects should be their great object. All the European sovereigns finally became members of the Holy Alliance, and it soon transpired that this Alliance was connected with the determination of those sovereigns to support existing governments throughout Europe by the declaration of November, 1819, and to check the liberal spirit then breaking out all over the continent. Afterwards, the congresses of Troppau, Laybach, and Verona established the character of the Alliance, to which the war of France, or rather of the Bourbons, against Spain in 1823 gave additional illustration. Since the secession of England and France, the Alliance can scarcely be said to have any active existence.

HOLY COAT OF TREVES, a garment, the pretended seamless coat of our Saviour, which is carefully preserved in the cathedral of Treves. It is supposed to have been discovered in the fourth century, and afterwards concealed till 1196, in which year, and again in 1512, it was publicly exhibited. It has been shown as recently as 1810 and 1844, when multitudes flocked to see it, and to take part in the religious festival of which it was made the occasion.

HOLY ISLAND. [DURHAM.]

HOLY LAND. [PALESTINE.]

HOLY OFFICE. [INQUISITION, THE.]

HOLY ORDERS. [ORDINATION.]

HOLY PLACES and **SEPULCHRE.** [JERUSALEM.]

HOLY WATER is water blessed by a bishop or priest for certain religious uses in the Roman Catholic, Greek, Russian, and Oriental Churches, but regarded by Protestants as unscriptural and superstitious. By the ancient Jewish law, the hands and face had to be sprinkled with water before entering the sanctuary, and the practice was retained in the early Christian church. The use of holy water is

regarded as symbolic of the purity that should reign within, and is believed to derive a special fitness for this purpose from its blessing by the priest.

HOLY WEEK, called also Passion Week, is the week before Easter, commencing on Palm Sunday, and comprising Holy Thursday, Good Friday, and Holy Saturday. It is commemorative of the passion of Jesus Christ during the week previous to his resurrection. Many Protestants observe only the Friday [GOOD FRIDAY] as a solemn day; but in the Roman Catholic Church the whole week is made one of great solemnity and fasting. They, however, call this Holy Week, and the preceding one Passion Week. Holy Week is not observed by Presbyterians.

HOLYHEAD. [MENAI STRAIT.]

HOLYHEAD ISLAND, a small island of North Wales, on the western side of Anglesea, from which it is separated by a sandy strait, fordable at low water. Its greatest length is seven, and its breadth three and a half miles. It has an area of 7000 acres, and a population of 8868. The island has some good pasture and arable land, but is mostly rocky and barren; the northern coast especially being very wild, and marked with precipices and caverns haunted by innumerable sea-fowl, while the falcon eagle soars over the highest crags. On the north-west coast are two islets, named respectively North and South Stack, on which there are lighthouses, with revolving lights visible 20 miles distant. South Stack is connected with Holyhead Island by a suspension bridge. *Holyhead*, a seaport and market town, is situated on the island of Holyhead, and is 270 miles north-west of London, with which it is in direct communication by railway. It is the government steam-packet station for Dublin, from which it is distant about 70 miles. At great national cost the harbour has been improved, and by the construction of a huge pier or breakwater, 900 feet long, the exposed bay has been converted into a secure roadstead, available for vessels of the largest class, in all winds, and at all states of the tide. The harbour of refuge just (1866) completed, incloses an area of more than 300 acres, with a depth of six fathoms. The population of Holyhead in 1861 was 6190, chiefly employed in the coasting trade, in shipbuilding, and rope-making. The town unites with Amlwch, Beaumaris, and Llangefin in sending a member to the House of Commons.

HOLYROOD, on the eastern side of Edinburgh, was anciently the residence of the Scottish sovereigns, and the scene of many tragical events connected with their history. Its site is a small plain or valley between the Calton Hill, a rounded summit rising 355 feet above the sea level, and the majestic Arthur's Seat, rising to the height of 822 feet, one of the most delightful resorts in the vicinity of Edinburgh. It was an abbey, founded by King David I. of Scotland in 1128, and dedicated in honour of the Holy Cross or Rood brought from Jerusalem by St. Margaret in 1070, which became one of the heirlooms of Scotland. The abbey was burned by the English in 1385, in 1544, and in 1547. It was made a chapel-royal in 1672. During the revolution of 1688 it was plundered and partially burned, and remained in a dilapidated state till 1758, when it was repaired and roofed.

In the year 1295 a Parliament was held in the

abbey by John Balliol. James II. was born in it, and made it his home. James IV. laid the foundations of a palace in addition to the abbey, and Holyrood became the chief seat of the Scottish sovereigns. Queen Mary resided here, and it was in this palace, in 1566, that Rizzio was murdered. James VI. was born and lived in it until his accession to the throne of England, and visited it afterwards. Charles II. rebuilt it, and various royal personages occupied it till 1822, when George IV. held his court there, and it has been repeatedly visited by her majesty Queen Victoria.

The precincts of Holyrood are a sanctuary for Scotch debtors, where they may avoid imprisonment by residing within them. A certificate of protection is given by an official within twenty-four hours of the debtor taking refuge. The practice is considered somewhat disreputable, and is not resorted to so much as formerly.

The castle of Holyrood contains the crown and regalia of Scotland, an armoury, and barracks.

HOLYWELL. [FLINTSHIRE.]

HOLZER, JOHANN, a fresco painter, was born at Burgeis, in the Tyrol, in 1709. His father was miller to the Benedictine convent of Marienberg, and Holzer was first instructed by N. Auer, at Meran in the Tyrol. He made here such progress, that at the age of eighteen he was invited by the painter J. A. Merz to Straubing in Bavaria, to assist him in some frescoes in the convent church of Oberalteich. From Straubing Holzer went to Augsburg, where he lived six years in the house of the painter J. G. Bergmiller. Holzer painted many excellent frescoes upon the exteriors of houses in Augsburg, but few, if any, now remain; there is, however, a collection of twenty-eight prints after them by J. E. Nilson, entitled 'Picturæ a Fresco in ædibus Augustæ Vind., a J. Holzer,' &c. Holzer's greatest works are the frescoes of the convent church of Schwarzach near Würzburg. They are now in a dilapidated condition. Holzer died of a fever at Clemenswerth, in July, 1740, at the age of thirty.

HOLZMINDEN. [BRUNSWICK.]

HOMAGE, an incident of tenure which is now abolished by 12 Car. II. c. 21. The word is derived from *homo*, because when the tenant did his service to the lord, he said, 'I become your man,' &c. (Litt. s. 85.) The copyholders, or tenants who attend to do their duty in a court baron, are called the *homage*.

HOMALIA'CEÆ, a small natural order of shrubby exogenous plants with polypetalous flowers. The species chiefly inhabit tropical countries; they have small starry flowers, and are of no known utility. Brown considers them nearly related to *Passifloraceæ*.

HOMARUS. M. Milne-Edwards separates the true marine lobsters from the fluviatile craw-fishes under the title of *Homarus*, reserving to the latter the title of *Astacus*. He regards the genera *Astacus*, *Homarus*, and *Nephrops* as constituting the family of the Astacians. [ASTACUS.] Fossil impressions of Astacians have been described by various writers.

HOMBURG. [HESSE-HOMBURG.]

HOME, or HUME, JOHN, was born in Scotland about the year 1722, and is supposed to have been a relation of David Hume. He was bred to the ministry of the Church of Scotland, and settled in

the parish of Athelstaneford, where he produced his tragedy of 'Douglas,' which was acted at Edinburgh with the most unbounded applause. Four other tragedies followed, but they have been long since forgotten. Home died in 1808.

HOMER (in Greek, *Homéros*), the supposed author of the earliest Greek heroic poems extant, and of some hymns in praise of different gods. Opinions the most various have been held regarding his birthplace, his age, his station, and the circumstances of his life. The author or authors of the 'Iliad' appear from the work to have been accurately acquainted with the geography of Greece and the northern part of the Archipelago; and it has been inferred that Homer was a wandering minstrel. The existence of such wandering minstrels seems to be shown by the Hymn to Apollo, quoted by Thucydides; as the notices of Phemius and Demódocus, in the Homeric poems, prove the existence of bards attached to particular courts.

The poems attributed to Homer are the *Iliad* and the *Odyssey*, to which some have added the Homeric Hymns. Of these poems, the *Iliad* stands first, as the oldest and at the same time the completest specimen of a national heroic poem. The subject is the revenge which Achilles took on Agamemnon for depriving him of his mistress Briseis, during the siege of Troy, and the consequent evils which befell the Greeks. It is divided into twenty-four rhapsodies or books, which detail the history of the besieging force during the period of Achilles' anger, and end with the death of Hector (who is slain by Achilles in retaliation for Hector's having killed Patroclus), and the solemn burial of the Trojan warrior. Heroic poetry, as a simple form of art, does not imply the development of a plot, but rather the extraction of a certain portion from the poetical annals of a nation, beginning and ending just where the subject may seem to suggest, but not necessarily ending with a regular disengagement of a plot regularly worked up and studiously combined from the beginning of the poem. Whether what we now possess be the exact poem which thus forms the beginning of all Greek literature, is scarcely doubtful. The lapse of so many ages can hardly have failed to have introduced some passages, and to have altered and removed others.

The *Odyssey* can hardly be called a national epic. It is much nearer the romance of chivalry than any other ancient work now in existence. It contains the account of those adventures which Ulysses (*Odysseus*) encountered on his way home from Troy, and in its present state consists of twenty-four books, which division is said to be owing to the grammarians in the time of the Ptolemies. There is little doubt that much has been interpolated in the account of Ulysses' visit to the shades, and Aristophanes and Aristarchus the grammarians considered the latter part of the 23rd and all the 24th book spurious. A characteristic of the *Odyssey* to which we have just alluded, is its romantic look, using romantic as opposed to classical. There is something quite northern in the adventures of Ulysses; they might have happened to a knight of Arthur's court, or perhaps still better to Beowulf. The Sirens would be singing maidens, who decoy travellers by their strains; the nymph Calypso would find an antitype in some

enchantress. Ulysses slays the suitors much in the way of William of Clonsdesley in the old ballad.

The difference in the character of the *Iliad* and *Odyssey* might lead us to the conclusion that these poems are not the product of the same mind. Other differences, however, of less importance have been pointed out by the critics. How far either poem can claim a single author is a still more difficult question. There is an historical fact which has been adduced in support of one side of this question, namely, the existence of a race of men called Rhapsodists, or *Homeridæ*, who imitated Homer, enlarged upon him, and interpolated his poems with verses of their own (Hermann, 'Preface to Homer's Hymns,' p. 7); treating him very much as the Bible was treated by one school of the early Mystery-mongers. Now those who deny the unity of the *Iliad* assert that these Rhapsodists manufactured it among themselves, until it gradually assumed that form in which Pisistratus finally established it, and in which we now have it. Whatever truth there may be in this opinion or any other as to the Homeric poems, we must admit that many lines and even whole passages may be interpolations. The Hymns, Epigrams, and the 'Battle of the Frogs and Mice,' make up the sum of the Homeric poems, genuine and spurious. The earliest mention made of Homer is by Pindar. Herodotus and Thucydides quote and refer to him; and by Plato he is constantly either hinted at or transcribed.

The principal modern editions of Homer are those by Clarke, Payne Knight, and Mr. Gladstone, in this country (the second having the digammas inserted in what the editor supposes to be their proper places), and abroad, Heyne, Hermann, and Nitzsch, for the *Iliad*, Hymns, and *Odyssey* respectively. Of translations, we have Hobbes, Chapman, Pope, Cowper, Sotheby, Worsley, and Lord Derby. Although the *Odyssey* of Worsley (Blackwood, 1861), has received special marks of public approbation, perhaps, on the whole, Lord Derby's is the best. The German translation by Voss is wonderful as regards accuracy. It is in hexameters, and preserves every sentence, and nearly every word. In Italian the translations of Cesarotti and Monti, and in French that of Montbel, are the best known. (See Plate 'Homer.')

HOMESTEAD. There is in most districts of the country a great difference between what is required as farm buildings by the intelligent farmer, and what is supplied to him by the landowner. Every writer on agriculture has described what is wanted, but it is only here and there that specimens are found which come up to their ideal. The cost of good buildings is well repaid by the increased annual value of the estate. Shelter for live stock, and safety for produce, and for both cattle and implements, are always worth paying for. The tendency at present is to do away with barns, and to cover a given space of ground with shedding, dividing it out into yards, stalls, or boxes, according to convenience; but it is still necessary to make a careful selection of the position, aspect, accommodation, and supply of water for the homestead buildings. The following description of the Englefield farmery in Berkshire will give an idea of the modern first-class homestead. The buildings are centrally placed. They consist, first, of a block about 50 feet by 100 feet, covered in by a double span roof, under which are forty-two

boxes—six single rows of seven each—the rows being separated alternately by three narrow gangways for feeding, and two wider gangways for carts entering to remove the dung. Each box has a manger for roots and hay, and a trough for water. Another block of buildings of the same length includes thrashing machines, granary, root house, chaff house, steam house, and steam power (a fixed 10-horse engine, consuming eight cwt. of coal a day, and worked on an average three days a week). Between the two the space is roofed over and occupied as a straw house. The steam power is conveyed by a strap to a longitudinal shaft up stairs, from which straps on pulleys carry it to the thrashing machine, turnip-cutter, two pairs of millstones, two chaff-cutters, cake-crusher, and corn-bruiser. The steam power is used to cut the roots for two days' supply, by means of Samuelson's largest Banbury cutter, to cut hay chaff at the rate of five tons a day, and to crush oats and crack beans—all at one and the same time.

On the south side of this block of cattle boxes is a shed for implements. On the west side is a range of stables, lofty and airy, with no particular nicety, but great convenience of internal arrangement, and on the other side, as a lean-to, are shedding and yards for the calves, of which fifty or sixty are kept in three divisions, provided with racks for straw and mangers for the roots, chaff, and cake. North of the thrashing machinery and barns are six long rows of open roofing for storing away the corn. The implement shed, barns, straw house, granaries, and corn shed thus succeed one another as you go northwards. East of this range are nag stalls, slaughter houses, poultry house, cow byre, &c., on two sides of a square, thus sheltering a yard for cows and calves from the north and east, and lying alongside of the cattle boxes, and another square of pigsties and yards lying alongside of the granaries and thrashing machinery. The corresponding space eastward of the rows of corn sheds is occupied by sheds and yards for cows when required. The buildings were planned by Mr. Benyon, M.P., on whose farm they are, and erected by the workmen of the estate at a cost of about 3000*l*.

HOMICIDE. [MURDER.]

HOMILY (ὁμιλία), in ecclesiastical matters, is a familiar discourse on a religious subject. In the earliest ages of the church the words *sermon* (λόγος) and homily appear to have been used indifferently.

All the homilies of the Greek and Latin fathers were composed by bishops, for before the fifth century none but bishops were allowed to preach. In modern use the term 'homily' is applied to a discourse read out of a book, and not composed by the preacher. At the period of the Reformation in England two books of homilies were published by authority, in order to insure uniformity of doctrine in the Church of England. The first book, ascribed to Cranmer, appeared in 1547; the latter, said to be by Jewell, in 1563. They were originally meant to be read, in default of regular sermons, in such remote or poor localities as had no regular clergyman, and to avoid heterodoxy.

HOMŒOPATHY (a Greek word, ὁμοιοπάθεια, literally 'similar or like state of feeling'), a mode of treating diseases, founded on peculiar doctrines, which were first proposed in 1796 by Samuel Hahnemann,

a German physician. [HAHNEMANN.] The homœopathic method consists in the administration of a medicine which is capable of exciting in healthy persons effects closely similar to the symptoms of the disease which it is desired to cure.

This system of medicine stands in direct contradistinction to that founded upon the principle of treating diseases by their opposites, *contraria contrariis curantur*, which has served more or less as a guiding law since the time of Galen. To this last method the homœopaths have given the name Allopathy, from two Greek words signifying 'other suffering.' The arguments adduced in support of the truth of the homœopathic law seem to be principally drawn from the three following sources:—

1st. Popular experience, it is said, has proved that the safest manner of restoring the circulation of a frozen limb is to rub it with snow (*similia similibus curantur*). Warm applications, according to the evidences of the same experience, would cause the destruction of the part affected.

Again, severe burns are most quickly cured by the use of heated spirits of wine or oil of turpentine, which excite a very similar sensation, although in a greatly modified degree. Cold applications, although they give temporary relief, are, as is well known, generally followed by increased inflammation and severe after-suffering.

The homœopaths also insist that the acknowledged efficacy of Jenner's great discovery is a powerful argument in favour of the truth of the homœopathic law, since by producing a similar disease an almost perfect immunity from attacks of the small-pox is obtained. The same principle is exhibited in morals—'Weep with them that weep, and rejoice with them that rejoice.'

2ndly. The homœopaths endeavour to show by a number of observations collected from the works of different medical authors, that many drugs recorded by these authors as curative in different forms of disease, were observed by others to produce effects closely resembling the symptoms of those very forms of disease, or that they acted upon the principle *similia similibus*.

3rdly. Hahnemann, it is said, was first struck with the close analogy between the effects produced by Peruvian bark and the symptoms of that form of ague for which it was considered a specific. He having obtained similar results in connection with other medicines tried upon his own person, was led to the discovery of the homœopathic law; and he, believing that the mode of operation of all remedial agents was in perfect harmony with this principle, by repeated experiments upon himself and some medical friends converted to his opinions, first determined their direct action and then employed them in disease. The practical results obtained by him and the physicians of his school are appealed to by them as a further confirmation of the truth of their fundamental law; and it is well to note that Hahnemann taught a view almost as important as that embodied in his law—the view that it is possible to learn the *pure* effects of medicines only by trying the medicines on the healthy.

The extremely minute quantities in which the remedies are administered seem to form a marked difference between the homœopathic and all other

schools of medicine. The homœopaths, however, assert that this is merely a point of practice to be determined by the physician at the bedside of his patient, and that, in the application of the homœopathic principle to the treatment of disease, it was soon found that remedial agents, given in the doses usually employed, acted too energetically upon a frame already predisposed to their influence by the affinity existing between their medicinal effects and the morbid signs of the disease; and hence a gradual diminution was made in the quantity of the medicine exhibited, in order to approximate to that amount which might exert its full curative power without aggravating the sufferings of the patient by an excess of medicinal action. The result has been the general adoption among homœopaths of the minute dose at present in use, which perhaps more than any other single cause, from its discrepancy with generally received opinions, has prevented any impartial investigation into the principles of the system by the profession at large. Hahnemann, however, taught that the efficacy of these medicines in these infinitesimal quantities rested, first, on the application being in accordance with the homœopathic law; and second, because the powers of the medicines are developed (Hahnemann termed it *dynamized*) by the process of preparation—a process which Hahnemann invented. Indeed, the whole has been well summed up in the following statement, which the editor of *Household Words* inserted:—We have never been subjects of the homœopathic mode of treatment, nor have we ever been concerned in making others so. But as we desire to state the homœopathic doctrine fairly, like all other doctrines to which we make any reference, and as it has been suggested to us that we may have scarcely done so in a passing allusion to it at page 592 of the last volume of this journal, we will here reprint the following extract from a work in explanation of homœopathic principles by Dr. Epps:—‘It is not maintained that a millionth part of a grain or of a drop (to take a given though a large quantity in homœopathic administration), will produce any visible action on the man in health; nor is it maintained that a millionth part of a grain or of a drop will act on the man in disease; but it is maintained that the millionth part of a grain or of a drop will act on the man in disease, if between the diseased state of the man and the medicine, infinitesimally administered, there is a homœopathic relationship. In other words, the homœopaths do not vaguely say that medicines in infinitesimal doses cure diseases; but they do say that medicines given for the cure of diseases to which they are homœopathic, do cure these diseases when administered in infinitesimal quantities: to repeat, the homœopathist, in maintaining the efficacy of medicines in infinitesimal quantities, regards three requirements as necessary:—First, the development of virtues in medicines by the process of preparation; second, the increased receptivity to impression produced by disease; and third, the selection of the right remedy.’—(‘Homœopathy and its Principles Explained,’ by John Epps, M.D.)

It now numbers in its ranks some medical men who had obtained high repute and professional eminence in the other systems before they embraced the principles of homœopathy, and seems to be

more or less diffused in all parts of the world. In America there are upwards of 2000 avowed practitioners of the system, and about 300 in Great Britain. The great bulk of the medical profession in England are, however, more or less opposed to its adoption, owing in a great measure to the fact, that with increased knowledge of disease and the action of medicines, there has been a tendency to discard all general theories with regard to both.

HOMOGENEOUS, HETEROGENEOUS, are terms applied in mathematical language to expressions which have or have not the same number of factors of a given sort in each term. Thus, with respect to x and y , $ax^2 + by + cx^2$ is homogeneous, but $ax^2 + by$ is heterogeneous.

HOMOLA, *Homola Tribe*. The Homolians, according to the system of M. Milne-Edwards, constitute a group of the anomurous crustaceans, including the genera *Homola*, *Lithodes*, and *Lomis*; genera which he regards as closely related to each other, although previous naturalists had placed them widely asunder. Of the habits and manners of these small crustaceans nothing is known.

HOMOLOGOUS, a term applied in Euclid to those magnitudes which, being of the same kind, occupy different places in a proportion, one being an extreme, and the other a mean.

HOMOLOGY (Anatomy), a term derived from the Greek, *homos*, ‘like,’ and *logos*, ‘a discourse.’ It is often popularly used as if it were the same as *analogy*. But this is not correct. Homology is the relation between organs or parts of the body which are constructed on the same plan, however much they may vary in form, or serve for different uses. Thus, there is a homology between the arm of man, the fore legs of the horse, the wings of birds, and the pectoral fins of the cod, because, though used for different ends, they are constructed on the same plan—but there is no analogy. On the other hand, there is an analogy between the wings of the butterfly and those of birds, because both serve for flight.

HOMOLONOTUS, the name of a group of Trilobites, in which the tripartite character of the dorsal crust is almost lost; for which reason Mr. Miller called it Monolobite. *Homolonotus Knightii* occurs in the Upper Silurian rocks of England, and a similar species at the Cape of Good Hope.

HOMOIOUSIAN and HOMOIOUSIAN. It is scarcely possible to exaggerate the importance which was attached to the difference of the above words in the early church, although, as will be seen, it consists only of a single letter. The first signifies ‘the same substance,’ and the second ‘like substance.’ The former was the watchword of orthodoxy in the celebrated Arian controversy and at the Council of Nice, which declared the Son to be of the same substance as the Father. The Arians, on the other hand, held the subordination of the Son, and proposed to substitute *homoiousian*, i.e., a similar but not identical substance. The words distracted the church for many years.

HOMOPTERA, one of the sections into which the class *Insecta* is divided. According to Leach, Stephens, and some other authors, the section *Homoptera* is regarded as an order; but in Latreille’s arrangement it forms the second of the two great sections into which the order *Hemiptera* is divided.

The insects of this group are thus characterized by Latreille:—Rostrum arising from the lowest part of the head near the chest; the elytra, almost always tectiform, are of the same consistence throughout, semi-membranous, and sometimes resembling the wings; the three segments of the thorax are blended, and the first is often shorter than the following.

In the typical *Homoptera* the head is large, broader than long; the eyes are large, and there are ocelli, or simple eyes, between them; the antennæ are minute, composed of but few joints, and terminated by a seta; the rostrum is a slender-jointed process, which, like that of the Hemiptera, lies close to the chest; the legs are of moderate size; the hinder tibiæ are usually spined; the body is convex above and flattish beneath; the wings are semi-membranous, the anterior pair often opaque, sometimes transparent, and always of a uniform texture throughout. The larvæ are active and resemble the perfect insect, excepting that they possess no wings; the pupæ are also active, but possess rudimentary wings.

These insects feed upon vegetable juices. The females are furnished with an ovipositor, composed of three denticulated blade-like processes, which are lodged in a groove in the abdomen. By means of this ovipositor they pierce holes in vegetables, in which they deposit their eggs. Many homopterous insects possess the power of leaping by means of their posterior pair of legs.

The section or order *Homoptera* may be divided into the following families, most of which are analogous to Linnæan genera, or nearly so.

1, *Cicadidæ* (Leach); 2, *Fulgoridæ* (Stephens); 3, *Cercopidæ* (Leach); 4, *Psyllidæ* (Stephens); 5, *Thripidæ* (Stephens); 6, *Aphidæ* (Leach); 7, *Coccidæ* (Leach). The first two families constitute the section *Cicadariæ* of the 'Règne Animal.' [FULGORA.] The other references are *CICADELLA*, *APHIS*, *GALLINSECTA*.

HONAN, an island province of China, mostly between lat. 32° and 37° North, and long 110° to 116° East. The area is stated to be 65,104 square miles, and the population 29,669,771. Its northern part is intersected by the Hoang-ho, and all its streams are affluents of that river. It is considered the most fertile and salubrious province in China, and was the seat of government for many centuries, when it was named Chung-wha, or *Central Flower*, and hence the title of 'Central Flowery Land' applied to the whole country.

HONAWAR, a seaport town of British India, in the presidency of Madras, 200 miles N.W. of Seringapatam, containing a population of about 12,000. It is the chief of a subdivision, and is a civil and detachment station. Hyder Ali here formed a dock for building ships of war, some of which were destroyed by the British in 1798. The place stands on the north side of an extensive inlet of the sea, or salt water lake, 3 miles broad, and 7 long, which contains several islands.

HONDEKOETER, the name of a celebrated family of Dutch painters, whose founder, Egidius Hondekoeter, born at Utrecht in 1583, was the son of a marquis of Westerloo, a wealthy landowner in Brazil. He painted chiefly landscapes, and he died at Amsterdam. His son *Gijsbert*, born in 1613, painted landscapes in the manner of his father. He

died at Utrecht in 1653. *Melchior Hondekoeter*, son of Gijsbert, born in 1636, was the most distinguished of the family. He painted poultry with admirable skill. His pictures are held in high estimation, and fetch great prices. He died in 1695.

HONDURAS, a republic of Central America, situated in lat. 13° to 16° N., and 85° to 89° W. It is bounded on the north and east by the Caribbean Sea and Mosquitia; west, by Guatemala; south, by Salvador and the Bay of Comayagua on the Pacific; and south-east, by Mosquitia and Nicaragua. The state is divided into seven departments, named after their principal towns, of which Comayagua is the capital. Of the ports, the chief are Truxillo, on the Caribbean Sea, and Port San Lorenzo, in the Bay of Comayagua. The republic consists of a senate of fourteen members, a legislative chamber of fourteen deputies, and a president elected by the two chambers. The population at the last census was estimated at 308,000. [CENTRAL AMERICA.]

HONE, WILLIAM, was born in 1779, at Bath, where his father is stated to have been an occasional preacher among the dissenters. After being engaged for some years as an attorney's clerk at Chatham and in London, William quitted the law, and having married, set up in July, 1800, as a bookseller in Lambeth, and afterwards in three or four other places in London, in all of which he was unsuccessful. In 1811 he took a humble lodging in the Old Bailey, and endeavoured for a time to support his seven children by contributing to periodical publications, especially the *Critical Review* and the *British Lady's Magazine*. At length, however, he found means to set up once more as bookseller in a small shop in Fleet Street. Here he was again unfortunate in having his premises twice broken into and plundered. In 1815 he became publisher of the *Traveller* newspaper. In 1816 he commenced a weekly paper called *The Reformists' Register*. The next year he brought himself into great notoriety by a series of political satires, which had immense success, the effect partly of the woodcut embellishments from the designs of Mr. George Cruikshank. Those of the series that turned out the most productive for the author were three composed in the manner of parodies upon various parts of the Book of Common Prayer. For the printing and publishing of these parodies Hone was brought to trial on three several indictments in the Court of King's Bench, on the 18th, 19th, and 20th December, 1817. He defended himself on all the three trials, which were before special juries, and, notwithstanding the best exertions of the bench to procure a conviction, was acquitted on each indictment. His acquittal was followed by the subscription of a considerable sum of money for his use, which enabled him to remove from Fleet Street to a large house on Ludgate Hill, where he continued a few years, but was unsuccessful. In 1823 he published the results of researches to which he had been originally directed with a view to his defence, in an octavo volume entitled 'Ancient Mysteries Described, especially the English Miracle Plays founded on Apocryphal New Testament Story extant among the unpublished MSS. in the British Museum.' In 1826 Hone began the publication, in weekly numbers, of his 'Every Day Book.' The sale was large, but his family had now increased to

ten children, and he again got into difficulties; the end of which was that he was arrested by a creditor and thrown into the King's Bench prison. Here he remained for about three years, during which time he finished his 'Every Day Book,' in two volumes, and began and finished his 'Table Book,' in one volume, and also his 'Year Book,' in one volume.

During the latter years of Mr. Hone's life he was employed as sub-editor of the *Patriot* newspaper. He died at Tottenham on the 6th of November, 1842.

HONES are stones used for the purpose of whetting or sharpening knives, scythes, and edge-tools. They are of many sorts, the finest being varieties of slate, called oil-stones. The best are brought from Turkey. Those used for sharpening scythes and other large blades are made of coarse sandstone.

In the year 1865 the number of hones imported into the United Kingdom was 8057, of the value of 276*l.*; and in the same year 600 hones, value 12*l.*, were exported.

HONEY is a fluid or semi-fluid substance, the materials of which are collected by different kinds of bees, in Europe chiefly by the *Apis mellifica*, or hive-bee [BEE], and solely by the neuter or working bees, from the nectariferous glands in the cup or chalice of flowers. It cannot be said to be a purely vegetable production, for, after being collected by the proboscis of the insect, it is transmitted to that distension of the œsophagus termed the crop, sucking-stomach, or honey-bag, where it is elaborated, and again disgorged, to be deposited in the cell of the honey-comb. It undergoes less change when the bees are very young, remaining nearly white, and is then denominated virgin honey. At all times it retains qualities derived from the kind of plant whence it has been procured, as is manifest not only by the peculiar odour of the honey, but by the effects which follow the use of honey obtained from certain plants, chiefly of the sub-tribe *Rhodoraceæ*, such as the azalea, rhododendron, kalmia, &c., which yield a honey frequently poisonous, while that from the genus *Erica* (termed Heather-honey), and most *labiate* plants, is wholesome.

Honey is sweet, faintly aromatic, granular, soluble in water, and capable of undergoing the vinous fermentation, and so yielding an intoxicating drink called hydromel, metheglin, or mead. Honey is certainly nutritive, but it cannot be employed to any great extent, since if taken in considerable quantity it excites the action of the bowels, and is gently laxative. Its effects in this way will be greater in proportion to its age and acidity, and less, or scarcely appreciable, when largely diluted with water. In the latter state it is rather demulcent, emollient, and refrigerant, and hence forms a good drink in fever and other inflammatory complaints, but it should not be taken if there be much gastric or intestinal irritation. It is used likewise in catarrhs, and when drunk warm is considered to be expectorant. Along with vinegar it forms a good gargle in slight cases of sore throat, and combined with borax a most efficacious application in aphthæ of the mouth and throat.

In the year 1865 the quantity received into the United Kingdom amounted to 4519 cwt., of the value of 7475*l.*; and in the same year 758 cwt., value 1254*l.*, were exported. The best description

comes from France and Greece, the latter being generally deemed a table delicacy. The coarser kinds are sometimes used to give a spurious sweetness to tobacco. Honey is often adulterated—generally with flour—but the chief impurities rise to the surface if it is gently heated, and may be easily skimmed off.

HONEY-COMB. [BEE.]

HONEY-COMBS in guns are marks or indentations in the metals, caused by the frequent explosion of gunpowder. They are so termed from their resemblance to the cells which bees form in the comb. In time, they spread and eat into the barrel to such an extent as to render it unsafe. As it is the action of firing which causes them, no remedy can be applied.

HONEY-DEW, a juice which exudes from trees and herbaceous plants in warm dry weather, and concretes on the bark of the plant. It occasionally flows from the leaves. It is a sweet viscid fluid, and often produced by the aphid [APHIS] and other insects which feed on the juices of plants. Sometimes, however, it flows from any wound in the bark, such as cracks made by heat, &c. When allowed to dry on the tree, fungi, mould, and other extraneous substances form in it, and soon injure the health of the tree. Manna is dried honey-dew. [MANNA.]

HONEY-EATERS. [MELIPHAGIDÆ.]

HONEY-SUCKLE. [LONICERA.]

HONFLEUR. [CALVADOS.]

HONG-KONG, or HIANG-KIANG (*Fragrant Streams*), is one of the group of rocky islands situate at the mouth of the Canton River, about 37 miles south of Macao, and 100 from Canton, in lat. 22° 12' N., long. 114° 3' E. It is separated from the mainland of China by a narrow strait, which varies from less than a mile to four or five miles in width. The island is about eight miles long, with a breadth of from two to six miles. Its area is 29 square miles.

Hong-Kong was taken possession of by the British during the first war with China, and was formally ceded to them by the treaty of Nankin, August 30, 1842. On the 26th June, 1843, it was regularly constituted a British colony. It is what is called a crown colony—that is, it has no legislative assembly, but is governed by orders from the Colonial Office in London. There is a legislative and executive council to aid the governor with their assistance and advice. The offices of the government are at Victoria, the chief town. There is a chief-justice and attorney-general, with other law officers, and the usual departments of a colonial administration.

At the time when the British first occupied Hong-Kong, the number of Chinese inhabitants was supposed to amount to only about 5000, consisting chiefly of fishermen and smugglers. Since it became a British colony there has been a great increase of Chinese. They make themselves generally useful as domestic servants, labourers, tailors, shoemakers, builders, carpenters, &c., and become tenants of the little shops in the Chinese bazaars. There is a small body of Chinese police.

The census of 1863 showed the population of the colony to be 124,850—1644 Europeans, 1336 Portuguese, Indians, and mixed blood, and 100 aliens or temporary residents, leaving 121,770 Chinese. The

number of boats plying in the harbour and bays showed a total of 4019, with a population on board of 16,233 men, 6529 women, 4901 male children, and 2884 female children, or a total of boat population amounting to 30,547.

The northern side of the island is traversed by a ridge of mountains, which vary in height from 500 to upwards of 1800 feet, three of the summits being 1575, 1711, and 1827 feet high respectively. The south side is less mountainous. The cultivable land is small, but the supply of water is abundant. The climate is subject to great fluctuations, and is still unhealthy for Europeans, although cultivation and drainage have rendered it much more salubrious than formerly. It is generally exceedingly hot and damp in summer, and cold and dry in winter—the great change producing dangerous diseases, especially of the kidneys.

There is a good anchorage at Hong-Kong Roads and Victoria Harbour, both near the town of Victoria. The commerce of Hong-Kong is inferior to that of the principal treaty ports of China; but as a British colony on Chinese soil, it is most important in its political and defensive position, and is the headquarters of the military, naval, and mercantile establishments. There are several daily and other newspapers printed here in the English language, and one three times a week in Chinese. Regular steam communication is kept up with England, India, Manilla, Canton, Macao, Shanghai, and all the northern ports. The shortest sea voyage to London is 12,900 miles; the quickest time by sailing vessel, 102 days. In 1864 the total number of vessels which arrived at the port was 2264 (1,013,748 tons), being an increase of 442 ships and 118,824 tons, as compared with the previous year. Of the vessels, 1013 were British and 1221 foreign; and the proportion of British to foreign ships in the increase was—British, 227; foreign, 215. Hong-Kong being a free port, no return of imports and exports can be given; but from the official tables compiled in England, it appears that in 1865 the exports to Hong-Kong from the United Kingdom were valued at 1,587,647*l.*; consisting chiefly of cotton goods and cotton yarn, 899,958*l.*, and wools, 224,310*l.* The imports into the United Kingdom from Hong-Kong in the same year were valued at 773,068*l.*; the chief articles being raw cotton, 532,059*l.*; tea, 79,094*l.*; and silk, 17,245*l.*

Since the British took possession of it, the government have formed many miles of good roads round the island; excellent docks, gas and water works, have been established at Victoria, the capital, and numerous Chinese and European schools set up throughout the colony.

Hong-Kong is the seat of a bishopric, and, in addition to the Established Church, has places of worship for Roman Catholics and various dissenting denominations. In 1864 (the latest year for which returns are issued) the revenue amounted to 637,846 dollars, and the expenditure to 763,307 dollars.

Victoria, the chief town of the colony, stretches for four miles along the northern coast of the island, and, according to the latest return, had a population of about 10,000, though it is probable the number has by this time considerably increased. The command of cheap (Chinese) labour to any extent has been one great cause of the rapid progress of this

place, the building of which was not commenced till August, 1841. It is now laid out in magnificent streets and terraces on the steep declivity of Victoria Peak, with numerous fine public buildings and store-houses; picturesque private dwellings, surrounded by gardens; and houses built of stone in the European style. A good road connects the capital with the town of Stanley.

On the mainland, opposite the northern shore, is the Kow-lung peninsula, a strip of coast territory and portion of the township of the same name, which was ceded to Great Britain by the convention of Peking in 1861.

(*Consular Reports*; Milner's *Gallery of Geography*; Johnston's *Dictionary of Geography*.)

HONITON. [DEVONSHIRE.]

HONOLULU, the chief town of the Sandwich Islands, Pacific Ocean, is a seaport in the island of Oahu, in lat. 21° 30' N, long. 158° W. In 1863 the population was estimated at 14,310. It is an *entrepôt* for European and Indian goods; and sugar, coffee, hides, tallow, rice, wool, salt, whale-oil, pumpkins, melons, oranges, limes, &c., are exported. In 1864 the number of whalers that called at the port was 140. An English journal, the *Polynesian*, is published here; and the town has its theatre, hospital, music-halls, billiard-rooms, taverns, and a fashionable drive. Foreign merchants represent as consuls nearly all the states of Europe.

HONORARIUM, a recompense for the services of a counsel or physician, so called because the fees were presumed to be given beforehand, and as a present or gift. Until recently, neither counsel nor physician could recover their fees by legal process; but as the law now stands, the latter can get a judgment for their fees by action. The old law remains in force with regard to counsel, and in the remarkable case *Kennedy v. Broun*, 1863, it was decided that a counsel cannot validly make a special agreement for a fixed sum, nor recover against his client in default of payment.

HONORIUS, son of Theodosius the Great, and younger brother of Arcadius, was born at Constantinople in 384. After the death of his father in 395, Honorius had for his share the Empire of the West, under the guardianship of Stilichon. Honorius fixed his residence at Milan. For several years after, Stilichon was the real sovereign of the West; and he also endeavoured to extend his sway over the territories of Arcadius in the East, under pretence of defending them against the Goths. He gave his daughter Maria in marriage to Honorius, and recovered the province of Africa, which had revolted. In the year 402 Alaric came a second time into Italy, when Stilichon hastily collected an army, with which he met Alaric at Pollentia, on the banks of the Tanaro, and obliged him to recross the Noric Alps. After this victory Honorius repaired to Rome with Stilichon, where they were both received with great applause. In the year 404 Honorius left Rome for Ravenna, which he made his residence, in consequence of which the province in which Ravenna is situated assumed the name of Romania, Romaniola, and afterwards Romagna, which it still retains. In the following year Radagaisus again invaded Italy with a large force of barbarians, but he was defeated and put to death by Stilichon. In the next year

the Vandals, the Alani, the Alemanni, and other barbarians, crossed the Rhine, and invaded Gaul. Constantine in Britain usurped the imperial power, and, having passed over into Gaul, established his dominion there, and was acknowledged by Honorius as his colleague. Stilichon now began to be suspected of having an understanding with the barbarians, and he was put to death by order of Honorius, in 408. His death was fatal to the empire. Alaric again invaded Italy, took Rome, and proclaimed the prefect Attalus emperor. [ALARIC.] The indecision and bad faith of Honorius brought Alaric again before Rome, which was plundered, in 410. After Alaric's death his son Ataulphus married Placidia, sister of Honorius, and took possession of Spain. Honorius died at Ravenna, in August, 423, leaving no issue.

HONORIUS I. II. III. IV. [POPE.]

HONOUR, COURT OF, in military matters, a term applied to a board of inquiry appointed to ascertain the degree of guilt attached to misconduct, and also to decide whether the individuals charged may or may not have been guilty of ignominious behaviour.

HONOURABLE, MOST HONOURABLE, and RIGHT HONOURABLE, are titles given in the United Kingdom to peers, their families, and persons holding certain public situations. A marquis or marchioness is styled Most Honourable; peers, peeresses, younger sons of dukes and of marquises, and their wives, and all the daughters of dukes, marquises, and earls, are styled Right Honourable. The younger sons of earls, and all the children of viscounts and barons, have the title Honourable. The prefix Right Honourable is also bestowed on Privy Councillors, the lord mayors of London, York, and Dublin, the lord advocate of Scotland, and the lord provost of Edinburgh; maids of honour, lords of session, the supreme judges of England and Ireland, are entitled to be designated Honourable. Members of the House of Commons are, during debate, addressed as Honourable, but do not prefix the title to their names in ordinary usage. In America, nearly all persons taking prominent parts in public affairs are styled Honourable.

HONOURS OF WAR, a military term applied to the conditions under which a fort or city is evacuated. In some cases the retreating forces are allowed to depart with all their colours, baggage, artillery, &c.; in others they have to retire to a distance, pile their arms, and surrender as prisoners of war. *Military Honours* are salutations paid to crowned heads or officers of rank, by the discharge of artillery, dropping colours, and other modes.

HONTHORST, GERHARD, called by the Italians Gherardo dalle Notti, from his effects of light by night, was born at Utrecht in 1592. He was the pupil of A. Bloemart, studied some time in Rome, and was engaged for six months by Charles I. in England. There are several portraits by him at Hampton Court, for which he received 3000 florins, a service of plate complete for twelve persons, and a beautiful horse. Honthorst was the favourite painter of the queen of Bohemia, and he was the court-painter to the prince of Orange. He died at the Hague in 1662.

HOOD, ROBIN, is supposed to have lived in the reign of Richard I. He was the most distinguished

in his time of those numerous outlaws who, under the tyrannical government of the early Norman kings, lived in bands in all the great forests, and combined a sort of championship of the cause of the old national independence with the practice of deer-shooting and robbery. The chief residence of Robin Hood and his followers was the forest of Shirewood, or Sherwood, in Nottinghamshire; but he is said to have also frequented Barnsdale in Yorkshire, and Plumpton Park in Cumberland. 'The personal courage of this celebrated outlaw,' Bishop Percy observes, 'his skill in archery, his humanity, and especially his levelling principle of taking from the rich and giving to the poor, have in all ages rendered him the favourite of the common people.' His exploits appear to have been a common subject of popular song. Of Robin Hood's followers the most celebrated were Little John, his chaplain called Friar Tuck, and his paramour named Marian. Amidst a variety of conflicting statements it is difficult to arrive at any distinct facts relating to this celebrated personage. He seems to have died in 1247.

HOOD, SAMUEL, VISCOUNT, was born December 12, 1724, at Butleigh in Somersetshire, of which parish his father was the incumbent. He was brought up to the navy, and was appointed in 1757 to command the *Antelope*, 50 guns, in which he took a French 50-gun ship. In 1759, in the *Vestal*, 32 guns, he was again successful in capturing the *Bel-lona*, a French frigate of equal force. He served in the Mediterranean, under Sir Charles Saunders, till the end of the war in 1763, and was appointed to command on the Boston station in 1768. In 1778 his services were rewarded with a baronetcy. In 1780 he was promoted to the rank of rear-admiral, and sailed with a squadron to the West Indies to join Sir George Rodney. By Rodney's departure to England, in 1781, Hood succeeded to the command of the fleet. The events of the war called him almost immediately to America. In January, 1782, the French invaded the island of St. Christopher. Hood hastened to relieve it; but, notwithstanding a dexterous manœuvre, he was unable to prevent the surrender of the island. His conduct in the whole of this affair has been warmly applauded by naval critics. After the action of April 12, 1782, in which the French fleet in the West Indies, under the Comte de Grasse, was defeated by the British fleet under Admiral Rodney, Hood, who commanded a part of the fleet and greatly distinguished himself, was created an Irish peer by the title of Baron Hood of Catherington, and Rodney returned finally to England, leaving Lord Hood again in the chief command, which he retained till the peace of 1783. In the memorable Westminster election of 1784 Lord Hood opposed Fox, and was returned at the head of the poll. He lost his seat on being made a lord of the Admiralty in 1788, but was re-elected in 1790. In 1793 he was appointed to command the Mediterranean fleet, and an arduous responsibility devolved on him in consequence of the surrender of Toulon to the British and Spanish fleet by the French royalists. Early in 1794 Lord Hood applied himself to the expulsion of the French from Corsica, which was accomplished chiefly by the astonishing exertions of the British sailors on shore, especially in the capture of Bastia, for which Lord Hood received the thanks of both

Houses of Parliament. His health being much impaired, he returned to England at the close of the year. In 1796 he was appointed governor of Greenwich Hospital, and raised to the English peerage by the title of Viscount Hood of Whitley. He afterwards received the Grand Cross of the Bath. He died at Bath, in his ninety-second year, June 27, 1816.

HOOD, ALEXANDER, VISCOUNT BRIDPORT, younger brother of the above, was also brought up to the navy, and found many opportunities of signalizing his skill, activity, and bravery. He was made rear-admiral in 1780, and in 1782 sailed as second in command of the fleet sent under Lord Howe to relieve Gibraltar. He held the same rank in the Channel fleet, under the same commander, in 1794, and bore a distinguished part in the great victory on the 1st of June. In 1795 he engaged a French fleet off L'Orient, and took three ships of the line; and in the following year was appointed to the command of the Channel fleet, which he held till April, 1800. He was successively raised to the Irish and English peerage by the titles of Baron and Viscount Bridport, the last creation June 10, 1801. Lord Bridport died at Bath, May 3, 1814. The title is now extinct.

HOOD, THOMAS, was born in 1798, in the Poultry, London, where his father was a bookseller of the firm of Vernor and Hood. In 1811 Hood's father died, and his mother sent him to a day-school. From this school he was removed to the counting-house of Messrs. Bell and Co., Russia merchants, Warford Court, City, but his health soon began to fail, and he took up his abode at Dundee. After a residence of two years, he returned to London, and engaged himself to his uncle Mr. Robert Sands, an engraver, in order to learn his art, and was afterwards with Le Keux for the same purpose.

Hood had published some trifles in the *Dundee Advertiser* and *Dundee Magazine*. In 1821 he succeeded Mr. John Scott as editor of the *London Magazine*. His first publication in a separate form was 'Odes and Addresses to Great People,' in which he was assisted by his brother-in-law, J. H. Reynolds, and which was brought out anonymously. 'Whims and Oddities,' published in 1826, in small 8vo., consisted chiefly of his contributions to the *London Magazine*, with some additions. His next work was in prose, 'National Tales,' which was followed by 'The Plea of the Midsummer Fairies, Hero and Leander, Lycus the Centaur, and other Poems.'

He commenced the 'Comic Annual' in 1829, and continued it nine years. In the same year his comic poem of 'The Epping Hunt' came out. He was for one year editor of *The Gem*, and wrote for it his poem called 'Eugene Aram's Dream.'

In the spring of 1834 Hood became the occupier of a house called Lake House, in Essex. While residing here he wrote his novel of 'Tylney Hall.' Pecuniary difficulties compelled him to leave his pleasant residence in 1835. The 'Comic Annual' having terminated in 1837, Hood commenced the publication of 'Hood's Own,' in a series of monthly numbers. He afterwards went to the Continent for the benefit of his health, and in Belgium he published his 'Up the Rhine.' On his return he became editor of the *New Monthly Magazine*; after his retirement in 1843, he collected his contributions to that work,

and, with additions of prose and poetry, published them under the title of 'Whimsicalities.'

In 1844 Hood started his last periodical, *Hood's Magazine*, and continued to supply the best of its contributions till within about a month before his death. Those who have read the work, and have a taste for wit, humour, and character, will not readily forget his 'Schoolmistress Abroad,' and his novel of 'Our Family,' which was interrupted by his last illness and death: the last chapters were in fact written by him when he was propped up by pillows in bed. Hood was an occasional contributor to *Punch*, and it was in that periodical his immortal 'Song of the Shirt' first appeared. He had the consolation, a short time before his death, of having a government pension of 100*l.* a year offered to him by Sir Robert Peel, which was transferred at his own request to his wife. He died May 3, 1845, and was buried in Kensal Green Cemetery. An appropriate monument, raised by public subscription, has since been erected there to his memory.

HOOF. The horny substance which covers or terminates the feet of certain animals, as oxen, horses, sheep, goats, deer, &c. The value of the hoofs imported into the United Kingdom in 1865 was 1480*l.*

HOOF, PETER CORNELIUS, one of the most eminent poets and prose writers of Holland, was born on the 16th of March, 1581, at Amsterdam, where his father was an eminent burgomaster. He wrote 'Granida,' and several other tragedies, and may be considered in some degree as the founder of the Dutch stage. His tragedies are composed on the Greek model, and have choruses. In his lesser poetical productions he displays more originality, and many of them are distinguished by playfulness and elegance. He also formed a correct and harmonious style of prose, of which his 'History of the Netherlands' is esteemed a model. He died May 21, 1647.

HOOG, PETER DE, was born about 1643, but the place of his birth is uncertain, as well as the master under whom he studied. His pictures, of which there are some capital specimens in England, sell at high prices.

HOOGVEEN, HENRY, was born at Leyden in January, 1712. His parents were in humble circumstances. He filled successively the office of rector at the gymnasiums of Kuilenburg, Breda, Dort, and Delft, at the last of which places he died in 1791.

The principal work of Hoogveen is a treatise on the Greek Particles (2 vols. 4to., Leyden, 1769), of which an abridgment was made by Schütz (Leipzig, 1806); one of the most useful of his works, entitled 'Dictionarium Analogieum Lingue Græcæ,' was published after his death at Cambridge, in 1800.

HOOGLY, a river of India, in the presidency of Bengal, formed by two branches of the Ganges—the Bhagruttee and the Jellinghee—which join each other in lat. 23° 25' N., long. 88° 22' E., 160 miles from the sea. During the south-west monsoon, when a great current is driven into the river from the Bay of Bengal, it produces a phenomenon called 'the Bore,' when the tide rises on the sands near the banks in waves 12 or 15 feet high, and rushes along at the rate of 20 miles an hour, driving before it the shipping in its course. The Hooghly is one mile wide at Calcutta, and ships drawing 17

feet of water can go up thus far, but the river is said to be gradually silting up. Here the tides are often violent and rapid, running at the rate of seven miles per hour. It is 15 miles wide at the mouth, and much encumbered by shoals, through which it requires great care to steer large ships. (Johnston's *Dictionary of Geography*.)

HOOGLY, a district in the presidency of Bengal, British India, comprising an area of 2089 square miles, and a population of 1,520,840, of whom two-thirds are Brahmins, the remainder Mussulmans and Christians. This district is low and level in the east, but hilly in the west and north-west, where it stretches towards the high lands of Burdwan. The principal rivers are the Hooghly, the Damoodah, the Dalkissore, and several other lesser streams. Hooghly was ceded to the English in 1765. The chief crops now are rice, sugar-cane, mustard, ginger, potatoes, indigo, tobacco, cotton, hemp, oil-seeds, vegetables of various kinds, and the mulberry tree. There are also manufactures of rope, sacking, and coarse canvas. Silk, indigo, and sugar are the principal articles exported. The wild animals are elephants, buffaloes, tigers, and wolves. Winter continues from the beginning of November to the end of January, and the nights are so cold that ice is formed. During the dry hot season, from the beginning of March to the end of June, the thermometer ranges from 75° to 110° Fahrenheit. The rainy season commences about the end of June, and lasts till the beginning of October, during which time fever and agues are very prevalent. The chief towns are Hooghly, Serampore, Ghotal, Ompah, and Shahbazar.

HOOGLY or HOOGLY, a town of British India, capital of the district of the same name, in the presidency of Bengal, on the right or western bank of the Hooghly River, 27 miles north of Calcutta, on the Calcutta and Burdwan Railway. The population, according to the latest return, is 12,000. The town was founded by the Portuguese in 1537; in 1676 the Dutch and English established factories here; and in 1757 it was finally taken by Clive, since which it has remained in the possession of the British. It has a civil establishment, consisting of judges, collectors, magistrates, and surgeons, and a government college, in which English and Oriental languages are taught, and in connection with which are several branch schools.

HOOK, THEODORE EDWARD, was born September 22, 1788, in Charlotte Street, Bedford Square, London. He was the son of James Hook, a musical composer of some celebrity, by his first wife (Miss Madden). There was only one other child by that marriage, Dr. James Hook, dean of Worcester.

Theodore Hook was a handsome boy and remarkably clever. He had a fine ear, was an expert performer on the pianoforte, and had a sweet and powerful voice. His father was employed at Vauxhall and the theatres, and Theodore wrote songs for him, and sometimes composed the airs. In 1805 he wrote an operatic farce, 'The Soldier's Return,' which was very successful. He afterwards wrote several other successful operatic pieces and farces. In 1809 he made his first essay as a novelist by the publication of 'The Man of Sorrow.' It was a very flimsy work, and had no success.

Hook was even at this period distinguished for his

conversational powers, but his talent as an *improvisatore* is described as extraordinary. He was invited to perform before the prince regent, who was so much delighted, that in 1812 he got him appointed accountant-general and treasurer to the colony of the Mauritius, with a salary and allowances amounting to nearly 2000*l.* a year. He reached his destination October 9, 1813. In 1817 a large deficiency in the assets of the office was discovered; an investigation took place, and Hook was arrested on the 9th of March, 1818; all his property was seized, and he was sent back to England in custody. The result of an examination of the matter by the law-officers of the crown was a claim upon him for 12,000*l.*

The *John Bull* newspaper was established soon after Hook's return, and he became the editor. Hook, in its prosperous state, received full 2000*l.* a year from it; and, though its circulation gradually diminished, he derived a considerable profit from it up to the time of his death. In August, 1823, Hook was arrested under a writ of Exchequer; his property was sold, and realized about 40*l.*; and he was taken to a spunging-house, where he remained till April, 1824, whence he was transferred to the King's Bench, where he remained till May, 1825, when he was released from custody, but with an intimation that the crown abandoned nothing of its claim for the debt.

Hook published his first series of 'Sayings and Doings' in Feb. 1824, while confined in the spunging-house, and his diary records the profit to have been 2000*l.*; and he realized sums almost as large by the novels and other works which he published in rapid succession afterwards. The following is a list of the whole of them:—'Sayings and Doings,' First Series, 3 vols., 1824; Second Series, 3 vols., 1825; Third Series, 3 vols., 1828; 'Maxwell,' 3 vols., 1830; 'Life of Sir David Baird,' 2 vols. 8vo., 1832; 'Parson's Daughter,' 3 vols., 1833; 'Love and Pride,' 3 vols., 1833; 'Gilbert Gurney,' 3 vols., 1835; 'Jack Brag,' 3 vols., 1837; 'Births, Deaths, and Marriages,' 3 vols., 1839; 'Gurney Married,' 3 vols., 1839; 'Precepts and Practice,' 3 vols., 1840; 'Fathers and Sons,' 3 vols., 1840; 'Peregrine Bunce,' 3 vols., 1841, some months after his death. In 1836 he became editor of the *New Monthly Magazine*. He wrote Kelly's 'Reminiscences,' from Kelly's notes, in 1836, without any remuneration.

While residing at Putney he gradually mixed more and more freely in society, and in 1827 took a house in Cleveland Row, St. James'; he became a member of divers first-rate clubs, received invitations from persons of the highest distinction, and ran himself rapidly and deeply into debt, notwithstanding the large sums which he obtained by his literary labours. By his extravagance, which he supplied at a ruinous expense of labour of mind and body, his constitution was completely broken up. He died August 24, 1841, in the fifty-third year of his age.

HOOKAH, an Indian tobacco-pipe, the stem or tube of which is made of cocoa-nut, while some ornamental tubing lengthens it out into several coils. The mouth-piece is usually of amber; the bowl of shell, silver, or earthenware; and the smoke passes through a glass water-vase. These hookahs are in almost universal use among the upper classes of the

Arabs, Turks, Indians, Egyptians, and other Oriental nations; and on all occasions of friendly visits they are considered as the calumet of peace.

HOOKE, NATHANIEL, born in 1690, died in 1764. He was a Roman Catholic, enjoyed the friendship of Pope, and was intimate with most of his eminent literary contemporaries. He is said to have lost his fortune in the South Sea scheme. The work by which Hooke is principally known is entitled 'The Roman History, from the Building of Rome to the Ruin of the Commonwealth,' which was originally published in 4 vols. 4to., 1733-1771. Hooke also published a work on the Roman senate in answer to Dr. Middleton's and Dr. Chapman's treatises on the same subject, 1758, and translated from the French the 'Life of Fenelon,' 1723, and Ramsay's 'Travels of Cyrus,' 1739.

HOOKE, ROBERT, was born July 18, 1635, at Freshwater, in the Isle of Wight, of which parish his father was minister. After studying successively at Westminster and Oxford, he was engaged to assist Dr. Wallis in his chemical experiments, and he subsequently served Mr. Robert Boyle in a similar capacity. In 1662 he was appointed curator of experiments to the Royal Society; and when that body was incorporated by charter the following year, Mr. Hooke was one of those Fellows who were first nominated by the council. In 1664 he succeeded Dr. Dacres as professor of geometry in Gresham College, and two years afterwards received the appointment of city surveyor. In 1677 he succeeded Oldenburg as secretary to the Royal Society. In 1691 he was created Doctor of Physic, by a warrant from Archbishop Tillotson. He died at Gresham College in 1702, in his sixty-eighth year. A list of the works left by Dr. Hooke is given in Ward's 'Lives of the Gresham Professors.'

HOOKE, RICHARD, was born at Heavitree, near Exeter, about 1553 or 1554. He was introduced by his uncle, the chamberlain of Exeter, to the notice of Bishop Jewel, who procured him, in 1567, a clerkship in Corpus Christi College, Oxford. In December, 1573, he became a scholar of that college, and a fellow and master of arts in 1577. In 1579 he was appointed lecturer of Hebrew in the university, and in October of the same year he was expelled his college, with Dr. John Reynolds and three other Fellows, but restored the same month. In about two years he took orders, and was appointed to preach at Paul's Cross, London. Through the influence of the archbishop of York, he was appointed Master of the Temple in 1585, and was presented to the living of Boscombe, in Wiltshire, in 1591. On July 17 in the same year he was made a prebendary of Salisbury. On July 7, 1595, he was presented to the living of Bishopsbourne in Kent, which he held till his death on November 2, 1600. His great work is his defence of the constitution and discipline of the Church of England, in eight books, under the title of 'The Laws of Ecclesiastical Polity.'

HOOKS and EYES are well known articles used for fastening ladies' and children's dresses. They are made entirely by machinery, from the unreeling of the wire through all the cutting and bending processes until ready for use, and at such a rate, that one machine will manufacture 100 hooks and the same number of eyes in a minute.

HOOKE, JOHN, was born in London in 1727. At the age of seventeen he became a clerk in the East India House. He is chiefly known for his translation of Tasso's 'Jerusalem Delivered,' London, 1763, 2 vols. 8vo. It is a diffuse and feeble version. He published also a translation of Ariosto's 'Orlando Furioso,' 5 vols. 8vo. He translated many of the dramas of Metastasio; and he wrote three or four tragedies, which were unsuccessful. He died in 1803.

HOOPER, JOHN, one of the most venerated martyrs of the Reformation, was born in Somersetshire about 1495, and educated at Oxford. In 1550 he was appointed bishop of Gloucester; but his assumption of the office was long delayed by his scrupulousness as to the use of the episcopal dress. By way of overcoming his reluctance, he was confined to his house, and finally committed to the Fleet Prison. His friends exhorted him to compliance, and at length the matter was compromised. In 1552 he received the bishopric of Worcester in commendam. Wood says, 'When Queen Mary began to reign, in July, 1553, he was persuianted up to London, in the latter end of August, and committed to the Fleet, where, remaining some months, he was at length examined several times, and required to recant his opinions, but standing constant and resolute to them, was condemned to be burnt. He suffered, February 9, 1555, at Gloucester, bearing his torments with great courage.'

HOOPING-COUGH. This disease, to which, on account of the violence of the cough that attends it, the Latin term *Pertussis* has been applied, has also obtained the popular designation Chin or Kink Cough.

It commences with the symptoms of simple catarrh, and is indicated by cough and the expectoration of a clear limpid fluid, by redness of the conjunctive, a watery discharge from the eyes and nostrils, hoarseness, and occasional sneezing. These symptoms are attended by some degree of fever, which in general, however, is very slight; the patient is languid and out of spirits, but is free from pain, or complains only of soreness in the anterior part of the chest. At the end of a period varying from one to two weeks, the fits of coughing become longer and more frequent; each fit is commonly announced by a sensation of tickling in the larynx and trachea, during which the inspirations are irregular and incomplete, especially in children, whose countenances are at this time expressive of fear and anxiety. At the moment the fit comes on they cling with firmness to the persons or objects around them; if asleep at the time of its accession, they suddenly start up and place themselves in a sitting posture. The efforts of coughing are now repeated in such quick succession as to suspend almost completely the act of breathing; during their brief intervals we can with difficulty perceive any inspiratory movements, excepting at times when the cough is momentarily interrupted by a prolonged inspiration attended by a peculiar whooping noise, which has supplied a name for the affection, and which constitutes its characteristic symptom. In consequence of the obstruction to the circulation occasioned by these long-continued efforts of coughing, the face and neck become swelled, and of a deep red or violet colour; the veins on these parts are distended almost to bursting; the eyes are

prominent and bathed in tears; occasionally the patient becomes completely exhausted; the fit of coughing is interrupted for one or more minutes; it then recurs with the same violence, and the patient seems in imminent danger of suffocation, when the paroxysm is terminated by one or two long and whooping inspirations, and by the rejection of a limpid viscid fluid, which hangs in threads from the mouth. This fluid comes from the bronchi and pharynx, and sometimes also from the stomach; it is occasionally mixed with particles of blood. These paroxysms or fits of coughing continue for many minutes, and when they are very severe blood frequently issues from the nose, mouth, ears, or even from the eyelids; they recur at various and often very short intervals, generally, however, more frequently and with greater severity by night than by day, and they are excited by the slightest causes, as by food or exercise, by any agitation or mental emotion. In the intervals of the fits the child appears to have its ordinary health.

After the affection has presented the characters which we have described for a period which varies from two or three weeks to as many months, the paroxysms become shorter and less frequent, and the cough ceases to be characteristic, but still continues to terminate in vomiting and the discharge of sputa, which now resemble those of catarrh. The paroxysms become more and more rare, in some cases recur at regular intervals, and finally cease, but for some time afterwards they are easily renewed by any unusual exposure to cold.

Whooping-cough prevails epidemically, and chiefly attacks children from birth to the period of second dentition, but it occasionally occurs in adult and even in old age. It rarely affects the same individual more than once, although this sometimes happens, and it is one of those diseases that are contagious.

No method of treatment has hitherto been discovered by which the progress of whooping-cough can be arrested. We may mitigate its severity and somewhat diminish its duration, but it will run a certain course, and this course, in spite of all our efforts, will often be long. In the early stage emetics may be given repeatedly, and at a more advanced period great benefit is derived from the employment of narcotic and sedative medicines, of which opium, hydrocyanic acid, and belladonna are the best; but on account of the powerful influence of these drugs on the system, the greatest caution should be observed in their administration to children.

HOOPOES. [UPUPIDÆ.]

HORN. [HOLLAND.]

HOP-FLY (*Aphis humuli*), a species of insect of the family *Aphides*, or plant-lice. The prevalence of this insect at certain seasons in hop-growing districts determines the price of hops. [HOPS.] This has fluctuated in different years between a loss of from 15,000*l.* to 468,000*l.*, according as the fly abounded. 'It is the barometer that indicates the rise and fall of the hop-growers' wealth, as well as of a very important branch of the revenue.' Hand-picking in spring is the only effectual remedy. The hop-plant is also attacked at the roots by the caterpillar of a moth (*Hepialus humuli*), and by a small beetle (*Haltica cinnamomea*), which is very destructive to the tender shoots.

HOPE, THOMAS, was descended from the wealthy family of the Hopes of Amsterdam. He was born in London, in 1770, and gave very early indications of his attachment to architecture. At the age of eighteen or nineteen he went abroad, and travelled for about eight years in various parts of Asia and Africa, as well as on the continent of Europe.

Soon after his return to England he began to apply his studies practically by remodelling and enlarging his mansion in Duchess Street, Portland Place. He thus rendered his house one of the largest private mansions in the metropolis, and fitted up and furnished the interior in a style of classical taste that was then a novelty in this country. His publication on 'Household Furniture,' in 1805, created a revolution in taste.

In 1809 appeared his 'Costume of the Ancients;' and in the same year he contributed to a periodical (by J. Landseer) entitled *Review of Publications of Art*, an essay on the 'Architecture of Theatres.'

With the exception of a minor work entitled 'Modern Costumes,' in 1812, Mr. Hope did not publish anything further till 1819, when appeared his 'Anastasius, or Memoirs of a Modern Greek at the close of the Eighteenth Century.' His last two works, both of them published posthumously, are, 'The Origin and Prospects of Man,' and an 'Historical Essay on Architecture.' Mr. Hope died on the 3rd of February, 1831.

HOPITAL, or HOSPITAL, MICHEL DE L', born in 1505, near Aigueperse in Auvergne, was the son of Jean de l'Hôpital, physician to the Connétable de Bourbon. L'Hôpital remained in the University of Padua six years, during which the Connétable de Bourbon lost his life under the walls of Rome, and Jean de l'Hôpital found himself without a protector in a foreign land. After practising for some time at the bar of the Parliament of Paris, his merit, added to his having married the daughter of the lieutenant-criminel Morin, procured for him a seat on the bench of the counsellors of the Parliament. The duchess of Berri, daughter of Francis I., invited L'Hôpital to her court, and recommended him to the king, Henri II., who appointed him superintendent of the finances. L'Hôpital endeavoured to check prodigality and corruption. He also opposed the persecution of the Protestants. On the death of the chancellor Olivier, in 1560, L'Hôpital succeeded him. He strenuously opposed the cardinal de Lorraine, who wanted to establish the Inquisition in France; and his next thought was that of assembling the States-general, which had not met for eighty years, but the Guises opposed the proposal. L'Hôpital accordingly contented himself with assembling the nobility and high clergy at Fontainebleau. The only useful result of the assembly was the passing of an ordonnance prepared by L'Hôpital, which abolished arbitrary taxes, regulated the feudal authority of the nobles, and corrected many abuses in the judicial system. Soon after, July, 1561, L'Hôpital obtained from the regent Catherine an edict, ordering the release of all prisoners suspected of heresy. By another edict Roman Catholics were forbidden, under pain of death, from forcing an entrance into the houses of Protestants under pretence of dispersing their meetings. After the death of the duke of Guise, 1563, L'Hôpital

prevailed upon Catherine to grant the edict 'of peace,' by which, among other conditions, all prisoners on both sides were released, and the Protestants were allowed the exercise of their religion within the towns which they had occupied during the war. He also prevailed upon Catherine to declare the majority of her son, Charles IX. L'Hôpital's opposition to the bull of the pope, by which the king was authorized to levy 100,000 crowns a year on the revenues to root heresy from the kingdom, caused his downfall; the seals were taken from him, and he retired in 1568 to his country-house at Vignay, where he died March 15, 1573.

HOPITAL, GUILLAUME - FRANCOIS - ANTOINE L', Marquis de Sainte Mesme and Count d'Entremont, commonly known as the Marquis de l'Hôpital, was born at Paris in the year 1661. He entered the army at an early age, and served some years as a captain of cavalry. His name is intimately connected with the early history of the differential and integral calculus. In 1661 no knowledge whatever of the calculus existed in France; and indeed throughout the Continent it appears to have been known only to Leibnitz, and to the brothers John and James Bernoulli. About this time John Bernoulli arrived at Paris, and spent some time at the residence of L'Hôpital for the purpose of giving him instruction in the differential and integral calculus. With such assistance he was not long in becoming one of the first mathematicians of Europe, and he soon after distinguished himself by his solution of the great problem in mechanics relative to the brachystochron, or curve of quickest descent, which Bernoulli had proposed as a challenge to the geometricians of the day, and to which, at the end of ten months, only four solutions had been given, by Newton in England, Leibnitz in Germany, James Bernoulli in Switzerland, and L'Hôpital in France. Still, however, the calculus was regarded as a sort of mystery by most of those mathematicians by whom it was not actually opposed; and, with the exception of the papers of Leibnitz dispersed in the Acts of Leipzig, there existed no work from which any information could be obtained. To remedy this defect he wrote and published his 'Analyse des Infiniment-Petits,' which appeared in 1696, Paris, 4to. 'The appearance of this work,' says M. Boucharlat, 'marked the epoch of a great revolution in science. Mathematicians hastened to initiate themselves into the wonders of the infinitesimal calculus, and doubts concerning its truth were advanced only by those who were blinded by their prejudices in favour of ancient methods.' At his death in 1704, when only forty-three years of age, L'Hôpital left an 'Analytical Treatise on Conic Sections,' which was published in 4to. the following year, and was for a long time considered the best treatise on the subject.

HOPLITES (Gr. *hoplites*, 'armour'), among the ancient Greeks, such of the candidates at the public games as ran races in armour.

HO-PO-SO. A small port in the Island of Hainan, belonging to Chiuu.

HOPPNER, JOHN, R.A., was born in London in 1759. When young, he was one of the choristers in the Chapel Royal. He studied afterwards in the Royal Academy; and before he was thirty years of age he had, owing to the active patronage of the

prince of Wales, painted more royal and noble portraits than usually falls to the lot of distinguished portrait painters during the whole of a long life. Hoppner's style is easy and effective, but gaudy. He died of dropsy in 1810.

HOPS (Botany). [*HUMULUS LUPULUS*.]

HOPS (*Humulus lupulus* of Linnæus) are extensively cultivated for the flowers or seed-vessels, which give flavour and permanence to beer by being boiled with the wort in brewing.

Hops were introduced into England from Flanders about the year 1524. The most extensive plantations are in Kent, Sussex, and Herefordshire, but they are also cultivated in Worcestershire, Wiltshire, Hampshire, Gloucestershire, Surrey, and several other counties. The hops of Kent and Sussex are the finest in the world. The hop is a slender climbing plant, which requires a very rich mellow soil and careful cultivation. The soil of a hop garden must be rich to a considerable depth, or made so artificially.

The young plants are raised in beds, and may be raised from seed; but it is more usual to plant the young shoots which rise from the bottom of the stems of old plants. The varieties most esteemed are the Grape, the White Vine, the Golden Hill and East Kent Golding, and Farnham White Bine. The young plants are placed in groups of three each, about six inches apart, in the midst of prepared masses of soil about two feet asunder. A watering with liquid manure greatly assists their taking root, and they soon begin to show bines. A stick three or four feet long is then stuck in the middle of the three plants, and the bines are tied to this stick with twine or the shreds of Russia mats, till they lay hold and twine round it. During their growth the ground is well hoed and forked up around the roots, and some of the fine mould is thrown around the stems. In favourable seasons a few hops may be picked from these young plants in the autumn, but in general there is nothing the first year. Early in November the ground is carefully dug with the spade, and the earth being turned towards the plants, is left so all the winter.

In the second year, early in spring, the hillocks around the plants are opened and the roots examined. The last year's shoots are cut off within an inch of the main stem, and all the suckers quite close to it. A pole about twelve feet long is then firmly stuck into the ground near the plants; to this the bines are led and tied as they shoot, till they have taken hold of it. The ground being well hoed and the earth raised round the plants, the produce this year will average 4 cwt. per acre if the season is favourable.

In September the flower containing the seed assumes a fine straw colour turning to a brown; it is then in perfection. No time should then be lost in picking them. The hops when picked are dried on a hair cloth in a kiln. They are then laid in heaps on the floor, where they undergo a very slight heating. As soon as this is observed, they are bagged. This is done by pressing them into large bags suspended below a hole in the floor; when sewed close and tight the bag is stored in a dry place till the hops are wanted for sale.

The crop of the third year will average 8 cwt. per acre, but will in some cases reach 15 cwt.

The hop is a dioecious plant, *i.e.*, some of the individuals are male plants and others female, which have respectively flowers of a different construction and of different habitudes; and the pollen of the former is conveyed by the air to the latter. Though the pollen, from its extreme lightness, can be wafted to a considerable distance, and some seeds in each cone may be so fertilized, yet it would be well to rear a number of the male plants among the others, or along the hedges of the hop-gardens, to insure the fertilization of all the seeds.

The poles are an expensive article; those of chestnut are the most durable, and also the dearest. They should be put into a shed during winter; or else be placed on end in the form of a cone, leaning against each other.

The uncertainty attending the culture of the hop is very great; the crop is most exhaustive of the soil, extracting as much nitrogen from an acre of land as nine hundredweight of guano will replace, and the hop-grower has to contend against a greater number of foes than perhaps any other cultivator.

As the young shoots push themselves from the earth in March, they are attacked by the flea (*Alicea cincinna*); and if the bines survive its assaults, they are liable to destruction by the hop-aphis (*A. humuli*). These assailants appear in May, and settling upon the plants, suck the under-side of the leaves, and deposit thereon their young, the aphis louse, which possesses the curious but inconvenient faculty of increasing and multiplying within a few hours of its birth, without waiting till it becomes a perfect insect. If the lice are allowed to remain undisturbed, they soon extract the juices of the bine; its leaves curl up, turn brown, and finally the bine drops from the pole. Nature has provided a check upon the multiplication of the aphides in the shape of the ladybird, which feeds upon the fly, and lays her eggs among the lice. The wireworm is another enemy to the hop-grower. It usually confines its unwelcome attentions to young grounds; but new and old plantations suffer from the depredations of various species of caterpillars, and the destructive visitations of 'honey-dew,' blight, mould, red-rust, and fire-blast.

In 1869 there were 64,500 acres of land devoted to the cultivation of the hop in England alone. Abroad, the cultivation is carried on in Prussian Poland, North Germany, Bavaria, and Belgium, the entire continental crop being about equal to that of England. North America also produces a considerable quantity of hops, but of such a coarse, rank flavour as to find but little favour with European customers.

The hop serves other purposes besides that of flavouring beer. Medicinally it is sometimes used as a narcotic. A brown dye is extracted from the young leaves; the bines have been converted into brown paper, and made into cloth; the prunings are useful as winter provender for horses and cattle; in Belgium, the young shoots are used as a vegetable in the way we use asparagus; and, lastly, spent hops are useful as a manure.

Till 1862 hops used in England were liable to an excise and customs duty, which, on an average, yielded about 200,000*l.* per annum to the revenue. But owing to the uncertainty attending the crop and other causes, in that year both duties were repealed,

and a charge of 3*d.* per barrel on all beer brewed in the United Kingdom was substituted, and has been found to work much more satisfactorily.

In 1868 the imports of hops into Great Britain amounted to 231,720 cwt*s.*, value 689,883*l.*, chiefly from Hamburg, Belgium, France, and the United States. [*HUMULUS LUPULUS.*]

HOR, MOUNT, a hill forming part of Mount Seir or Edom, in Arabia, nearly intermediate between the head of the Gulf of Akayabah and the Red Sea. It is a steep and irregular truncated cone, having three peaks on the north, in the loftiest of which is a grotto, the reputed tomb of Aaron. A small and plain Mohammedan chapel marks the supposed sepulchre, in which the Arabs suspend ragged shawls, ostrich eggs, and beads as votive offerings.

HORAPOLLO, or HORUS APOLLO, the author of a treatise on Egyptian Hieroglyphics. Champollion, and Leemans, in his edition of the work, are disposed to attribute greater importance to it than former critics had been willing to allow. The best edition is by Leemans, Amsterdam, 1884.

HORARY (Astronomy). The horary motion of the sun or a planet is the arc which it describes in one hour, or the angle which that arc subtends at the eye of the spectator.

HORATIUS, FLACCUS QUINTIUS, was born at Venusia, December 8, B.C. 65. His father, who was a *libertinus*, or freedman, acquired some property (1 'Sat.,' vi. 6, 86), with which he purchased a farm near Venusia, on the banks of the Aufidus. In this place Horace appears to have lived till his eleventh or twelfth year, when his father removed with his son to Rome, where he was placed under the care of a celebrated schoolmaster, Orbilius Pupillus, of Beneventum. After studying the ancient Latin poets (2 'Ep.,' i. 70, 71), Horace learned the Greek language (2 'Ep.,' ii. 41, 42). He also enjoyed during the course of his education the advice of his father, who was a sensible man, and is frequently mentioned by his son with the greatest respect. About the age of seventeen he went to Athens to pursue his studies (2 'Ep.,' ii. 43-45), where he was when Brutus was raising troops to oppose Octavianus Cæsar and M. Antonius. He joined Brutus, was promoted to the rank of a military tribune (1 'Sat.,' vi. 48), and was present at the battle of Philippi, B.C. 42. Though the life of Horace was spared, his paternal property at Venusia was confiscated, and he repaired to Rome with the hope of obtaining a living by his literary exertions. Some of his poems attracted the notice of Virgil and Varius, who introduced him to Mæcenas, whose liberality relieved the poet from all pecuniary difficulties.

From his introduction to Mæcenas till the time of his death, Horace appears to have enjoyed exemption from all cares; he was intimate with Virgil, Tibullus, and other distinguished literary men in Rome, and was a great favourite of his patron Mæcenas, and also of Augustus. He resided principally at Rome, or at his country-house in the Sabine valley, which had been given him by Mæcenas. He also had in the latter part of his life another country residence at Tibur (Tivoli). Horace died on the 27th November, B.C. 8, when he had nearly completed his fifty-eighth year.

The works of Horace have been printed by Mr.

Tate, under the title of 'Horatius Restitutus,' in the order in which Bentley supposes that they were written, Cambridge, 1832. The Satires and Epistles, which are familiar moral discourses, and not poetry in the usual acceptation of the word, are the most valuable of his works. The Odes, which are little more than translations or imitations of the Greek poets, are generally written in a very artificial manner. The best are those in which the poet describes the pleasures of a country life, or touches on the beauties of nature, for which he had the most lively perception and the most exquisite relish; nor are his lyrical productions altogether without those touches which excite our warmer sympathies. The qualities in which Horace excels are good sense, judgment, and purity of taste.

The following are the most esteemed editions of Horace:—Lambinus, 1561; Heinsius, 1629; Bentley, 1711; Burman, 1713; Sanadon, 1728; Mitscherlich, 1800; the edition of Baxter, edited by Gesner and Zeune, frequently printed; Döring, 1828–29; Braunschard, 1833; and Orelli, 1837–38 and 1843–44. Horace has been translated into almost all the European languages, both in prose and verse. Some admirable translations have recently appeared from the pen of Mr. Theodore Martin.

HORDEIN, a peculiar vegetable product found in barley. It is a yellowish powder, insoluble in water. It is not found in pearl-barley, and is therefore supposed to be contained in the husk only.

HORDEUM, the genus of plants to which the corn called Barley belongs. As many as fifteen species of *Hordeum* are distinguished by Professor Kunth, in addition to which there are many varieties. The species are found wild in various places in both the Old and New World; as many as eight inhabit America.

H. distichum is the common summer Barley of England, and that which cultivators seem to prefer; its ears are not so large as those of *H. hexastichum*, but the grains are heavier. It is commonly stated to be a native of Tartary.

H. gymnodistichum, Naked Barley, a species but little cultivated now, is of unknown origin.

H. Zeocriton, Battledore Barley, or Sprat Barley, is little cultivated in England because of the shortness of its straw; its native country is unknown.

H. hexastichum. The native country of this species is unknown. It is the Bere, Bigg, or Winter Barley of farmers, and is particularly valuable for ripening quicker than the common two-rowed Barley, but its grains are lighter. To northern nations with short summers it is, however, invaluable.

H. gymno-hexastichum is extremely productive, and in some parts of Europe it is reckoned the most valuable of all. The French call it, on account of its good qualities, *orge cèleste*.

H. Aegiceras, a most curious species, found in the northern parts of India, and probably in Tartary, as its grains have been sent to England under the name of Tartarian Wheat. Its appearance is more that of wheat than of barley, and its naked grains assist the resemblance. It is, however, a genuine species of *Hordeum*. It appears to be a productive plant, but little is as yet known of its quality in this climate.

Of most of the species there are many varieties,

the most striking of which are those called Black Barleys, on account of the dark colour of their husks.

HOREB, MOUNT. [SINAI.]

HOREHOUND (*Marrubium vulgare*) a perennial herbaceous plant, a native of Britain, found growing by roadsides. It is bushy, and about one foot high, its leaves being of a whitish woolly appearance, and possessing a faint odour, which becomes less by drying. It is a tonic stimulant, much used for the cure of coughs, being a very old-fashioned and excellent remedy. It is usually made into a syrup and mixed with sugar; sometimes candied into the form of rock. Other and finer species of horehound are found in various parts of Europe.

HORIZON (*ὁρίζων*, 'bounding'). The physical horizon is the apparent circle by which the spectator's view is bounded when he is upon a level and uninterrupted plain, such as the surface of the sea. It differs from the astronomical horizon in two points: firstly, because the physical horizon dips, as it is called, or is not at the same level as the eye; and secondly, because the astronomical horizon always supposes the spectator to be at the centre of the earth, and not at the surface.

The plane of the horizon at any place is perpendicular to the direction of a plumb-line, or parallel to the surface of any fluid at rest. At sea, when it is necessary to take the altitude of any heavenly body, the physical horizon is, in tolerably fair weather, sufficiently well defined for the purpose, and, with proper allowance for its dip, is used accordingly. But in land observations with a sextant or other instrument requiring a horizon, the surface of a fluid (generally mercury) is used, which is called an artificial horizon, but might more properly be termed an artificial portion of a horizontal plane.

HORMISDAS. [POPE.]

HORN. The structure of such horns as those of the ox, antelope, goat, and sheep may be described as a number of conical sheaths inserted one into another, the innermost of which lies upon the vascular membrane which covers the bony core. The tip, or that portion of the point of the horn which projects beyond the core, is very dense, and the several layers of which it is composed are scarcely distinguishable; while towards the base the layers may be readily distinguished, owing to their successive terminations forming prominent rings. Horn appears to consist of coagulated albumen; and there is a certain chain of connection between the substance of horns, nails, claws, hoofs, the scales of animals of the armadillo and tortoise kind, of lizards, serpents, and fishes, hair, feathers, and even skin.

The principal kinds of horns employed in manufacturing operations are those of oxen, buffalo, two or three species of deer, and sheep and goats. The first process is to remove the bony core or pith, which is accomplished by steeping the horns in water for several weeks, by which operation the membrane which lies between the core and the horny sheath is so destroyed or softened by putrefaction that the cores may be easily extracted. These are applied to many useful purposes. The solid tip of the horn is sawn off with a frame-saw, and is employed for making knife-handles, umbrella-handles, the tops of whips, buttons, and various other articles. The remainder of the horn, which is employed for

purposes for which thin laminae are required, may either be left entire or sawn into two or more lengths, according to the use to which it is to be applied. When divided, the lower part, or that next the root of the horn, is frequently employed for making combs, while the portion which has formed the middle of the horn is used for lanterns and for other articles where a thin plate of horn is required. To prepare the horn for use it is softened in boiling water; and, while hot from this operation, it is held in the flame of a fire until it acquires about the temperature of melting lead, and becomes so soft as to be semi-fluid. The slitting is performed while it is in the semi-fluid state, by a strong pointed knife resembling a pruning-knife; and by the application of two pairs of pinchers, one to each edge of the slit, the cylinder or cone of horn is opened until it is nearly flat. Several such pieces are then exposed to pressure between alternate plates of iron until they are flattened. The thin sheets of horn are then scraped, rubbed, and polished.

The various articles made of horn require manufacturing processes differing in various cases. The making of combs is noticed elsewhere. [COMB-CUTTING.] Umbrella-handles, snuff-boxes, knife-handles, bell-pulls, drawer-knobs, &c., are made by softening the horn to such a degree that it may be pressed into moulds.

Horn is easily dyed of various colours; but in this country it is usually coloured of a rich reddish brown, and spotted to imitate tortoiseshell, by a mixture of pearl-ash, quicklime, and litharge, or red lead, with water and a little pounded dragon's blood.

No part of the refuse of the horn manufacture is without its value. When exposed to a decomposing heat in close vessels, horn produces a large quantity of the gaseous compound which forms the base of prussic acid, on which account hoofs and horn cuttings are in great request among the manufacturers of Prussian blue, and of the beautiful yellow prussiate of potash. The clippings of the comb-maker and of the lantern-maker are also used as manure.

Improvements in the manufacture of horn have recently been made, by which the smallest waste fragments may be united and made into a variety of articles. In France, too, a kind of artificial horn is manufactured from bones treated with muriatic acid, and converted into a horny substance by tanning.

A considerable trade has sprung up in horn—it being estimated that nearly 7000 tons, value 200,000*l.*, are now used annually in England. Sheffield alone requires about 300,000 deer horns yearly to make handles for cutlery.

In 1867 the imports of horns into the United Kingdom were as follows:—Buffalo horns, 1549 tons, value 46,803*l.*; deer horns, 311 tons, value 24,250*l.*; and horns of other sorts, 2080 tons, value 48,150*l.* In the same year 17 tons of deer horns, value 1342*l.*, and 328 tons of horns of other sorts, value 7593*l.*, were exported. The imports are chiefly from the East Indies.

HORN, a musical wind-instrument of very ancient origin, and of various forms.

The *French Horn*, or now, *par excellence*, the *Horn*, is a tube of about ten feet, very narrow at top, widening considerably at the bottom, and bent in rings for the convenience of the performer. It is not

provided with holes, as the flute, &c.; the production of the various sounds depending upon the lips of the player, the more or less pressure of his breath, and the insertion of the hand in the bell, or wide end, of the instrument. Crooks and shifting pieces are provided to adjust the instrument to different keys, or fundamental notes.

Music for the Horn is always written in the key of c, an octave higher than played, and in the treble clef; and the key in which the instrument is to be tuned is indicated by the composer.

The *Bugle Horn* is a tube of three feet ten inches in length, doubled up in a small compass. The *Keyed Bugle*, or a Bugle Horn with keys, is that now in common use, the scale of which comprehends about two octaves, with the semitones. The *Cornopean* and the *Cornet-à-Pistons*, are improved modern forms of this instrument.

The *Russian Horn* is an unjointed brass tube, conical in shape, of various dimensions: the deepest-toned is eight feet long, and nine inches in diameter at the wide end, and the highest is two inches and a half in length, by one at the wide end. The former gives A, an octave below the first space in the base; the latter gives E, the third additional line above the treble. Some of these horns have keys, producing one or two semitones, but generally every note has its separate horn; and a band of Russian Horns counts almost as many individuals as diatonic notes in a scale of between four and five octaves.

Basset Horn. [BASSET HORN.]

The *English Horn* is a deeper-toned oboe, but of rather larger dimensions, somewhat bent, the lower end very open, and is to the latter what the basset horn is to the clarinet; or what the viola is to the violin. The tone of this instrument is extremely pathetic, and by the Italians is thought so much to resemble the human voice, that they sometimes call it the *voce umana*. Its scale is from A below the treble staff, to $\sharp\flat$ above, or two octaves and a semitone.

Of late years, a Frenchman, M. Adolphe Sax, has excited much attention in the musical world by his *Sax-horns*, *Sax-trumpets*, and *Saxophones*. These instruments are a great improvement on those made in the old style, and have had a considerable influence on military music. [SAX-HORN.]

HORN, CAPE. [CAPE HORN.]

HORNBEAM. [CARPINUS.]

HORNBILL, *Hornbill family*, *Buceridae*, a group of birds of considerable size, characterized at once by the enormous and disproportionate development of their beak, and of certain cellular casques or processes surmounting the upper mandible. The generic details may be summed up as follows:—

Genus *Buceros*.—Bill long, very large, and compressed, more or less curved or falcated; base smooth, elevated, or rather surmounted by a casque or helmet-like protuberance; edges of the mandibles smooth or notched; point smooth; interior of the bill, especially the upper mandible and casque, very cellular; nostrils basal, on the surface of the beak, in a furrow, small, somewhat round, open, pierced in the corneous substance of the bill, covered at the base by a membrane. Feet short, strong, muscular; sole of the foot large. Wings moderate; the first three quills graduated; the fourth or fifth the longest.

Geographical Distribution.—Africa, India, and the island of New Guinea.

Its nearest approach, so far as structure goes, is to the Toucan; the toucan, however, in the want of a gall-bladder, agrees with the parrots; the presence of that organ in the hornbill places the bird in more relation with the crows. The disposition of the intestine in long and narrow loops also agrees with the raven. The tongue, so remarkably varied in form and use among the Scansores, resembles in the hornbill that of the carnivorous birds.

For the opinion of various naturalists as to the place these birds hold in the class *Aves*, the writings of Brisson, Linnæus, Latham, Lacépède, Duméril, Illiger, Cuvier, Vieillot, Temminck, Vigors, De Blainville, Lesson, Swainson, and others, may be consulted.

Habits, &c.—Bontius, in his description of the *Corvus indicus* (*Buceros hydrocorax*, Linnæus), says, 'It walks like the crow of our countries, but differs much in disposition from our crows, inasmuch as it feeds not on carcasses, but most especially on nutmegs, and that greedily, doing a great deal of damage to them. Their flesh also is delicate, and when roasted has an aromatic flavour from their food.' Of the *Corvus rostrocornuto* (*Buceros rhinoceros* of Linnæus), he says that it lives on the carcasses and intestines of animals, and that it waits upon the



B. rhinoceros.

hunters who kill wild cattle, boars, and stags, to gorge itself with the entrails of those animals. Cuvier considers the hornbills as omnivorous; and states that they eat tender fruits, mice, small birds, and reptiles, and do not even disdain carrion. The progressive motion of the birds of this genus, although their feet are formed for walking, is always by jumping or hopping. In a state of nature these birds live on wild fruits. In confinement they feed freely on plantains and on boiled rice. At night they perch with great security, though the largeness of the foot seems better suited to rest on the ground. M. Lesson sums up the habits of the hornbills thus:—Those of Africa live on carrion; those of the East Indies seek for fruits, especially nutmegs, and their flesh acquires from them a delicious flavour. Their flight is performed by repeated strokes of the wings, and the air which they displace, joined to the clattering of their

mandibles, occasions a great and very disquieting noise in the forests, when the cause is unknown.

The most familiar examples are *Buceros rhinoceros*, from India and the Indian Islands, and *Buceros cavatus*, from India, the Himalaya range, Java, and most islands of the Indian archipelago. This species, with others, is to be seen in most public museums.



B. cavatus.

HORNBLLENDE. [AUGITE.]

HORNBLLENDE SCHIST is a mineral commonly associated with gneiss, less frequently with mica schist, and seldom forms alone any considerable mountain mass. It follows the contortions of gneiss, and is traversed like it by granitic veins.

HORNCastle. [LINCOLNSHIRE.]

HORNE TOOKE. [TOOKE.]

HORNET. [VESPIDÆ.]

HORNGELD, a tax paid in the feudal ages for horned beasts feeding in the forest; and none could be free without a privilege granted by the king, according to the charter of Henry III.

HORNING, LETTERS OF, in the law of Scotland, were the first step of the old process under which the arrest of a debtor was competent. By a legal fiction, no person could be incarcerated for a civil debt. But on the application of the creditor, a charge or legal demand was made upon the debtor to pay within a certain period, and if this was disregarded, the debtor was denounced at the market cross of the sheriffdom as a rebel to the king, as having disobeyed the royal command to make payment to the creditor. This ceremony was performed by messengers-at-arms after three several blasts of the horn. The instrument which embodied the charge to pay, and the command of the sovereign to proceed to denunciation and horning, was from the ceremony above described, and from the form in which it was framed, called Letters of Horning; and on the execution and registration of these, letters of caption followed, in virtue of which the creditor could proceed to apprehend and incarcerate his debtor. These cumbrous and complicated forms, though by no means abolished, were practically superseded by the provisions of the Personal Diligence (Scotland) Act, 1 & 2 Vict. c. 114, ss. 5 & 6.

HOROCLOGY (Gr. *hora*, 'a defined portion of time,' and *logos*, 'a discourse'), a term usually applied

to signify that science which regulates the action of the various machines used for the purpose of measuring time. [CLEPSYDRA and SUN-DIAL.] The practice of measuring time by hours, minutes, and seconds is of comparatively recent date; yet we find improvements early made in the computation of larger periods of time, by observations of the heavenly bodies. The progress of astronomy disclosed many sources of error that had been overlooked in the movements of the more conspicuous planets, when these movements were employed to mark intervals of time. Thus time was anciently divided into years, according to the motion of the sun among the constellations; into months, according to the motion of the moon relatively to the sun's place in the heavens; and into days, by the alternate light and darkness caused by the rising and setting of the sun. The earliest attempt made to divide the day itself was by tracing the shadow of an upright object, which gave a rough measure of time by the variations of its length and position, or, in other words, by means of the sundial. Hour-glasses belonged to this plan of determining gross amounts of time by a rough and ready mechanism, and the clepsydra was contrived for the same purpose. In the former case the running of fine sand from one vessel to another was the method adopted, and in the latter the measurement of short periods of time was effected by the quantity of water dropped from one vessel into another.

History of Watch and Clock Making.—The origin of clock-work is involved in great obscurity. Some maintain that clocks were invented by Boethius early in the sixth century; and that Pope Paul I., about 760, made a present of one to Pepin, king of France, which was then supposed to be the only clock in the world; others give the honour to Pacificus, of Verona, in the ninth century, and assert that the striking part was invented by the Saracens. It is certain that a curious clock was sent to Charlemagne from the Caliph Haroun al Raschid, which the historians speak of with admiration. Mention is made of a clock having been put up at Westminster in the year 1288, during the reign of Edward I. Striking clocks were known in Italy as early as the latter part of the thirteenth or the beginning of the fourteenth century.

De Wyck's clock, made in 1364 for the emperor of Germany, was a large striking clock, going for one day, and with one hand (the hour hand), and much the same as many old church clocks at present. It had two pallets worked by a crown-wheel, and two weights on a lever to regulate the movement to time. (See Plate 1, figs. 1, 2, 3.) It appears there is still a clock in existence at Dover Castle, bearing the date 1348, earlier by sixteen or more years than that of De Wyck. In 1484–85 Waltham made a balance clock for astronomical observations. In 1560 Tycho Brahe had four clocks which indicated hours, minutes, and seconds, the largest of which had only three wheels, one having 1200 teeth. In 1577 Moesthin had a clock, whose beats enabled him to determine approximately the apparent diameter of the sun. At what time watches or small clocks were introduced, by the use of a mainspring instead of a weight as the moving power, is uncertain. The earliest portable timekeeper of which any account has been given, is one dated in 1525, made by Jacob Lech of Prague, and a good many years in the pos-

session of William Beckett, a London clockmaker. Galileo's discovery of the isochronism of the pendulum paved the way for the introduction of pendulum clocks; this was the great epoch in the history of horology, and it is probable that both Galileo and Huygens had constructed pendulum clocks before 1648, though some writers say that Richard Harris made a pendulum clock a few years earlier, viz., in 1641. In 1676 Barlow, a London clockmaker, invented the repeating mechanism by which the hour last struck may be known by pulling a string. Several artists followed in the same line, particularly Quare, in London, and Julien le Roy, Collier, Larçay, Thiout, &c., on the continent. Clocks soon afterwards were made to show not only mean but apparent time.

Clement, a London clockmaker, invented in 1680 the anchor escapement, which was a great improvement on the crown-wheel before in use; he also introduced the practice of suspending the pendulum by a thin and flexible spring. (Fig. 4, Plate 1.) The next important improvement was the adjustment of the length of the pendulum to the varied effects of heat and cold. In 1715 George Graham, by substituting a jar of mercury for the pendulum ball, succeeded in retaining the point of suspension and the centre of oscillation at an equal distance from each other. The principal objection to this pendulum is its liability to breakage, of which its author felt the full force, and in consequence suggested the idea of the compensating expansions of different metals, as a substitute for his form of pendulum. John Harrison immediately turned his attention to the subject, and by dint of perseverance overcoming all the difficulties of his humble and retired situation, not only astonished the world by his improvements in horological machines, but absolutely constructed with his own hands a timekeeper which determined the longitude within such limits as to procure him the parliamentary reward of 20,000*l*. [HARRISON.] Although the anchor escapement previously mentioned was a great improvement upon all that had preceded it, still it was subject to objections, not one of the least of which was that at every vibration a considerable recoil took place. The inconveniences of this escapement were, however, removed (about the same time with the invention of Harrison's pendulum, 1726) by Graham, who introduced what is called the dead-beat escapement, which is both simple and effective. (Fig. 7, Plate 2.) The dead-beat escapement is adopted in timekeepers when great accuracy is required. Other inventions, as the *detached escapement*, the *pin-wheel escapement*, the *gravity escapement*, in various forms and in different degrees of efficiency, have been only partially adopted. The names of Harrison, Cumming, and Mudge, whose several contrivances are shown in the Plate, are associated with contrivances of this kind.

Description of the Eight-Day Clock.—The woodcuts employed to illustrate clock and watch work are so very embarrassing to non-technical readers, that we will endeavour to give a verbal description of an eight day-clock:—There are two barrels containing springs, one to give motion to the train of wheels called the 'going' train, and the other to the 'striking' train. (See figs. 4, 5, 6, Plate 1, and fig. 6, Plate 2.) The first of these springs moves a wheel called the main wheel, which in its turn acts upon several

other wheels, whose time of rotation corresponds with that of the minute and hour hand. The last wheel of this system acts upon two little levers or pallets, which give an alternating motion to the pendulum of the clock. A *fusee*, which is a kind of spiral system of grooves, is fitted to the main wheel, and enables the main wheel to maintain an equable motion during the varying pulling force of the spring. All the above-named wheels belong to the *going* train. There is a somewhat similar train belonging to the *striking* action; but the teeth of the wheel, instead of being so cut as to facilitate the movement of two index hands, act upon certain pins and levers which move the hammer belonging to the bell: this part of the mechanism is exceedingly beautiful, especially when the clock strikes the quarters.

The action of such a clock, then, is this:—Once in eight days the clock is ‘wound up,’ which consists in coiling up the going spring very tightly in its barrel. Where the actuating force of the mechanism of the clock is a descending weight, as in the old gravitation clocks, the fusee and spring are substituted by a cylindrical barrel and a cord which is wound up on its circumference. In its efforts to uncoil itself, the spring forcibly pulls round the main wheel, with which it is placed in connection; and the fusee causes this motion to continue steadily and equably. As the main wheel cannot rotate without moving the train of wheels to which it is connected, these also rotate, with a velocity depending on the number of teeth acting upon each other. In two of the wheels these numbers are so regulated that the wheels revolve in one hour and twelve hours respectively; and the axes of these wheels serve as axes for the minute and hour hands. Meanwhile the second spring gives motion to the *second* train of wheels, which are so connected with the going wheels as to enable the bell-hammer to be moved at the proper time. One of the many kinds of pendulum, concealed behind or within the clock, is set in motion by one of the wheels, and by its isochronous or ‘equal-timed’ vibrations, tends to give regularity to the movements of the wheels generally. The gradual perfection of clocks required also improvements in the pendulum. No simple pendulum, however, can be depended on for an accurate timekeeper, for the isochronism of vibrations of the pendulum depends on its being always of the same length. Now a cord always contracts or expands with changes in the atmosphere, and a rod with cold or heat. To overcome these defects in the pendulum, the compensation pendulums of Graham and of Harrison, already referred to, were invented.

Large Pendulum Clocks.—Turret-clocks differ from other machines employed for measuring time, not only in their greatly superior size, but because such a clock is frequently required to indicate the time upon as many as four different dials, on the four external faces of the tower in which it is mounted. This is accomplished by placing the clock near the centre of an apartment, and causing the motion of the axis, which under ordinary circumstances would carry the minute-hand (which revolves once in an hour), to be transmitted by bevel-gear to a vertical rod, the opposite end of which carries a horizontal bevel-wheel nearly on a level with, and situated centrally in reference to, the four external

dials. The motion of this central wheel is communicated by four vertical bevel-wheels of the same size and number of teeth, ranged round its circumference, to four horizontal rods, the opposite ends of which, passing through the several dials, carry the four minute-hands. At the back of each dial is a series of wheels and pinions, imparting motion to the hour hand, which revolves once in twelve hours. In a turret-clock, the moving power is supplied by the descent of a weight, regulated in the case of the movement, or going train, by the oscillations of a large pendulum, and in that of the striking train by the resistance of the air to the rapid revolutions of a fly or fan set in motion by the wheel-work. Owing to the necessity for using a very heavy hammer to strike the hours in a church-clock, the power required for working the striking-train considerably exceeds that of the going train.

The escapement in this, as in any other form of horological mechanism, is of the highest importance, and the performance of the piece depends much upon its soundness of principle and excellence of workmanship. An escapement should possess the following qualities:—Being intended to keep the pendulum in motion, it should supply the necessary force with absolute regularity, so that the pendulum should vibrate to the same distance at all times; irregularities in the power transmitted through the wheel-work should not take effect upon the pendulum. The latter should be free to exercise its own peculiar governing power, and obey those laws of motion upon which the excellence of this form of movement depends. The form of escapement known as the *remontoir* or *rewinder*, has found much favour among the improvers of turret-clocks. There is an application of the *remontoir* principle known as the *gravity* escapement, referred to above, in which the weight raised acts directly upon the pendulum, the ordinary escapement-wheel being dispensed with. In the London Exhibition, 1862, a large clock was shown by Messrs. Cooke & Sons, of York, with this latter form of escapement. (See Plate 4.) In connection with this subject a word may be said about the dials of turret-clocks. The established form of dial for these is a sheet of copper made convex, to preserve its shape, and this is just the worst form which a perverse ingenuity could contrive for the purpose. The minute hand is thrown off from the surface by the convexity, and if it is bent to avoid parallax, it presents a poor appearance. Dials should be slightly concave, and the material may be of slate, stone, or cast iron.

Musical chimes require the addition of another train of mechanism to that of the ordinary turret-clock, somewhat like that which constitutes the striking train. The mechanism of the chimes very nearly resembles, on a large scale, that of a musical snuff-box; levers, connected with hammers which strike upon a series of bells, being substituted for the springs which in the musical snuff-box are caused to vibrate by the projecting pins on the revolving barrel.

In the Royal Exchange clock, London, made by Mr. Dent, many improvements have been introduced. There is a simple but strong cast-iron framing, which enables the several parts of the clock to be put together with less strain than usual. The wheels for the striking train are made of cast iron; more

durable and less costly than the usual gun-metal wheels. The wheels of the going train, smaller and requiring to be more nicely adjusted than those of the striking train, are made of hammered brass. Hollow iron drums are used instead of wooden cylinders for the driving barrels, and wire instead of hemp or ropes for suspending the weights. It was required, by the terms of contract, that this most admirable clock should have a compensation pendulum, and that it should be so constructed as not only to show perfectly correct time upon the dials, but also to tell it with accuracy by making the first stroke of the hour upon the bell true to a second. This object is attained by a beautiful arrangement of mechanism. In this clock has also been introduced a skilful contrivance for maintaining the motion of the wheels during the time of winding up, which was invented a few years since by Professor Airy for the clock-work of the great Northumberland telescope at the University of Cambridge.

Electro-Magnetic Time-Pieces.—Koosen, of Dresden, has recently introduced a peculiar construction and arrangement of what he terms a galvanic chronometer, with centrifugal regulator, which consists of an application of galvanic agency to the works of a chronometer, and of a regulation of the movements of the latter by a device for controlling the speed of the electro-magnetic machine. The improved electro-magnetic machine, as here applied, is one of rotation, and has this important property, that the accelerating force acts almost uniformly in all phases of its rotation, and that the acting power cannot be interrupted by any intervals of suspension. This is effected on the principle that the several electro-magnets, forming part of the machine, are not magnetized simultaneously, but successively; so that no actual impediment of the galvanic current can ever occur, but the current flows from the coil of one electro-magnet, after the latter has exercised its influence on the corresponding soft iron bar, directly into the coil of a second magnet, which begins to act in a similar manner to the first, on a second soft iron bar, and so the action continues.

On a brass plate, *A* (Plate 5, figs. 1 and 2), of about six inches in diameter, provided with three elevating screws, *B*, are permanently fitted three electro-magnets, *C*, with cylindrical arms, so that their six poles are directed upwards, each of which is about three quarters of an inch in diameter, the series of poles forming a regular hexagon, all six of which lie in the same horizontal plane. Both arms of the electro-magnet can be screwed off from their connecting plate, *D*, by means of short screws at *E*. The wire for the coil must be selected as thin as possible, about 1-100th to 1-200ths of an inch in diameter; it should be well covered with silk, and strongly varnished. Immediately above and as close as possible to the poles of the electro-magnets, rotate two soft iron bars, *F*, with cylindrical ends; they are screwed on to a brass pin or axle, *G*, at right angles to each other, so that their four ends or poles form a regular rectangle in a horizontal plane. The brass pin on each terminates below in a hard steel point, resting on a conical hollow, also made of hard steel, whose upper end is also provided with a steel spindle, running in brass bearings, and immediately below the spindle it carries a wheel,

which transmits the rotation of the axle by means of a system of toothed gearing to the hands of a clock, and so indicates the number of rotations of the machine or the hour upon the dial. The entrance of the galvanic current into the different coils is regulated by the commutator, *H*, consisting of a ring or disc of mahogany permanently fixed concentrically to the axle of the machine, and kept in this position by a brass bracket or arm. The upper surface of the ring is inlaid with twelve plates of silver, *a*, strongly gilt, and separated from each other by small interstices. Each plate is provided, on its outer edge, with a small hook, *b*, of silver wire, whereon to fasten one end of the wire of the coils, in such order and succession as is required by the relative positions of the magnet poles and the corresponding poles of the rotating soft iron bars. The other ends of the wire coils are permanently connected with each other, and with one pole of the galvanic battery; whilst the other pole conducts the current into the axle, *G*, thence into a brass rod, *I*, fastened to the axle at right angles, and carrying a mass of the finest gold wire, which glides easily over the different sections, *a*, of the commutator, and in this manner, as the machine rotates, guides the current into the different coils.

To produce a uniform velocity of the rotation, a regulator is fixed on the axle, *G* (fig. 2.), which consists essentially of a steel rod, *K*, through whose centre of gravity passes a steel pin or axle, *L* (fig. 3), provided at the end with conical points of hard steel, carried in fixed screws, *M*, so that the whole rod may revolve round its centre of gravity with the least possible amount of friction. The bearings, *M*, in which the axle, *L*, of the rod rests, are let into the circumference of a brass ring, *N*, which is fixed concentrically upon the axle of the machine, and rotates with it. Thus the latter will, at the smallest velocity of rotation, assume a horizontal position by the action of its centrifugal force, as soon as the brass balls at the end of the steel rod, *K*, are brought in such a position that the centre of gravity of the whole rod passes through its axis of suspension. On its lower end the steel rod carries a brass arm, *O* (fig. 2), tipped with gold or platinum, whose point, while the machine is not in motion, rests against a thin and slightly feathering plate of platinum, *P*. The galvanic current enters through the main vertical axle into the brass ring, *N*, whence it passes at *S* into the steel spring, *A*, thence, at *Q*, into the rod, *K*, from there, at *O*, into the platinum plate, *P*; a fine platinum wire, *T*, connects this plate with the brass rod, *I*, which carries the gold wire sliding on the metallic sections of the commutator, and so the regulated current enters the different coils in succession, and sets the instrument in motion.

Astronomical Clocks.—These are simply standard clocks most frequently used by astronomers, and especially contrived for them. A good astronomical clock should be as simple as possible in construction, and all resources of practical science should be drawn upon to render its parts in perfect accordance with theory. Remontoir or gravity escapements have been much favoured for these clocks by the theorist, but no perfectly successful gravity escapement has yet been introduced. But the art of horology would be incomplete unless there were some standard, independent of all mechanical contrivances, to which

all may be referred, and by which the errors of each time-keeping instrument may be corrected.

The movements of the heavenly bodies are still, as of old, the only standard for a general measurement of time, affording as they do marks of unvarying certainty, to be read by all alike; and clocks and other mechanical contrivances are individual and imperfect measures of the intervals, to be trusted only until there is a new opportunity of comparing them with the certain and public signals of the heavens. These signals can, however, only be accurately read by persons furnished with the proper apparatus, and informed sufficiently in its use. This is done in observatories, and there are now in most parts of this country sufficient opportunities of setting clocks by a communication more or less direct with these establishments. The time which a clock ought to mark is *mean time*, the definition of which will be found in the article DAY. The *mean time* at any place depends on the longitude. Supposing a clock to be set to Greenwich mean time, a clock keeping mean time of any place will be fifteen minutes faster for every degree of longitude east of Greenwich, fifteen minutes slower for every degree west. Since the introduction of railways, clocks are usually set, within Great Britain, to Greenwich mean time.

The methods by which time is determined in observatories belong to the details of practical astronomy. For the more ready transmission of correct time to the public, there is at Greenwich Observatory, as well as at some other places, a ball which is dropped by means of electricity precisely at one o'clock. Recently, however, there has been invented a most ingenious device by which public clocks in a town can be kept at every instant in perfect agreement with the mean-time clock in the observatory. This is effected by an electric connection invented by Mr. R. L. Jones of Chester, on the suggestion of Mr. Hartnup, the astronomer of the Liverpool Observatory. (For a description, see ELECTRIC CLOCK.) The earliest public application of it was to the town-hall clock in Liverpool, when for the first time was seen the curious spectacle of a great clock with works nearly 100 years old keeping time with astronomical accuracy. In the same way, a clock in the castle of Edinburgh, by whose mechanism a gun is fired precisely at one o'clock every day, is controlled by the mean-time clock in the observatory on the Calton Hill.

Mechanism of a Watch.—A pocket watch is very similar in principle to a good clock, except that the regulation of the former is by a balance and spring, and that of the latter by a pendulum. It would be a matter of some difficulty to determine what artist first reduced the portable spring-clock to the dimensions of a watch to be worn in the pocket. The small clocks prior to the time of Huygens and Hooke were very imperfect machines; they did not even profess to subdivide the hours into minutes and seconds until the invention of the balance-spring, which is to the balance what gravity is to the pendulum, and its introduction has contributed as much to the improvement of watches as did that of the pendulum to clocks. The honour of this invention was warmly contested by the last-named individuals previous to 1658; but so far as priority of publication is concerned, the honour is due to Dr. Hooke.

When clocks and watches had acquired a certain degree of accuracy in their performance, the time lost in winding up (especially when it had to be done every twenty-four hours) became a matter of importance, and there have been several inventions to remedy this evil. By Huygens the clock was kept going while winding up by means of an endless cord. The *forcing spring* gives another plan, in which a lever is so adjusted as to allow the wheels free movement while the spring-barrel is being acted on by the key. But Harrison's contrivance for the same purpose is the one now in general use, both in clocks and watches, and is admirably adapted to the purpose, as it requires no attention from the person who has to wind up the machine, but is always in its place, and ready for action the moment the operation of winding is commenced. It is generally called the *going fusee*, but a better name for it is *maintaining power*. The principle of its action depends on the mode in which the fusee is fixed into a socket connected with the main wheel, so as to allow the wheel and the fusee to rotate independently of each other when required.

Watches and Chronometers.—These have a spiral spring instead of a weight for their maintaining power. Watches seem to have been made as early as the sixteenth century, though Huygens in the seventeenth was the first discoverer of the important law respecting springs, which he enunciated in the well-known words, *ut tensio sic vis*—the force of a spring varies as the bending of it. The most simple form of mainspring arrangement for a clock or watch is that where the spring, which is a narrow strip of tempered steel, has its inner end attached to the arbor, which ends in the winding square having a ratchet set on it with the click in the clock-frame. The other end of the spring is fixed to the barrel, which is the great wheel of the clock or watch. And one advantage of this is, that there is just the same pressure on the train, or the wheels and pinions placed between the uppermost frame-plate and dial, when you are winding up as at any other time, and no going barrel apparatus is wanted. But it will be obvious, that by virtue of the rule *ut tensio sic vis*, there must be a much greater force on the train when the watch is wound up, than when it is nearly run down. Fig. 1, Plate 2, shows the general arrangement of a watch, as presented in elevation. The barrel and fusee will be recognized at once. The fusee is a sort of grooved cone, with a concave section; the more rapid swell towards the thick end is required because one turn of the fusee, when the chain is at that end, takes much more off the barrel than at the thin end; and on the assumption that the force of the spring varies as its tension, the radius of the cone must increase more rapidly, in order to make the increase of leverage keep pace with the decrease of the force of the spring, as it unwinds with an increasing velocity off the thick end of the fusee. The fusee itself is connected with the great wheel by a ratchet and click and going ratchet, parts which may be seen in fig. 1, and in the ground plan, fig. 2. Something is also required to prevent the watch from being over-wound, or the chain strained so as to break. This is done by means of a hooked lever set on a hinge in the upper frame-plate; and when the watch is nearly wound up, the chain

moving upwards, reaches this lever, and raises it in such a position that its hook catches hold of the long tooth projecting from the thin end of the fusee, and thus the winding is stopped without any strain by the sudden check. In watches without a fusee, the apparatus for preventing them from being overwound is different; it goes by the name of the Geneva stop. Its principle is simply this: If two wheels work together, of which one has the spaces between some two or more adjacent teeth filled up, it is evident that that wheel cannot be turned quite round. It will be the same thing as if one of the wheels is only a cylinder with a single tooth in it, and the other has a certain number of notches not going all round, through which the teeth can pass. The other parts of a watch do not differ from those of a clock, except in size, and the position in which the parts are arranged to bring them within the circle of the dial, until we come to the escapement, and there a different state of things arises.

The word *escapement* is a term applied to a combination of parts in a clock or watch, which has for its object the conversion of the circular motion of the wheels into a vibratory motion, as exhibited in the pendulum. The component parts include the scape-wheel, the pallets with their arbor or axis, and a bent lever attached thereto, called the crutch, which last piece maintains the motion of the pendulum, see fig. 4. In a watch this combination consists of the scape-wheel, together with all those parts lying between it and the balance, and which are concerned in converting the circular motion of the wheels into the alternating one of the balance. The pallets act upon or between the pointed teeth of the scape-wheel by a reciprocal or oscillatory motion.

The balance of a watch moves (figs. 4, 5, 6, and 7, Plate 3), sometimes through a space equal to 270° , while a clock pendulum only vibrates through 4° or 5° . The balance being common to all watch escapements, it will be proper first to describe that, and the conditions to which it is subject. The two equal arms with equal weights at each end are really a balance just as much as the wheel, which is commonly used as the more convenient form. The compensation balance consists of two arcs attached by one end to a cross connecting bar, having the other end free to move. These arcs being composed of thin strips of steel and brass, the bars being outside, are so affected by the heat as to curve inwards, carrying the weights nearer to the centre, and thus diminishing the effective diameter of the balance, at the same time that the strength of the spring is relaxed. But the centre of gravity of these arcs or bows does not approach or recede from the centre in a straight line. The decrease of temperature straightens the arcs, the increase curves them in greater degree. The metals forming the compensation balance of the watch are generally soldered together by pouring melted brass round a solid steel disc, and the whole is afterwards turned and filed away till it only leaves a cross bar lying flat in the middle, and the two portions of the rim lying edgewise. The first person who practised this method of uniting them, appears to have been Thomas Earnshaw, whose skill brought the chronometer to the state in which it has remained for the last eighty years with scarcely any alteration. Kulberg's balance (figs. 5 and 6, Plate 3) is a contrivance, the

distinguishing feature of which is that the rim, instead of being upright, is saucer-shaped, causing the balance to flatten itself in the cold. This tendency is promoted by making the radial bar compound, and increasing its action by tripling it laterally, so that the term 'gridiron balance' has been erroneously given to it.

The Keyless Watch.—This was first introduced in Switzerland, and, as applied to the going barrel of the Swiss watch, is a comparatively simple affair, consisting merely of two or three steel wheels actuated by a button, the stem of which passes through the pendant, and has cut upon its end a bevelled pinion. The arbor of the going barrel being stationary, except when the winding of the watch takes place, does not necessitate any contrivance for throwing the winding mechanism out of gear, and only an arrangement is needed for connecting the hands with the wheels when it is desired to set the watch to time. It is unnecessary to enter into further detail respecting this mode of construction. Figs. 1, 2, and 3, Plate 3.

The method of a keyless watch possesses a considerable advantage besides the mere convenience of being independent of a key; for as there is no occasion to open the watch, the case may be made to fit more closely, and the air more completely excluded. Consequently it will go longer without cleaning, and the thickness and cost of a double back to the case are saved.

The number of clocks imported into the United Kingdom in 1867 was 251,355, valued at 263,291*l*. Nearly the whole came from the United States, France, and Holland. In the same year, 11,454 clocks, valued at 20,425*l*., were exported, the majority being sent to Australia and India. Of watches received in 1867, almost exclusively from France, there were 119,697, valued at 189,183*l*.; and exported, chiefly to Egypt and the Channel Islands, 9040, of the value of 61,141*l*.

HOROLOG'GIUM (Constellation), the Clock, a southern constellation of Lacaille. It is cut by a line passing through Canopus to the southern part of Eridanus.

HORREBOW, PETER, a Danish astronomer, was born in the year 1679. After studying medicine for several years, he became the pupil of the celebrated mathematician and astronomer Olaus Roemer, whom, in 1710, he succeeded as professor in the University of Copenhagen. Horrebow died at Copenhagen in 1764, at the advanced age of eighty-five years, leaving a considerable number of works.

HORROCKS, JEREMIAH, often written Horrox, an astronomer who has obtained a lasting celebrity, though he died at the age of twenty-two, or thereabouts. Jeremiah Horrocks was born, it is supposed, about the year 1619, at Toxteth, near Liverpool. His father, a man of moderate means, placed him, before 1633, at Emmanuel College, Cambridge, and there he soon began to turn his attention to astronomy. During the time in which the Court and Parliament were occupied in the disputes which led to civil war, four men, three of them very young, and all personally acquainted with each other, were employed in advancing the theory and practice of astronomy. Three of them died very young, and their names had almost perished, and would probably

have been lost, but for the more than usual talents of Horrocks. Though the papers which Horrocks left behind him contain many good observations and ingenious remarks, he must now be considered as known by two particulars. He was the first who saw Venus on the body of the sun, and who remarked that the lunar motions might be represented by supposing an elliptic orbit, provided that the eccentricity of the ellipse were made to vary, and an oscillatory motion were given to the line of apsides. Newton afterwards showed that both suppositions were consequences of the theory of gravitation.

The account given by Horrocks of his observation of Venns, November 24, 1639, entitled 'Venus in Sole Visa,' was printed by Hevelius at the end of his 'Mercurius in Sole Visus,' published at Danzig in 1662. The remainder of the works of Horrocks were published by Dr. Wallis, London, 1672, some copies bearing the title-page 'Opera Posthuma,' and others 'Opuscula Astronomica.' The death of Horrocks took place January 3, 1641 (old style).

William Crabtree, who died a few months after his friend Horrocks, at a very early age, was a clothier at Broughton, near Manchester, and many of his observations were printed by Wallis in the work above cited, and afterwards in the discussion about Gascoygne, presently to be mentioned.

William Milbourn, curate at Brancespeth, near Durham, was, according to Sherburne, well versed in algebra, having extracted the approximate root of an equation of the fifth degree before he had seen Harriot's work. In astronomy he had, by his own observations, detected the errors of Lansberg's tables, and verified those of Kepler.

William Gascoygne, of Middleton in Yorkshire, was killed, at an early age, fighting for Charles I. at Marston Moor. He invented methods of grinding glasses, and Sherburne states that he was the first who used two convex glasses in the telescope. When Auzout announced, in 1666, his invention of the micrometer, Richard Townley, nephew of Christopher Townley, presented Hooke with a modification by himself of a similar instrument made by Gascoygne; and it appeared, from a letter written by Crabtree to Horrocks, that Crabtree had seen Gascoygne use an instrument of the kind. It appears now to be generally admitted that Gascoygne was the original inventor of the wire micrometer, of its application to the telescope, and of the application of the telescope to the quadrant; but that the invention was never promulgated, even in England, until the undoubtedly independent inventions of Auzout and Picard had suggested their publication.

HORS DE COMBAT, a French term, meaning 'out of the fight,' disabled. When a combatant or an army is incapable of further action, completely beaten, they are said to be 'hors de combat.'

HORSE, the family of *Equidae*. Cuvier places the horse in the solipedous section of the Pachydermata, quadrupeds which have only a single toe on each limb apparent, incased in a hoof, although there are on each side of the metacarpus and metatarsus stylets which represent two lateral toes. Cuvier considers that one genus only is comprehended in this group or family, viz., *Equus*, the characters of which he gives as follows:—In each jaw six incisors, which in youth have their crowns hollowed by a pit, six molars

on each side above and below, with a square crown, showing four crescentic pits, besides which, in the upper teeth is a little disc on the internal edge. The males, moreover, have two small canine teeth in the upper jaw, and sometimes in both jaws: these are almost always wanting in the females. Between these canines and the first molar is a vacant space which corresponds to the angle of the lips; it is here that the bit is placed, by means of which alone man has come to subdue these vigorous quadrupeds. The stomach is simple, and of moderate size; but the intestines are very long, with an enormous cæcum. The teats are inguinal.

Gmelin, in his 'Systema Naturæ,' gives a species of horse which he calls *Equus bisulcus*, the *Equus pedibus bisulcis* of Molina, 'Hist. Nat. Chili.' This was a Llama, and Gmelin was deceived by the term *Equus* used by Molina. We shall pass over as unworthy notice all the various fabulous kinds of horses, described by Aldrovandus and others.

Mr. Gray considers the *Equideæ* as consisting of two genera, viz., *Equus* and *Asinus*, and many modern zoologists have adopted his views.

In *Equus*, the mane is long and flowing, the tail densely covered to its root with long hair, the hinder legs as well as the fore-arms are furnished with warty callosities. In the coat of the horse, moreover, there is a disposition to the formation of small round spots or rings of a different shade or hue from that of the ground; and this is the case whether the general colour be black, chestnut, or gray.

In *Asinus*, the mane is short, meagre, and upright; the tail is furnished with long hair only towards its extremity; there are warty callosities on the fore-arms, none on the hinder limbs. The ground-colour of the coat is more or less whitish (in the wild species), always with a distinct dorsal line of a dark tint, with stripes or bands of the same colour more or less pervading the body and limbs.

Col. H. Smith separates from the genus *Asinus* those species which are banded like the Zebra, and applies to them the title of *Hippotigris*, but this cannot be considered as a generic section.

Genus *Equus*.

The Horse (*Equus caballus*), in a state of domestication, varies in size from the massive and gigantic dray horse to the diminutive Shetland pony. Its colour is also as variable as its size, ranging through white, cream-tint, gray, mottled, iron-gray, dun, bay, chestnut, black, &c. It, moreover, presents us with different strains, how produced originally it is not easy to say; certainly the high-blood racer and the slight meagre Arab present strong contrasts in their contour and capabilities to the heavy Flanders horse and the huge dray horse rising from 18 to 20 hands high at the withers. Between these two extremes there are numerous intermediate breeds, some adapted for the chase, some for carriages and light-wheeled vehicles, some for the traveller's saddle, and some for farm-house labour. Ponies again, a small variety of the horse, show differences of a like nature—some are finely formed, full of mettle and courage, and show high blood—others are clumsy and ill-formed, though strong and hardy; and the intermediate gradations are numerous.

It would appear that the horse was first domesticated or reclaimed in the east, that it was brought

with the hordes migrating westward from Asia, and was thus introduced into Arabia and Egypt, and that we must look to the deserts north of Hindustan and Persia as its cradle, or at least as the locality in which it first became subject to man.

It seems, from their fossil remains, that various species of horse were once spread over Europe, Asia, and even North and South America. Fossil remains of a horse were brought home by Captain Beechey from the mudcliffs of Eschscholtz Bay, in North America; they were found associated with those of the mammoth and fossil ox. To this we may add Mr. Darwin's observation, that 'horses' bones mingled with those of the mastodon have several times been transmitted for sale from North America to England; but it has always been imagined, from the simple fact of their being horses' bones, that they had been accidentally mingled with the fossils.' In South America Mr. Darwin found the fossil tooth of a horse, together with one of the extinct toxodon at Santa Fé, in the red clayey stratum of the Pampas, and also part of another tooth at Bahia Blanca, imbedded with numerous other remains of extinct *Edentata*, in a beach which was covered at spring tides. In the caverns of Minas Geraes, a mining district of Brazil, the relics of a species of horse have been found in considerable abundance.

With the mastodon, the megatherium, the mylodon, &c., the indigenous horse has long disappeared from America; but in the present day man has refilled its place by the importation of the domestic stock from Europe, and now on the pampas and the prairies troops of wild horses scour the plain in perfect freedom, the descendants of a domestic race born and reared in slavery.

Formerly, according to Oppian and Pliny, wild horses existed in Scythia, Thrace, along the Danube, and even in Europe: according to Varro, they were found in Spain. Oppian says that wild horses existed in Ethiopia; and according to Julius Capitolinus, it was from Africa that the Gordianus procured eighty wild horses for the spectacles of Rome. Leo Africanus states that wild horses inhabited the deserts of northern Africa, an assertion to which Pennant alludes.

Genus *Asinus*.

Of this genus one species has been domesticated from the earliest ages, and is now spread over nearly all the world. We allude to the Ass (*Asinus vulgaris*), the subdued descendants of one of the wild species which roam the great Asiatic deserts. We may here observe that the members of the present genus are comparatively numerous, and are divided between Asia and Africa.

Some confusion appears to obtain among the Asiatic species of *Asinus*, which requires yet to be cleared up. The following is the result of our researches:

1. The Dziggetai, Djigetai, &c. (*Asinus hemionus*, Pallas), the great wild ass, or Ghoor-Khur, characterized by a simple dorsal line, without a shoulder-stripe. Locality, Persia, Bucharia, Tartary, Tibet, South Siberia, and India.

2. The Khur, or wild ass of Persia, described by Sir Robert Kerr Porter (*Asinus Hamar*, Col. H. Smith). Mane black, no dorsal stripe or cross; smaller than the Dziggetai, with the head heavier in proportion; swift.

3. The Kiang (*Equus kiang*, Moorcroft), described

by Moorcroft, and which he says is decidedly not the wild ass (dziggetai) of Scinde. Locality, the eastern parts of Ladakh. Colour light reddish chestnut; jaw, neck, legs, and belly white; mane dun; ears moderate; height about 14 hands; swift. Very little is known of this species.

4. The Onager, Koulan, or Wild Ass (*Equus onager*), the reputed origin of our domestic race. [Ass.] A distinct dorsal stripe and crossbar over the shoulder. In winter the coat of this species becomes fine and undulated. Gregarious, migratory, fleet. Locality, the country of the Khirgis, the Bucharians and Kal-mucs, and northern Persia. It is also found west of the Euphrates, and in Syria, Arabia Petrea, and Northern Africa.

5. The Yo-To-Tzé (*Asinus equulus*, Colonel H. Smith). The specimen Col. H. Smith describes and figures, was said to have come from some part of Chinese Tartary. Height about three feet. General colour reddish clay; tips of the ears, mane, and long hair on the tail, black; black dorsal line and broad cross bar; three or four cross streaks over the knees and hocks.

Perhaps the Koomrah of North Africa and the Wild Ass of the same region are identical. The Koomrah figured by Col. H. Smith is more asinine than equine in appearance.

The African species are:—

1. The Zebra (*Equus zebra*). Locality, mountain districts from Caffraria eastward to beyond Mozambique; gregarious.

2. The Dawu, or Burchell's Zebra (*Equus Burchellii*). Locality, the vast plains of Southern Africa north of the Gariap. Harris states that it is never found south of that stream.

3. The Quagga (*Asinus quagga*). Locality, the plains of South Africa.

4. The Congo Dawu, or Hippotigris of the ancients, and exhibited in the Roman spectacles. Locality, Abyssinia and Nigritia. The legs are not striped to the hoof as in the zebra. This species is termed by Col. H. Smith *Hippotigris antiquorum*. If an admitted species, it may stand in the present arrangement as *Asinus hippotigris*. It is closely allied to the dawu.

5. The Isabella Quagga (*Asinus Isabellinus*), a wild ass of a pale yellow colour, seen by Le Vaillant in large herds in South Africa.

Hybrids.

The ass and horse breed together. The offspring of a male ass and a mare is termed a mule—of a female ass and a horse, a hinney. The latter is valueless; not so the former. Mules have been produced from the mare and the quagga. The following mules of the equine family have been produced and reared in the gardens of the Zoological Society:—

1. Mule between Burchell's dawu (male) and ass (female). 2. Mule between common zebra (male) and ass (female). 3. Mule between dziggetai (male) and ass (female); fleet and beautiful. 4. Mule between zebra and Exmoor pony; the mule very little striped about the legs. 5. Mule between zebra and dziggetai.

We can here only briefly allude to a strange physiological fact, that the characters of the male parent of the mother's first progeny show themselves in her subsequent offspring by other males. A young mare

belonging to the earl of Morton, after producing a female hybrid by the quagga, had afterwards a filly and then a colt by a fine black Arabian horse. Both resembled the quagga in the dark line along the back, the stripes across the forehead, and the bars across the legs. In the filly the mane was short and stiff; in the colt it was long, but so stiff as to arch upwards and hang clear of the sides of the neck. In other respects they were nearly pure Arabian.

The fossil remains of *Equidae* are abundant and widely spread through the pliocene period of the tertiary series. The species appear to have been numerous.

Economical Uses and Diseases of the Horse.—The horse is naturally herbivorous; his thin muscular prehensile lips, his firm and compressed mouth, and his sharp incisors, are admirably adapted for the purposes of seizing and cropping the grass; so flexible, indeed, are the lips, that the horse can pick up with ease the last few grains of oats in the manger. The crushing power of the grinders is extraordinary, the muscles of the lower jaw being of vast volume and energy; hence vegetable fibres, grass, grain, &c., are comminuted to a pulp. Nevertheless, it is doubtful whether in his natural condition the horse would select grain, were it obtainable, in preference to grass. The grinders in time become much worn by its attrition, and in many old horses the grain is only partially crushed, and consequently affords little nutriment. Hence, as a general rule, grain should be bruised before being put into the manger.

As the age of a horse is ascertained by an inspection of its teeth, or rather its incisor teeth called nippers, a knowledge of the process of dentition, and of the exact character of the incisors at different periods of a horse's life, is indispensable to the veterinarian, the dealer, and the purchaser. But let not the purchaser, however knowing he may think himself, trust to his own judgment. So many artful and indeed barbarous tricks are played by horse-dealers to give an apparent age to a colt, and thereby enhance its value, and after maturity to give the teeth that appearance which they would have when the animal had but just attained to its prime of vigour, that even good practical men are often deceived.

The general management of the horse is a matter of serious consideration. The treatment of the foal, the best time for weaning (at five or six months old), the breaking in of the colt, and the proper method to be pursued (on the principle of kindness, not of tyranny or brutal usage) according to the breed and destination of the animal; the training of the racer, the hunter, the roadster, the coach-horse; the amount of labour to be exacted from the working horse in the waggon, the cart, the plough; the diet required under every different phase of labour, and at different seasons of the year; the kind of water (soft, if possible) to be given, and the quantity daily under different circumstances; all these are most important matters to be attended to.

Again, with respect to the anatomical structure of the foot; the qualities of the hoof; the nature and use of the frog; the bearing of the pastern bones on the coffin bone, with their ligaments, tendons, nerves, and bloodvessels; and the inference to be drawn, on physiological principles, as to the proper method of shoeing the hoof, according to the destined work

of the animal and the nature of the ground upon which it has to work; these form additional points of great importance to which the veterinarian has to devote deep attention.

What is the proper *conformation of the Horse*?

This varies essentially with the breed and destination of the animal. Nevertheless there are some points which are valuable in horses of every description. The head should not be disproportionately large, and should be well set on; *i.e.*, the lower jaw-bones should be sufficiently far apart to enable the head to form that angle with the neck which gives free motion and a graceful carriage to it, and prevents its bearing too heavy on the hand. The eye should be large and a little prominent, and the eyelid fine and thin. The ear should be small and erect, and quick in motion. The lop-ear indicates dulness or stubbornness; and when it is habitually laid too far back upon the neck, there is too frequently a disposition to mischief. The nostril in every breed should be somewhat expanded: it can hardly be too much so in the racer, the hunter, the roadster, and the coach-horse, for this animal breathes only through the nostril, and it would be dangerously distressed, when much speed is required of him, if the nostril could not dilate to admit and to return the air. The neck should be long rather than short. It then enables the animal to graze with more ease, and to throw his weight more forward whether he is in harness or galloping at the top of his speed. It should be muscular at its base, and gradually become fine as it approaches the head. The withers should be somewhat high in every horse, except perhaps that of heavy draught, and it does not harm him, for there is larger surface for the attachment of the muscles of the back, and they act at greater mechanical advantage. A slanting direction of the shoulder gives also much mechanical advantage, as well as an easy and pleasant action, and a greater degree of safety. It must not, however, exist in any considerable degree in the horse of draught, and particularly of heavy draught. The chest must be capacious, for it contains the heart and the lungs, the organs on which the speed and endurance of the horse depend. Capacity of chest is indispensable in every horse, but the form of the chest admits of variation. In the waggon-horse the circular chest may be admitted, because he seldom goes at any great speed, and there is comparatively little variation in the quantity of air required; but in other horses the variation is often fearful. The quantity of air expended in a gallop is many times that required in hard work. Here we must have depth of chest, not only as giving more room for the insertion of the muscles, on the action of which the expansion of the chest depends, but a conformation of the chest which admits of that expansion. That which is somewhat straight may be easily bent into a circle when greater capacity is required; that which is already circular admits of no expansion. A few words more contain almost all that is necessary to be added on the conformation of the horse:—‘The loins should be broad, the quarters long, the thighs muscular, and the hocks well bent and well under the horse.’

(See Plates ‘Horse,’ 1 and 2, for illustrations of the bony skeleton and muscular system of the horse.)

Diseases of Horses.—In the medical and surgical treatment of the horse a knowledge of the anatomy

and physiology of the animal is absolutely essential, and forms a basis for an accurate acquaintance with the numerous diseases which befall the horse, their symptoms, prognosis, and mode of treatment; the properties of the medicines, vegetable or mineral, employed, the effects of chemical combinations, and the various doses from which certain effects result. Wounds, fractures, dislocations, ulcers, and a whole class of what are called surgical diseases requiring manual as well as medical treatment, demand a union of the surgeon and physician in the same practitioner. Do not then dabble in physic or surgery, but as there are cases in which common sense will guide you, namely, those in which promptness alone can save, act boldly; the horse will die if you do not, and can but die if you fail. It is in cases of sudden congestion of the brain, threatening apoplexy, that this promptitude is especially needed. Suppose that you are driving or riding a high-fed horse, one perhaps that has been pampered and kept for some time out of work; suddenly he stops, reels, staggers, and falls, and then plunges violently and desperately. What is to be done? Bleed instantly—if possible before the horse falls. If you have no lancet or fleam, a sharp penknife will do. Few, however, could obey our injunction. Bleeding can only be learned practically, and we would therefore recommend every traveller and every man who keeps horses either for luxury or for necessity, to learn the art of bleeding, and to have a lancet ever in readiness about him.

Horses were formerly liable to different rates of excise duty according to height, but in 1869 all distinctions were abolished, and a licence of 10s. 6d. per annum is now required to keep any kind of horse except those used solely for agricultural purposes.

In the year 1867 the number of horses imported into the United Kingdom was 1468, of the value of 33,710*l*. Of this number 291 came from France, 202 from Holland, and 503 from Iceland. In the same year 4136 horses, value 177,651*l*., were exported, chiefly to Hamburg, Belgium, and France.

HORSE-CHESTNUT. [*Æsculus*.]

HORSE-FLY, more properly called *Forest Fly*, is an insect of the order *Diptera*. It receives one name from its frequent occurrence in forests, and the other from its power of teasing horses. It is about four lines long, brown colour, with two wings. It has a remarkable tough skin, which renders it hard to be killed. It lives by sucking the blood of quadrupeds, chiefly horses, but also dogs, oxen, sheep, &c.

HORSE-GUARDS, a public military establishment, situated in Whitehall Place, Westminster, to which all official communications relative to the British army are transmitted. Here are the offices of the commander-in-chief, quartermaster-general, adjutant-general, &c., and here the commander-in-chief receives all applications, either personal or otherwise, relating to the army. Much of the business formerly transacted by this department is now administered by the secretary-at-war.

HORSE-GUARDS, ROYAL, is the third heavy cavalry regiment of the household brigade. It has always been a fine corps of heavy cavalry, and has served in numerous important campaigns. The uniform is a steel helmet, with plume, a steel cuirass over a blue coat, leather breeches and top-boots. The horses are black. The regiment consists of

eight troops, the total cost of which for the year 1869-70 was 24,066*l*., distributed amongst 436 officers and privates. The colonel has 1800*l*. a year; the pay of officers varies from 8*s*. to 29*s*. a day; non-commissioned officers, from 2*s*. to 4*s*.; and 335 privates, 2*s*. 0½*d*., and additional allowances.

HORSE-POWER. A term used in mechanical engineering to express the unity of comparison of the power of steam, or water-power machines, which is based upon the assumption that a horse is able on the average to perform a certain definite quantity of work within a given time. Engineers differ in their estimates of the value of an average horse-power, some reckoning it to be equal to 27,500, some to 29,000, and others to 33,000 lbs. raised one foot high per minute. The latter estimate was the one adopted by Watt, and it is also the one most generally followed both by English and foreign engineers. In calculating the power of a steam engine in terms of this unit, the general rule is to multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet, and the number of strokes per minute, the result divided by 33,000 will give the horse-power; but it is necessary to deduct about one-tenth of the whole, as an allowance for friction.

HORSE-RADISH. [*Cochlearia*.]

HORSE-SHOEING. Although persons practically acquainted with the matter had long been aware that the general method of shoeing horses was the source of many evils, no real improvement was made simple enough to be carried into general effect until a very recent period. The objection to the old method was, that by rasping and cutting the foot was made to fit the shoe, and not the shoe the foot, and the consequence was that the horse could never assume its natural position. Its hind shoes were generally furnished with large heel calks, which elevated the heels an inch or more, and placed the bearing upon a tripod, formed by these calks and by the point of the toe. The frog, intended by nature to be an elastic organ, and to be the medium through which the foot feels the ground, was so lifted up that it could never exercise its functions. It became hard, dry, and useless, and was pared away by the farrier at each renewal of the shoes. On a declivity, or when checked, the horses slipped and staggered, and when at rest their bent knees and quivering limbs testified to the pain and weariness produced by the unnatural attitudes in which they were forced to stand, which was exactly like a man with tight boots.

In 1860 Mr. Goodenough, an American, invented and patented the shoe we are about to describe, and has succeeded, we think, in securing all necessary protection to the hoof, and in removing, or reducing to a *minimum*, the bad effects of earlier methods. The principle laid down by Mr. Goodenough is that the shoe should resemble, and preserve as far as possible, the natural shape of the hoof of which it is a continuation. The unshod horse has the under surface of his foot on a generally level plane, the frog and the whole margin of the hoof in contact with the ground, and the surface of the sole, between the frog and the margin, somewhat raised by its own concavity. The Goodenough shoe is made precisely to follow the outline of the hoof for which it is intended, and to reach exactly to the bars, never

projecting at all beyond the heel. Its upper surface is perfectly plane and true; its under surface is generally concave from the outer to the inner margin, the outer margin having, however, a narrow flat bearing upon the ground, and this bearing is interrupted by portions of the margin being cut away, so as to leave a central toe calk, and two smaller calks on either side. The elevation of these calks is inconsiderable, and their general level is the same, so that they may be compared to a series of short claws on the under surface of the shoe. In the notches, or spaces between the calks, the nail-holes are bored and counter-sunk, so that the nail-heads are completely buried in the shoe. For frost, shoes are made in which the calks have no flat bearing, but are brought up to a feather edge. The inner margin of the shoe is thin, so that its outline passes insensibly into that of the sole, and presents no projections by which stones or snow can be retained. The method of preparing the foot and of applying the shoe is as follows:—

In the first place, a shoe which precisely fits the outline of the hoof is selected from the stock. If a proper fit cannot be found, any slight alteration is made by a few blows on the cold iron, or, if heating be necessary, the shoe is made cold again before it is applied, and care is taken that it remains perfectly level and true. The farrier then prepares the hoof by cutting or rasping away the surface of that portion of the crust on which the iron will rest, leaving the centre of the sole and the frog and bars untouched. Having given what he judges to be a true level to this marginal seating for the shoe, the shoe is applied cold, and the hoof is rasped again and again until horn and iron come into perfect contact in every part. As a guide to the use of the rasp, the surface of the shoe is ruddled, so that any portions of horn not touched by it remain uncoloured. The adjustment being correct, the shoe is nailed on in the ordinary way.

When the shoes are put on for the first time it will often happen that the frog, dwarfed and deformed by previous ill-treatment, does not reach the ground at once, and for some hours, or even for a day or two, the horse may experience the same kind of inconvenience that would be felt by a man who was taken out of very high-heeled boots, to which he was accustomed, and made to walk on level soles. But a very short time restores the muscles of the leg to their natural equilibrium, and relieves the latter discomfort, while, after a few shoeings, the frog reaches the ground fairly and fully, forming an elastic wedge which gives the horse a conscious and safe foothold upon every surface. The sole also grows somewhat within the circle of the shoe and forms a shoulder by which the firmness and security of the latter are greatly increased, so that fewer and smaller nails are required. At first, too, it is necessary to have a considerable thickness of iron, in order to supply the place of the horn usually removed by the excessive cutting of the ordinary farrier; but when the hoof has grown to its natural proportions, smaller and lighter shoes are sufficient.

Mr. Goodenough's system was only introduced into this country in 1868. It was at first tried in England on 200 horses of the London General Omnibus Company. Two months afterwards some of

these horses and some shod in the old method, with high-heel calks, were brought together for inspection, and the improvement was so great that the new plan was at once adopted, and is rapidly becoming general.

It is manifest that a shoe with a perfectly true and level surface, and of a regular pattern, can only be made economically by machinery. Machines have been designed, and a plant consisting of five parts now turns out 18,000 pairs of shoes in a week. The first machine cuts prepared bars of iron into lengths; the second punches the nail-holes at the proper degree of obliquity, so that the nails cannot be driven into any sensitive part of the foot; the third splits the lengths so as to separate each into the two shoes that it is intended to form. The separate portions are then heated, bent round a kind of mould to the proper shape, and, lastly, pressed to the required level. The size of the shoe is determined by the length of the bar, the shape by that of the mould around which it is bent.

HORSE-TAIL. [EQUSETUM.]

HORSES, TAMING OF. The subjugation of vicious or intractable horses, by which they can be rendered docile and obedient to the requirements of man, is a matter of serious consideration; and various methods have been pursued to effect so desirable an object. We have already stated that the general management of the horse must not be by 'tyranny or brutal usage, but by kindness;' and Youatt, in his valuable treatise on the subject, says, that 'it is surprising how soon, under a system of kind management, the animal which has been accustomed to go where he pleased, and to do as he thought fit, may be taught to yield up his will to another, and to obey with alacrity his master's bidding. If there is a kind-hearted and faithful servant about the premises who will undertake this task, the breeder is fortunate; for without this, he is often compelled to resign his colt to the tender mercies of a colt-breaker—a man who seldom has any conception of obtaining his object by the moral influence which kindness would give him over the youngster, but who has too frequent recourse to violence, and that of the most outrageous kind, until the colt becomes a dull, dispirited, useful, but desponding and ill-treated slave through life, or cherishing a deep feeling of wrong and a spirit of revenge, becomes determinedly vicious and dangerous.'

Some years since much interest was felt in England on the subject of horse taming in consequence of the success of a Mr. Rarey from America, whose method of curing a wild or kicking horse is to tie up one of his fore feet, so that his hoof will appear bottom upwards, and nearly touching his body. There is no process in the world, he says, equal to it for breaking a kicking horse. He will sometimes become very restive, and try every possible way to get down the leg; but on finding he cannot do that, he will soon become settled down; and when you perceive that he is subdued, advance gently towards him, let down his foot, rub his leg with your hand, caress him, and let him rest a little; then put the leg up again; and by repeating this process several times, the horse will soon learn to walk some little distance on three legs. Let him be the most vicious horse in the world, he cannot kick in this position. When he has been taught to understand that you do

not intend to hurt him, you can let down the leg, and drive along gently without further fear or trouble.

HORSHAM. [*SUSSEX.*]

HORSLEY, SAMUEL (born 1733, died 1806), a distinguished prelate of the English church, successively bishop of St. David's, Rochester, and St. Asaph. He was the son of John Horsley, who held two rectories. The bishop was educated at Westminster School, from whence he passed to Trinity Hall, Cambridge, and his father resigned to him the rectory of Newington in Surrey.

In 1767 he was elected a Fellow of the Royal Society, to which body he became the secretary in 1773. In 1776 he projected a complete and uniform edition of the philosophical works of Sir Isaac Newton. This design was not accomplished till 1784. In 1781 he had been appointed archdeacon of St. Albans; and it was a little before that date that he first appeared in the field of theological controversy. The person against whom he chiefly directed his attack was Dr. Joseph Priestley, a minister among the Presbyterian dissenters, who in a series of publications defended the doctrines of philosophical necessity, materialism, and unitarianism. Dr. Horsley began his attack in 1778 on the question of Man's Free Agency; it was continued in a Charge delivered in 1783 to the clergy of his archdeaconry.

The tide of preferment now began to flow in upon him. Thurlow, who was then chancellor, presented him with a prebendal stall in the church of Gloucester. In 1788 he was made Bishop of St. David's. In 1793 he was translated to Rochester, and in 1802 to St. Asaph. Bishop Horsley's 'Sermons' have been published in 1 vol. 8vo. and in 2 vols. 8vo., his 'Charges' in 1 vol. 8vo., his 'Biblical Criticism' in 4 vols. 8vo., and his 'Theological Works' in 8 vols. 8vo.

HORTA. [*FAYAL.*]

HORTEN, a town of Norway, 32 miles south of Christiana, on the gulf of that name. It is the chief military port of the kingdom, and station of the fleet, and has an arsenal and extensive building yards.—(*Johnston's Gazetteer.*)

HORTENSIVS, QUINTUS, born B.C. 114, of an equestrian Roman family, had attained a great reputation as an orator when Cicero made his appearance in the Forum. From that time Cicero and Hortensius were considered as professional rivals, but they lived on friendly terms. At the beginning of his book 'De Claris Oratoribus,' Cicero pays an eloquent tribute of praise to the memory of Hortensius, who was then lately dead. Hortensius was successively quaestor, ædile, prætor, and lastly consul, with Q. Cæcilius Metellus Creticus, B.C. 69. He acquired great wealth, which he spent liberally, and yet bequeathed an ample inheritance to his children. Hortensius died B.C. 50. Cicero ('Brutus,' c. 92, 95) has given his opinion of the character of Hortensius as an orator.

HORTICULTURE. [*GARDEN.*]

HORTUS SICCUS. Literally, 'a dry garden;' an appellation given to a collection of specimens of plants carefully dried and preserved.

HOSEA, one of the twelve minor Hebrew prophets. We possess no particulars respecting the place of his birth or his history; but we learn from the inscription of the book that he was the son of Beeri, and that he lived 'in the days of Uzziah, Jotham, Ahaz

and Hezekiah, kings of Judah, and in the days of Jeroboam the son of Joash, king of Israel.' It is therefore probable that the prophecies of Hosea extended over a period of about sixty years (B.C. 784–724), and that he was contemporary with Isaiah, Micah, and Amos.

The canonical authority of the prophecies of Hosea has never been disputed. They are frequently quoted in the New Testament; compare Hos. vi. 6 with Matt. ix. 13, xii. 7; Hos. x. 8 with Luke xxiii. 30; Hos. xi. 1 with Matt. ii. 15; Hos. i. 10, ii. 23 with Rom. ix. 25, 26, and 1 Peter ii. 10; Hos. xiv. 2 with Heb. xiii. 15.

HOSHUNGABAD, a district or subdivision of British India, known as the Saugor and Nerbudda territory, in the north-west provinces. The area is 1916 square miles, and the population numbers 242,641. The district is very fertile, and has coal of superior quality, but the distance from the sea-coast is a great drawback to its being worked.—*Hoshungabad*, the chief town, is situated on the left bank of the Nerbudda, 114 S.W. Saugor, in lat. 22° 44' N., and long. 77° 44' E.—(*Johnston's Dictionary of Geography.*)

HOSIERY. The principal seat of the hosiery manufacture in England is in the three midland counties of Leicester, Nottingham, and Derby. In the first of these, woollen hosiery forms the principal branch of the manufacture, while in Nottinghamshire the material chiefly used is cotton, and in Derbyshire silk goods are mostly made.

The stocking-frame, by means of which this manufacture is carried on, is, next to the common warp and weft loom, the oldest machine in existence applicable to textile fabrics. It was invented about the close of the 16th century by the Rev. William Lee, of St. John's College, Cambridge, but a considerable time elapsed before the produce of this frame took the place of the trunk-hose then worn by all who could afford such an article of dress. For this reason Mr. Lee settled at Rouen, in Normandy, where his manufacture was carried on under the patronage of Henri IV.; but the assassination of the king and the political troubles brought on by that event caused the abandonment of Mr. Lee's establishment, and that gentleman shortly after died in a state of poverty at Paris.

From the period of its first invention the stocking-frame received no considerable improvement until very recently. Frames, however, with a rotatory action, and worked by steam power, have been brought into use at Nottingham, and will doubtless ere long entirely supersede the old reciprocating engine, as the economy effected in the process of manufacture is very great. The working of a rotatory machine impelled by steam power, in which twelve stockings are made at the same time, only requires the attendance of a man and a boy; whereas, in the old frame, but one stocking can be made at once by a single workman. The cotton branch of the hosiery manufacture differs from the woollen and silk in the relative proportions of the cost of labour as compared with that of the material. In cotton hosiery the cost of labour constitutes from two-thirds to five-sixths the value of the goods; while in woollen the labour does not exceed two-fifths of the value; and in silk goods the proportion is still smaller.

It is difficult to describe the processes of the hosiery manufacture without the use of many woodcuts, and even then the routine is not well understood without seeing the machines really at work.

In its more general application the term hosiery includes gloves, waistcoat pieces, pantaloons, drawers, braces, webs, comforters, caps, jackets, leggings, and various other articles made nearly in the same way as stockings, and of the same material. The processes for worsted, cotton, and silk are nearly analogous; those for silk, however, requiring the greatest care. Ireland has produced some of the finest specimens of hosiery in the world—a dozen pairs of ladies' full-size stockings weighing only nine ounces. The exports of cotton hosiery from the United Kingdom, in 1866, comprised 613,425 dozen pairs of stockings and socks, value 240,534*l.*; 29,761 dozen pairs of gloves, value 8962*l.*; 53,040 dozen pairs of shirts and drawers, valued at 57,582*l.*; and hosiery of other kinds valued at 146,759*l.* Of silk hosiery of all kinds exported, the value was estimated at 23,897*l.*; and of woollen—including 189,473 dozen pairs of stockings and socks, 33,297 dozen shirts, drawers, &c.—307,782*l.* The countries which received the largest quantities of each description were Australia, India, and the United States.

The imports of hosiery in the same year—both cotton and woollen—were valued at 88,982*l.*, nearly the whole of which came from Hamburg.

The principal seat of the cotton hosiery manufacture abroad is at Chemnitz, in Saxony, where, owing to the low rate of wages, goods are made, with yarns imported from Lancashire, at prices which have rendered them formidable competitors to English goods in many foreign markets, especially those of the United States.

HOSPICES are institutions founded and generally supported by monks, as resting-places for travellers on the Alpine passes. The oldest of these is on Great St. Bernard, and others are found on St. Gothard, Mont Cenis, the Simplon, and the Little St. Bernard.

HOSPITAL (from the French *hôpital*, and of which the word *spital* is a contracted form), a place endowed for the reception of the sick or support of infirm persons. Hospitals intended merely for the relief of poor and indigent persons in England are called ALMS-HOUSES. At an earlier date hospital signified a place of shelter and entertainment for travellers upon the road, more especially for pilgrims. Many of the charitable endowments in England are called hospitals. They are generally incorporated bodies, and often have schools attached to them, in which the children are sometimes boarded as well as educated. The name is, however, now more generally restricted to places for the reception of sick or wounded persons, and such hospitals are very numerous in the United Kingdom. In London the chief exceptions are the Foundling Hospital, for the reception of illegitimate children abandoned by their fathers; Christ's Hospital, an educational establishment; St. Luke's and Bethlehem Hospitals, for lunatics; and Chelsea and Greenwich Hospitals, for the reception of soldiers and seamen. Medical and surgical hospitals are established in almost every large town in the kingdom, and in London they are numerous. The oldest, and perhaps even yet the

most important, is St. Bartholomew's, founded in 1547; St. Thomas', changed from a religious establishment to a medical hospital in 1551; and Guy's, opened for the reception of patients in 1725. These are supported by endowments, and are very wealthy; but most other hospitals in London, as well as nearly all in the country, depend mainly upon voluntary contributions for their support. As to the management of their revenues and general superintendence, hospitals are on the same legal footing as other charities.

In addition to their value as a means of relief in disease, hospitals are naturally the very best schools of medicine, and nothing is so certain to secure a physician or surgeon a good private practice, as the knowledge that he has considerable hospital experience. Most hospitals are open by night as well as day to receive pressing cases, and there are always a surgeon and assistants in attendance. Visiting physicians, each of whom generally superintends special classes of complaints, also attend daily.

In the general report of the last census of the United Kingdom, the commissioners divide the hospitals for the sick in England into three classes:—General Hospitals, in which are received as in-patients or treated as out-patients, according to the urgency and severity of the cases, persons suffering from diseases (with certain exceptions), accidents, injuries, and deformities; Special Hospitals, which receive patients suffering from one class of diseases, as fever, small-pox, cancer, or consumption; and Class Hospitals, which receive only one description of persons, as soldiers, sailors, women, children, &c. In some parts of England hospitals are called infirmaries. Dispensaries are medical charities for out-patients only, who are often visited at their houses.

Exclusive of the patients in the military and naval hospitals, and in the sick wards of workhouses, prisons, &c., there were in hospitals in England and Wales, on the day of the last census, 10,414 patients, of whom 5970 were males, and 4444 females. In 1851 the number did not exceed 8617, and the increase of 1797 persons enumerated in these establishments may be ascribed to the additional accommodation for the sick afforded through the erection of new hospitals, and the enlargement of those already established. The above figures give the ratios of 1 in 1927 of the population in civil hospitals in 1861, and 1 in 2080 in 1851.

By far the highest ratio of the sick in hospitals is found in London, where 17.0 males, and 12.6 females in every 10,000 of each sex were enumerated in these institutions, which contained 4102 out of the 10,414 patients. Many of the patients come from the country, attracted by the great reputation of the medical staff of the metropolitan hospitals, or are sent up by country practitioners.

Although the primary design of these institutions is to afford a refuge to persons who are unable to pay for private medical or surgical aid, there is good reason for believing that their benefits are not mainly conferred on those for whose special relief they were established, but frequently on workmen in receipt of high wages, and their families, who are scarcely to be regarded as proper objects of such charities. That the class of artisans and other working-men in our towns are, when employed, well able to set aside a

small sum from their earnings to join a sick club or other provident society to provide for the evil days of sickness cannot be questioned; but it is said by competent judges that the indiscriminate manner in which gratuitous medical relief is afforded at the hospitals, more especially in London, only tends to encourage in the workman habits of improvidence.

Of late years the various matters connected with hospital administration have received the most careful attention of the medical profession and others well qualified by long experience to speak with authority on such subjects. The labours of Miss Nightingale may be said to have created a new era in hospital management, and the reforms advocated by that lady are now being carried out in some of the most important of these institutions. (See *Notes on Hospitals*, a third edition of which has been published).

Hospitals are found in most European countries, the *Maison Dieu* in Paris being the oldest, and one of the largest and best conducted, in the world. In many of the continental institutions the Sisters of Mercy render invaluable assistance in nursing, dispensing medicine, and in cooking, &c.

HOSPITALS, MILITARY, are of three kinds, viz., the Regimental, under the medical officers of the regiment; the Divisional, presided over by staff medical officers, for the benefit of all the corps in the division; and the General, for the use of the whole force. Soldiers while in hospital are subjected to a stoppage of 9*d.* a day from their pay if abroad, and 10*d.* if at home. The estimated amount of stoppages for 1867-68 was 79,839*l.*; and the total cost for medical establishments, services, and supplies for the same year, 275,589*l.* The medical staff comprises 331 persons, at a cost of 114,066*l.* per annum. The general hospitals at Netley and Woolwich figure for 4884*l.*, medicines cost 29,731*l.*, and the expenses of the purveying department were estimated at 129,152*l.*

HOSPITALS, NAVAL, are similar establishments for the cure of sick and wounded seamen. In England there are naval hospitals at Haslar, Plymouth, Haulbowline, and a lunatic asylum at Yarmouth. Abroad the English navy possesses hospitals at Malta, Bermuda, Jamaica, Cape of Good Hope, and Hong Kong.

HOSPITALLERS. [MALTA, KNIGHTS OF.]

HOSPODAR is the title of the persons formerly sent by the Turkish sultan to govern Wallachia and Moldavia, the two provinces north of the Danube. These governors for more than a century were taken from the principal Greek families of the Fanar [FANARIOTES], such as Mavrocordato, Soutzo, Calimachi, Ypsilanti, &c. They assumed the title of princes, and were addressed as 'most serene highness.' They held in their respective capitals, Bucharest and Jassy, a numerous court, consisting chiefly of Fanariote Greeks, and were, in fact, almost absolute sovereigns during the time of their administration. This, however, might be shortened at the pleasure of the Porte, who often recalled them, and put them to death. At the time of the Greek revolution in 1821, the hospodar of Moldavia escaped into the Russian territory, and his relative the hospodar or prince of Wallachia was poisoned. Afterwards the government of the two principalities was vested in one hospodar, elected separately by each; but in

1861 the provinces were united under the name of Roumania, and the present governor, Colonel John Alexander Couza, who was elected hospodar of Moldavia, January 17, 1859, and of Wallachia, February 5, 1859, is now styled John I., prince of Roumania.

HOST (*hostia*, 'a victim') is the name given in the Roman Catholic church to the consecrated bread used in the sacrament of the eucharist. It is made of fine flour, unleavened, in the form of a wafer, and usually has some device or inscription on it, having reference to the sacrifice. The Greek church and Protestants generally use leavened bread for the same purpose.

HOSTAGE, one given in pledge for security of performance of conditions. In warfare it is usual, when a town surrenders, for besiegers and besieged to give into each other's hands several officers as pledges that both sides will duly carry out the terms agreed upon. Should either party fail, the other has the right to put to death or punish in any way the hostages, though it is seldom that any severer measures than ordinary imprisonment are carried out. When the terms of treaty are fulfilled, the hostages are exchanged.

HOT-BED, a name given by gardeners to a heap of fresh stable litter in a state of fermentation, upon which a glazed box is placed for the cultivation of certain plants requiring heat and moisture in greater quantity than those agents exist in the external air. Formerly hot-beds were more exclusively used for various purposes in horticulture than they now are. This is owing to the perfection to which other means of producing and applying artificial heat have now attained; but still, for the growth of cucumbers and melons, raising seeds of tender annuals, and of other plants, either culinary or ornamental, hot-beds continue to be advantageously employed, as they likewise are for the striking of cuttings.

Hot-beds may be formed of various substances, such as unrotten dung, tan, leaves, or a mixture of these with moist litter; in short, any substance capable of producing and retaining fermentation, and which will admit of being built up so as to support a frame with sashes. The substance, however, that is most generally used is fresh stable-dung. The preparation which it requires consists in its being thrown in a heap, and also watered, if it contains much dry litter; and, as fermentation proceeds, it should be turned two or three times, and mixed thoroughly in the process.

The situation in which hot-beds ought to be formed should be dry, open to the south, and well sheltered in every other direction, either by walls backed by high and close-growing trees, or by very close and lofty hedges. Such extensive shelter, though desirable, cannot always be obtained; but some mode should be employed to break the force of sweeping winds. The basis on which the bed is to be formed should be marked out from four to six inches each way beyond the dimensions of the frame intended to be placed upon it; and if faggots or a layer of brushwood be laid as a foundation, it will admit heat completely under in case a diminution of heat in the bed requires the application of a *lining*, which is a quantity of fresh materials added to the outside. The bed is then built of successive layers of the prepared materials, each layer being beaten tolerably

compact with the fork as it is laid on, to the height of four feet in front, and four feet nine inches at the back: the sides and ends should be quite perpendicular. The top layer should be as free from litter as possible. When thus finished, the frame and lights are placed upon it, and as soon as the violence of the fermentation has diminished, mould is put in; and when the latter has acquired a proper temperature the plants are introduced. Instead of mould, rotten tan, or leaf mould, or sand, is spread over the surface of the bed, when pots containing seeds or cuttings are to be plunged.

As soon as the heat of the bed begins to decline, a *lining* of fresh materials must be applied. This, however, may be composed of substances that have not undergone any previous fermentation, and may consist of fresh stable-dung, merely shaken up as it is placed against the sides of the bed, or of grass mowings, or of leaves, or of a mixture of such substances. It sometimes happens that, notwithstanding every precaution as to its formation, a hot-bed will become too hot for plants or seeds that may have been placed above it. In this case the only remedy is to remove the plants until the bed has been re-made, with the addition of some materials, the fermentation of which is slower and less violent. Gardeners sometimes attempt to avoid the trouble of doing this by piercing the sides of the hot-bed with holes for the egress of heat; but this is seldom an effectual remedy for the evil.

HOT BLAST. In ironworks, a current of heated air injected into a furnace by means of a blowing-engine. It has been found that by employing heated air instead of cold air in blowing furnaces, a great saving is effected in fuel, and a great increase in the quantity of iron produced. The temperature to which the air is raised before it enters the furnace is about 600° Fahr. Furnaces constructed on this principle are called hot-blast furnaces, of which the invention is due to Mr. Neilson, of Glasgow.

HOT-HOUSE, in Horticulture, is a structure in which exotic plants are cultivated under circumstances approximating as closely as possible to those under which they naturally exist; or it is used for accelerating the production of flowers and fruits of either indigenous or exotic plants. Hot-houses appropriated to the latter purposes are very frequently termed *forcing-houses*.

The principles by which the construction of hot-houses must be governed have reference to the three great agents in vegetation—*heat, moisture, and light*.

With regard to *heat*, the building must provide for a sufficient amount to raise the internal temperature of the house, from that of the lowest degree of external air that occurs in this climate, to that of the highest which prevails for any length of time in the countries of which the plants intended to be introduced are natives.

Moisture is of very great importance, and a due proportion of it is frequently more difficult to maintain in the atmosphere of the house than heat, and more so by some modes of heating than by others. It therefore follows that, as all applications of fire-heat have a tendency to produce too great a degree of dryness, that mode is the best for the growth of plants which allows the greatest quantity of vapour to remain uncondensed in the atmosphere of the house.

Some tribes of exotic plants, natives of the torrid zone, are adapted for existing under a very dry atmosphere. Instead of developing a thin expanded foliage, they form thick succulent masses, which no degree of atmospheric dryness seems to injure. Plants of such a nature necessarily require a *dry stove*. In tropical countries the air is saturated with moisture during the night, or at least it is but very rarely otherwise in the open air. But if due precautions be not taken, and temperature only is attended to, without regard to moisture, a degree of dryness will prevail at night in hot-houses, which is double that of the tropic during the day. Artificial heat having therefore this excessive desiccating tendency, the necessity becomes obvious of adopting such modes of construction and heating as will afford the best means not only of supplying but of maintaining moisture; for vapour may be raised till the air of the house is at the point of saturation, and yet causes may operate so as to occasion a speedy condensation and a consequent dryness.

Light cannot be admitted too freely into hot-houses. This will appear evident from the circumstance of the most transparent medium that can be used reflecting a great proportion of the sun's rays when they impinge obliquely on its surface.

Although the necessity of admitting as much light as possible is now generally acknowledged, and although in cloudy weather great advantage will be derived from a roof rendered as transparent as possible, yet the generality of tropical plants do not thrive in bright sunny weather when placed near the glass of a hot-house in this climate; and the necessity of a screen of netting will appear obvious from the effects of solar radiation observed in the tropics as compared with, what is rather surprising, the still greater energy of the same in this country.

With regard to the means of supplying artificial heat, the old system of using brick flues is now rapidly being superseded by that of hot water. Hot-water pipes, once fitted up, require no repairs for many years; whereas the brick flues must be frequently broken up in order to clear out the soot. By hot water the distribution of heat can also be better regulated, and the uniformity of temperature better maintained, than by any other known means. The methods of heating by hot water are various, and steam, forced through pipes, has also been extensively used as a heating agent.

With regard to a supply of moisture, the hot-water system, in which the pipes are level, or nearly so, presents several advantages over other methods of heating.

Various modes of ventilation are in use. It should be so contrived as to be sufficiently effective in preventing excess of heat; but at the same time it should be perfectly at command, so that it may be employed when requisite in the most limited degree. No method should be finally adopted until it is put to the test by trying whether, under any agitation of the external air, a candle will burn steadily inside if placed near the apertures by which the air is admitted.

In all forcing-houses tanks should be placed for supplying water of a temperature more suitable to the nature of the vegetation than that from a pump out of doors. Nothing can be more injurious than

cold water applied to the roots and tops of tropical plants, or others in a forcing state, under a high temperature. The rain and dews which supply the plants of warm climates cannot be much below the mean temperature of the climate; and if only equal to the minimum, still it would be between 20° and 30° above that of spring-water in Britain.

Hot-houses may be classed under four different heads, namely, the *Dry Stove*, the *Damp Stove*, the *Bark Stove*, and the *Forcing-house*.

The *Dry Stove*, as the name implies, is used for the cultivation of plants which do not require much water: such as the different species of Cacti, some Euphorbias, and other succulents of like habits. The temperature of such a house during the winter months should never exceed 55° Fahr. No water should ever be given at that period, unless the plant shows signs of suffering from want of it. In spring, or early in summer, most of the plants will show an inclination for growth, and then they may be watered about twice a week. During summer fires may be discontinued, and plenty of air given in fine weather.

The *Damp Stove* requires treatment of an opposite description. Instead of being kept dry like the last, its atmosphere should be always excessively humid, except in the winter season, when the sky is generally cloudy, and the sun's rays weak. Various methods are adopted to keep the atmosphere in this saturated state. When the house is heated with common smoke flues, the most simple way is to throw water frequently upon them, and also upon the passages and other places, from which it will evaporate, and surround the plants with a moist atmosphere. It is a very bad plan, but one too often practised, to water at random, giving all the plants almost an equal share, regardless of their different capacities. Some will require a very abundant and constant supply, whilst others will almost live on the atmospheric moisture which surrounds them. Another thing to be attended to in the treatment of this stove is the placing of the plants. They must be regularly looked over, tied up, and kept clear of each other; elevating some, depressing others, and giving the whole, not only enough of room, but also a natural appearance. The temperature should be, in winter, 55° or 60° Fahr.; in spring it may be gradually raised to 70°; and during fine weather, in the middle of summer, fires may be discontinued for about three months; but the thermometer should never be allowed to sink lower than 60°.

The *Bark Stove*, when it is of large dimensions, consists of a pit in the middle of the house, surrounded by a brick wall, leaving as much room round the sides as will form a passage to walk in. The pit is filled with bark (commonly called tan, from its having been used previously by the tanners), and, after being allowed to sink a little and ferment, the pots containing the plants are plunged more or less deep as prudence may suggest. A bark bed is found useful in the cultivation of all those kinds of plants which are grown in the damp stove; orchidaceous plants, for example, succeed admirably in this way. The treatment of it, so far as the temperature, watering, and syringing are concerned, is precisely the same as for the damp stove.

What are called *Palm-houses*, *Musa-houses*, *Orchidaceous-houses*, &c., are merely damp stoves of dif-

ferent dimensions, for the cultivation of those different subjects.

The only other hot-house distinct from those already noticed is the forcing-house. [FORCING.]

Hot-house plants are peculiarly liable to the attacks of insects. The most common kinds are the Green-fly, Thrips, Red-spider, Brown-scale, and Mealy-bug. The first of these is easily conquered by fumigating the house with tobacco, or syringing the plants with an infusion of the same substance. The best remedy for the thrips and red-spider is to syringe well, and keep the house very moist and warm, as those insects cannot live in excessive moisture; a little of the flower of sulphur shaken upon the leaves will also destroy them. The brown-scale and mealy-bug are the worst of all that infest plants in hot-houses. Bruised laurel leaves strewn upon the passages and other parts of the house are said to destroy them, but these must be used with great caution, as they may not only kill the insects but the plants themselves. Various other substances are said to destroy them, but, after all, the best and surest remedy is to wash them off. This is perhaps rather difficult where these little intruders are numerous, but after the plants are once clean, it is an easy matter, with a little attention and diligence, to keep them so.

HOT-WALL. Hot-walls, or walls with flues in them, are constructed in cold countries, in order to afford warmth to trees placed against them, so as to counteract the effects of frost in autumn, when the wood and buds are maturing, and in spring, when the blossoms and leaves are unfolding. If hot-walls are used for these purposes only, they are productive of great benefit to the plants which they shelter; but if, as often happens, in addition to this it is attempted by their aid to advance the ripening of fruit in any considerable degree, hot-walls are of very doubtful service.

One furnace is allowed for heating about forty feet of wall, that is, twenty feet on each side of the place where the fire is situated. The flues are led as obliquely, and make as many turns from right to left, as is consistent with their drawing well, so that as much heat as possible may be given to the tree, and as little as possible escape by the chimney. Occasionally, glass frames or screens are placed in front of the tree.

HOTEL, the term applied to an inn or place of temporary accommodation for travellers. It is derived from the French *hostel* or *hostellerie*; but in that country it is not exclusively applied to houses of public accommodation, but is also used to designate the town residence of a great personage, as the word inn, in England, was once applied to the city residences of distinguished individuals. The inns of ancient times were generally only suited for the humbler classes of travellers, and at many refreshment was gratuitously distributed to poor wayfarers. With the introduction of Christianity, the duties of hospitality and the claims of religion for a long period rendered inns unnecessary—more especially when monastic establishments became general. But with the advance of civilization and the consequent increase in the number of travellers, it became desirable to establish places where food and shelter could be procured and paid for as a matter of business.

Hence the origin of the modern inn, which, in England especially, soon attained to a position of respectability and importance. A good idea of many of the old London inns is given in 'The Curiosities of London,' by Mr. Timbs; and descriptions of the English inns of the last century are met with in the writings of Johnson, Goldsmith, Fielding, and Smollett. They have also been celebrated in elegant prose by Washington Irving; and in many of Dickens' works are laments over their departed glories. The great changes effected in travelling by the introduction of railways have resulted in many of the good old-fashioned English inns being converted into, or superseded by, hotels—buildings of a much more pretentious character. In fact, some of the more recently erected—such as the Charing Cross, Grosvenor, London Bridge, and Langham, in London, and the Grand hotel at Brighton—are quite palatial structures, the first mentioned being certainly one of the finest buildings in the metropolis. All of those mentioned were built and are managed by joint-stock companies, and as regards accommodation are at least equal to most of the magnificent continental hotels. One of the chief reasons of the greater expense of living at an English hotel is, that the foreign system of taking meals at a *table d'hôte*, and, of course, thereby materially lessening the general charges, has never become popular in this country—owing, perhaps, to our national reserve and exclusiveness.

In the United States the hotels, or boarding-houses, are by some preferred to private houses as places of residence. They are conducted somewhat on the continental plan, *i.e.*, the meals are supplied in the *table d'hôte* style at a common charge, including everything but wines and spirits, of about 10s. 6d. per day. Many of them are very splendid establishments, and contain from 180 to 800 rooms each.

The law with respect to English hotels and the liability of innkeepers, is laid down in the article INN.

HOTMAN, FRANCOIS, called also by his Latinized name HOTOMANUS, was born at Paris in 1524, of a family originally from Silesia. He studied law in the University of Orléans, and afterwards practised at the bar. About 1547, when he embraced the Reformed religion, his father refused him his support, and Hotman repaired to Switzerland, where he taught humanities in the College of Lausanne. In 1550 he was appointed professor of law at Strasburg. He afterwards became professor of law at Valence, and then at Bourges, from which last place he ran away, after having concealed himself during the massacre of St. Bartholomew, and repaired to Geneva, and then to Basel, where he died in 1590. His works, in three volumes folio, were published in Geneva in 1599.

HOTTENTOTS. [AFRICA; CAPE OF GOOD HOPE.]

HOTTONIA, a genus of plants belonging to the natural order *Primulaceae*. It is a native of Great Britain in ponds and ditches, and is called the Water-violet. The leaves are submerged and crowded; the flowers rising above the water are of a purple and yellow colour. It is a pretty plant, but possesses no useful properties.

HOUBIGANT, CHARLES FRANCOIS, a priest of the Oratory, and an eminent biblical scholar, was born at Paris in 1686. His devotion to study pro-

duced a serious illness, which terminated in total deafness. Being thus incapacitated for public duty, he directed his principal attention to the study of Hebrew, in which he followed the system of Masclef, who was a strenuous opponent of vowel points. In 1732 Houbigant published his 'Racines Hébraïques,' and in 1746 his 'Prolegomena' to a new edition of the Hebrew Bible. His great work, entitled 'Biblia Hebraica cum Notis Criticis et Versione Latina ad Notas Criticas facta,' appeared at Paris in 1753, in four volumes folio. Houbigant died October 31, 1783, in the ninety-seventh year of his age.

HOUBRAKEN, the name of two Dutch artists, father and son:—

Arnold Houbraken, the father, was born of a good family at Dort in 1660, and was the pupil of Samuel van Hoogstraten. He painted history and portraits, and executed many designs for booksellers. He lived chiefly at Amsterdam. Houbraken is best known by his account of the lives of Dutch painters, with portraits engraved by his son, in continuation of Van Mander—'Groote Schouburg der Nederlantsche Konstschilders en Skilderessen,' in three parts, published in 1718, 1719, and 1721. Houbraken died in 1719.

Jacob Houbraken was an admirable engraver. He was born at Dort in 1698. The most beautiful specimens of Houbraken's engravings are some of 'The Heads of Illustrious Persons of Great Britain,' published in London by the Knaptons in 1748. He died in 1780.

HOUGUE. [MANCHE.]

HOUND (German, *Hund*), a term generally applied to dogs of chase, and most strictly to those which follow their prey by the sense of smell. Nevertheless, it is popularly applied to such as hunt down game by sight, as the Scottish Deerhound and the Greyhound, or Gazehound. [BEAGLE; BLOOD-HOUND; GREYHOUND; HARRIER.] Our ancient breeds of hounds have merged into lighter and swifter races. Of these the Foxhound takes the pre-eminence in speed, vigour, and endurance.

HOUNSLow. [MIDDLESEX.]

HOUR, HOUR-CIRCLE, HOUR-LINE. The first word means the twenty-fourth part of a day, by what revolution soever the day may be measured. In angular measure, it signifies the twenty-fourth part of a complete revolution, or 15°. The division of the day into hours is very ancient. It was probably known to the Babylonians and Egyptians, and from them derived by the Greeks and Romans. They, however, only confined their division to the natural day—while the sun was above the horizon—which they divided into twelve parts. Consequently the length of the hour constantly varied, but the system, with the addition of a similar division of the night, continued till about the fourth century, when the present plan was adopted. Except in Italy—where the day is reckoned from sunset to sunset, and the hours counted from one to twenty-four—all European countries commence the day at midnight, and divide it into two parts of twelve hours each. The Chinese hour is twice the length of ours, they having only twelve for both day and night. Astronomers reckon from mid-day to mid-day, counting one to twenty-four.

Any great circle on the sphere which passes

through the two poles is called an hour-circle, because the hour of the day is known when that circle of the kind mentioned is ascertained upon which the sun is for the time being. But the two semicircles into which the poles divide such a circle belong to different hours, and are twelve hours asunder. In fact, it is a *semicircle* which is spoken of under the term *hour-circle*.

The hour-lines of a dial are the lines on which the shadow falls at different hours, and are the intersections of the hour-circles with the plane of the dial. In the times preceding the common use of clocks, the science of dialling was of considerable importance, and many works were written on the subject, in which the forms of such instruments were varied without end, and also the methods of constructing them.

HOUR-GLASS, a glass instrument for measuring intervals of time. It consists of two bulbs of glass, united by a narrow neck, with a hole communicating one with the other. One end is partly filled with fine sand, of sufficient quantity to run through the neck into the other end in a given time—an hour, if it is to be an hour-glass; a minute, if a minute-glass. Hour-glasses were formerly much used in churches.

HOUSE. The degree of comfort exhibited in the arrangement of their houses is one and a very important characteristic of a nation's degree of civilization; and we may mark the progress of this civilization in its successive stages from a rude condition to a high state of perfection by studying the architecture of a people as shown in their ordinary dwellings.

There is a model in the British Museum representing, most probably, a part of an Egyptian house. It appears, to judge from the figures, to be about ten or twelve feet square, and fourteen or fifteen feet high. It is called a granary. In the lower part of this model, which has two stories, there is a court, the angles of the walls of which are raised a little higher in a sweep. The door into the court is low and roughly constructed, the hinges being merely wooden pins let into a socket above and below. The stairs leading to the upper part appear to be formed of a solid beam placed *aslant*, and the steps notched out. The walls are plastered. The roof appears to have been flat. There are three clamped and partly framed square-shaped doors to the mouths of the granaries.

Vitruvius (vi. 10) gives a general description of a Greek house, which differed from the Roman in not having a vestibule and atrium; and the Greek practice of separating the apartments of the females from those of the males led to an entirely different internal arrangement.

The modern Greek house is of a quadrangular form, with a court in the interior; the staircases are placed on the external part of the house, leading to a gallery round the first floor. The entrance is in the centre of the quadrangle; over the entrance is the sitting apartment of the women; a bow-window is placed in this apartment, over the door. In the lower story the cattle are often placed. The women's apartments are separated from the men's, as was the custom among the ancient Greeks. Many Greek houses are exceeding mean and ill-furnished.

The most perfect remains of ancient Roman houses are at Pompeii. Those called the house of Pansa and the house of Sallust are especially remarkable for

their size and grandeur. The Pompeian ruins exhibit the dwellings of both the rich and the poor; the latter are small and meanly finished; the former are in comparison extensive, and often richly decorated with columns, paintings, and mosaics. The principal features of a Roman house are the atrium, the tablinum, and the peristyle. The *atrium* is a kind of central quadrangular hall or court, having in the middle an *impluvium* or tank to catch the rain-water which falls through an opening in the roof. The *tablinum* is a kind of passage, paved with mosaic, which leads from the atrium to the *peristyle*. This peristyle is a second and larger quadrangle, supported by pillars, and having a basin or fountain in the centre. On all sides of these quadrangles are the various domestic apartments.

The walls of Roman houses were decorated with arabesque paintings, which added an agreeable charm to the light and airy apartments of a hot climate.

Three centuries ago English houses were constructed in a very different manner from the houses of the present century. The chief materials were wood and plaster, and a common but peculiar feature was the projecting upper floors. The internal arrangement was adapted to the wants of that day, and the external architecture had often a picturesque appearance. The modern English house, which is most commonly of brick, varies in its arrangement according to the wealth of the occupier, or the skill and taste of the architect. The houses of the middle class, especially in cities, are nearly the same in their chief features.

The floors of English houses are constructed of wood, and boarded; and the roofs, which are pitched, or at an angle, are covered with slates or tiles. The rooms are heated with open grates, with flues over them, the exit for which is above the roof.

The chimney-flue is a very important feature of an English house, as upon its construction depends the comfort of having the apartment free from smoke.

The staircase of an English house is usually constructed of wood, with a protecting baluster, often elegantly formed, on one side.

Every convenience which ingenuity can contrive is now found in the numerous minute arrangements and details of English houses, even of those which do not belong to the wealthy class. Those luxuries which the richest nobles could not formerly procure at any price, are now at the command of every man of a moderate income. We are, of course, here speaking of really well-built houses; for of late years the demand for 'genteel' villa residences, in the suburbs of London and other large and prosperous towns, has become so great, that speculating builders have been induced to erect houses of the very worst description. They are generally showy, but built only to sell, and mainly of a very unsubstantial character.

The houses of the poorer classes are too often negligently built. In their construction, economy, convenience, and a wholesome ventilation, should be mainly kept in view, and these may be united with as much picturesque beauty as the nature of the materials will admit of without increasing the expense. In cottages of two stories, the upper should be warmed by a flue from the fire in the lower; in order to effect this, the vent ought to be carried up the middle, with its sides as thin as possible. In a single cottage of

twelve or fourteen feet square, the conveniences should consist of a common dwelling room on the ground floor, and a sleeping apartment on the upper floor, which should be partitioned off to separate the sexes.

The English and Scotch cottages differ in their external appearance and arrangement. The walls of the old English cottage were formed of clay, mud, or turf, kept together and strengthened with upright pieces of wood and with wooden braces; the roof was steeply pitched. In order to keep the walls dry, the eaves of the roof were continued downwards beyond the top of the wall and projected from it. The chimneys, which formed the main strength of the building, were generally carried up singly in one or both ends of the building, and for the most part they projected on the outside of the wall. The roof was covered with straw, reeds, or slate. The front walls being low, the windows were made much longer than high, and the long lintel, or head part of the window, was supported by one or more upright pieces called *munnions*, or *mullions*. The frames for the glass revolved on hinges with an upright axis, and were glazed in borders of lead stiffened by cross pieces of wood or iron, called saddle-bars. The best English cottages of recent construction are built of brick and covered with slate. The use of these materials has changed the character of this class of dwellings; and the progress of sanitary knowledge has led to the introduction of numerous improvements in their internal arrangements. In many cottages the chimney-stack forms the principal bearing of the floors and roof.

The Scotch cottage contains two apartments on the ground floor, usually spoken of as 'but and ben'; this is also a matter of necessity, as they are seldom raised more than one story. The material for the walls is most commonly stone; the roof is large and heavy in appearance, and has but a small projection beyond the walls. The windows and doors, being without the projecting label, are not so well protected from the rain; the walls, however, are thick, and the window openings, on account of the size of the stones, are narrow; the windows slide vertically, being placed in a frame. The chimneys are either carried up in one or both gables, or in a partition wall, which separates the two apartments in the length. The old roofs of thatch, turf, or heath, have given place to slate and tile. But the houses in the Scotch cities and towns are built in what are called 'flats,' communicating by a common staircase, and each flat or story containing accommodation for one or more families.

As the French and Italians of the middle classes do not generally live in separate houses like the English, but, like the Scotch middle classes, on floors containing a series of rooms, it follows that the arrangement of their houses differs from that of the English. The staircase, as in public chambers, is common to each floor. The rooms communicate with each other, and generally with a passage or balcony on one side; chimneys are rare, stoves being most commonly used to heat the rooms. In France and Italy the windows are not hung with pulleys and weights, but are formed of two folding glass doors on hinges. The Mezzanino (Mezzanine) is common in French and Italian houses. The houses have generally projecting roofs with often broad overhanging eaves, while in England the gutter is usually

concealed within a parapet wall. French and Italian houses are mostly built of rough stone and stuccoed.

The Spanish houses are very spacious; they have large courts in the interior, and are formed with galleries round the inside of the quadrangular courts: families occupy the separate floors, as in France and Italy.

The houses in many parts of Germany approach nearer to the English in their arrangement than the French and Italian houses. In many places the houses are a framework of wood, and the interstices are filled with unbaked bricks, and are plastered with clay. The mode of heating them in Germany and Switzerland is principally by stoves (*ofen*), which, in the better houses, are so arranged that the domestic feeds the fire without entering the apartment which is heated by it.

The city architecture of Russian houses, both in its effect and arrangement, resembles the architecture of Italian and French houses, except that the roofs are covered with sheet iron painted with vivid colours, mostly green and red. The windows are double.

Various details relating to the practical construction of houses are given under BRICKWORK; BUILDING; CARPENTRY; FOUNDATION; FIRE-PROOF BUILDINGS; and other similar heads.

HOUSE-LEEK. [SEMPERVIVUM.]

HOUSE, LEGAL DEFINITION OF. 'An Englishman's house is his castle,' is a well-known proverb, and the saying is so far true that no house can be legally broken into unless the inmate be charged with a criminal offence. A debtor, for whose arrest a warrant has been obtained, may shut himself in his house and defy the bailiff as long as he pleases. At all events, under no circumstances must the latter use force to obtain admission, but if he can once get in—by any trick or stratagem whatever—he cannot be turned out. [BAILIFF.] In Scotland the law is very different, for there an order may be procured from the Court of Queen's Keys, and a man's house forcibly entered for debt alone.

In defending his house against trespassers and thieves a man must use no more force than is necessary, although in extreme cases even killing the intruder is justifiable.

The offence of assaulting a man in his own house—which is always looked upon as more serious than a common assault—is in Scotland called *Haim-sucken* or *Hamesucken*, but in England there is no peculiar name to distinguish it from other assaults. For the law relating to Housebreaking, see the article on that subject.

HOUSE OF COMMONS. [PARLIAMENT.]

HOUSE OF CORRECTION, called also a Bridewell, is a gaol governed by a keeper, and not under the ordinary charge of the sheriff. Prisoners convicted of felony or misdemeanour, or committed on suspicion thereof, persons awaiting their trial or convicted of small offences, and vagrants, are taken in charge at houses of correction.

HOUSE OF LORDS. [PARLIAMENT.]

HOUSEBREAKING and BURGLARY. The derivation of the word burglary is uncertain. The offence of burglary at common law is defined to be 'a breaking and entering the dwelling-house of another in the night, with intent to commit some felony within the same, whether such felonious intent

be executed or not.' By 1 Vict. c. 86, 'night-time' is declared to be from nine o'clock in the evening till six o'clock the next morning. By dwelling-house is meant the actual and personal residence of a man. If a dwelling-house is feloniously entered at any other time than in the night-time, the offence is simply housebreaking. Burglary is now only punishable by penal servitude for life or for not less than three years, or imprisonment for a term not exceeding two years.

HOUSEHOLD TROOPS are those troops whose especial duty it is to attend the sovereign, and to guard the metropolis. These forces comprise three regiments of cavalry, viz.—the 1st and 2nd Life Guards, and the Royal Horse Guards; and three regiments of Foot Guards, viz.—Grenadier, Coldstream, and Scots Fusilier. On 1st April, 1867, the Household Troops numbered 7270 of all ranks—1317 Life and Horse Guards, and 5953 Foot Guards—and the estimated cost for their pay and allowances during the year 1867–68 was 300,664*l*.

HOWARD, CHARLES, son of William, Lord Howard of Effingham, and grandson of Thomas, second duke of Norfolk, was born in 1536. He succeeded to his father's title in 1573. After seeing much service by land and sea, he was appointed in 1585 lord-high-admiral of England, and had the management of the naval preparations made against the Spanish Armada in 1588. He acquitted himself of this most weighty charge with signal prudence, skill, and bravery. In 1596 he was joined with Essex in the expedition against Cadiz. For this service Lord Howard was created Earl of Nottingham. In 1599 he suppressed the ill-concerted rebellion of the earl of Essex, whom he took into custody. Under the reign of James I. he was employed in several distinguished capacities. He died at the advanced age of eighty-seven, December 14, 1624.

HOWARD, HENRY, EARL OF SURREY, son of Thomas Howard, third duke of Norfolk, was born about the year 1516, and was educated at Christ Church, Oxford. In 1540 he distinguished himself at a tournament held before the court at Westminster, and was soon afterwards created a knight of the garter. In 1542 he served under his father in the army sent against Scotland, and in 1544 accompanied the troops with which the king invaded France. On the surrender of Boulogne in 1546, he was made captain-general and commander of the garrison left for its defence; but in this situation he was superseded by the earl of Hertford, and on his return to England dropped some remarks against the king and council which were reported by his enemies, and led to his ruin. He was accused, on some frivolous grounds, of high treason, was committed to the Tower of London, tried, and found guilty, and on the 19th of January, 1547, was beheaded on Tower Hill.

Surrey's works are principally remarkable as forming an important era in English literature. He far surpassed in smoothness of versification all the poets who had preceded him except Chaucer, as well as all his contemporaries. His sonnets have much delicacy and tenderness, and he was the first to introduce blank verse, in a translation of the 2nd and 4th books of Virgil's '*Æneid*.'

HOWARD, HENRY, R.A., was born January 31, 1769. He became the pupil of Philip Reinagle, R.A.,

and was admitted a student of the Royal Academy, March 27, 1788. On December 10, 1790, he received at the same time the first silver medal for the best drawing from life, and the gold medal for the best historical picture, '*Caractacus, a prisoner, recognizing the dead body of his son*.'

In 1791 Mr. Howard went to Rome, and there painted the '*Dream of Cain*,' his first work for the academy exhibition, which was forwarded to London in 1794.

After his return to London, Mr. Howard exhibited, in 1796, among other subjects of more or less interest, '*the Planets drawing Light from the Sun*,' an idea which he afterwards expanded into one of his most admired pictures, '*the Solar System*.'

In 1801 Mr. Howard was elected an Associate; in 1808 a Royal Academician; and in 1811 he succeeded Mr. Richards as secretary to the Royal Academy. From the year 1796 up to 1814 he had been occupied on a variety of works: on designs for engravings illustrative of the Poets; a number of portraits of private individuals; and many pictures, classical, religious, and historical.

In 1814 Mr. Howard obtained the premium of 50 guineas for the best design for a medal for the Patriotic Fund; and after that time he was employed on designs for most of the principal medals and great seals executed in this country during the remainder of his life. In the same year Mr. Howard exhibited a picture at first called '*Sunrise*,' but since better known as '*the Pleiades*.' In 1818 he exhibited one of his finest works, '*Fairies on the Sea-shore*.' Sir M. W. Ridley, who purchased it, gave him a commission to paint a larger picture of the '*Birth of Venus*,' which was exhibited in the following year. It has been considered one of the finest works of the artist and of the class. Mr. Howard died on the 5th October, 1847, at Bath, in the seventy-eighth year of his age.

HOWARD, JOHN, was born about 1727. His father was a London tradesman, who, dying early, left him in possession of a handsome fortune. In 1756, in a voyage to Lisbon, which he was desirous of seeing immediately after the great earthquake, he was captured by a French privateer. The sufferings which he endured and witnessed during his confinement struck deep into his mind. The impression was renewed in 1773, when, as sheriff of Bedfordshire, he had charge of the prisons of the county. In that year he visited, in two journeys, most of the gaols of England, and accumulated a large mass of information, which, in March, 1774, he laid before the House of Commons. Once actively engaged, he became more and more devoted to this benevolent pursuit, and made many journeys at home and abroad in order to collect information. The first fruit of these labours was a quarto volume, entitled '*The State of the Prisons in England and Wales, with some preliminary observations, and an account of some Foreign Prisons*,' 1777.

The House of Commons seconded his views by the introduction of a bill for the establishment of houses of correction. Mr. Howard, in 1778 and 1779, made other journeys on the Continent and in Great Britain. The results were published in 1780, in an '*Appendix to the State of the Prisons in England and Wales*,' &c. In 1781 and several succeeding years Mr.

Howard continued his tours on the Continent, and visited most of the countries of Europe.

He returned to England in 1787, resumed his home tours, and in 1789 published the result of his late inquiries in another important volume, entitled 'An Account of the principal Lazarettos in Europe, &c., with additional Remarks on the Present State of the Prisons in Great Britain and Ireland.' The same summer he renewed his course of foreign travels, meaning to go into Turkey and the East through Russia. He had, however, proceeded no further than the Crimea when a fever, which he himself believed to be infectious, put an end to his life, January 20, 1790. He was buried at Cherson. An interesting memoir of him by Mr. Hepworth Dixon, contains a succinct view of his admirable philanthropic labours.

HOWDAH or HOUDAH, a seat erected on the back of an elephant.

HOWDEN. [YORKSHIRE.]

HOWE, RICHARD, afterwards Viscount Howe, the second son of Emanuel Scrope Howe, governor of Barbadoes, was born in 1725. At the age of fourteen he left Eton and joined the *Severn*, one of the squadron which, under the command of Commodore Anson, was sent to make war upon the western coasts of Spanish America. He distinguished himself in the West Indies, and on the coast of Africa, which caused his rapid promotion to the rank of captain. On the first of June, 1758, he hoisted his flag in the *Essex* as commodore of the fleet destined to blockade Brest. In the same year he married, and soon afterwards, losing his brother Viscount Howe, he succeeded to his title and estate. In 1759 Lord Howe served as second in command to Sir Edward Hawke, when he defeated the French fleet under M. de Conflans. Peace being proclaimed, Howe occupied a seat at the Board of Admiralty for two years, and then filled the important office of Treasurer of the Navy, and was returned to Parliament for Dartmouth. In October, 1770, he was promoted to be Rear-admiral of the Blue, and Commander-in-chief in the Mediterranean. On a change of ministers, his friends appointed him Admiral of the Blue. Lord Keppel having resigned his office, Lord Howe succeeded him as First Lord of the Admiralty. In three months he was obliged to resign, on another change of the ministry, which restored Lord Keppel. At this time he was created Earl Howe. On the 22nd of June, 1790, he was appointed to the command of the channel fleet. On the 28th and 29th of May, and 1st of June, 1794, an engagement took place in the channel between the British and French fleets, when ten of the enemy's ships were dismantled, seven were taken, three only rejoined the French admiral, and Howe had the glory of towing into Portsmouth six ships of the line.

Lord Howe's health now began to fail; but, notwithstanding his infirmities, he consented to go in person to quell the mutinies that had arisen at Portsmouth, Spithead, &c. With his wife and daughter he spent the rest of his life in retirement. He had declined a pension. He died August 5, 1799.

HOWITZER, a piece of ordnance which differs from what is denominated a gun only in its proportions, the ratio of the length of the piece to its diameter being considerably less than that in the latter kind of arm. It may be considered as interme-

diate between the gun and the mortar, though it is mounted on a gun carriage. It is employed to project solid and hollow shot, loaded shells, carcasses, and case shot. It being comparatively light, the charge of powder is small, and consequently the angle of elevation required is high.

The howitzer is used against troops in the field, in the attack of redoubts or villages, and both in the attack and defence of regular fortresses. A small light gun called the Coehorn howitzer, is also much used for mountain service in India.

HOWLEY, MOST REV. DR. WILLIAM, Archbishop of Canterbury, and Primate of all England, was born at Ropley, near Alresford, in Hampshire, in 1765. He was educated at Winchester, under the tuition of Dr. Warton; and in 1783 he proceeded as a scholar to New College, Oxford, where he was elected fellow in 1785. After passing successively through the different university degrees, he was appointed, in 1809, Regius Professor of Divinity. In 1813 he was promoted to the see of London. In the following year he made his primary visitation as the new bishop of London; and the eloquent charge which he delivered on that occasion produced a deep sensation, especially amongst the Unitarians, whom he represented as 'loving to question rather than learn.' To this Mr. Belsham published a powerful reply, and accused the bishop of promulgating the slavish doctrines of Popery rather than the free spirit of Protestantism. But while exhibiting the principles of intolerance on the one hand, his lordship appears to have displayed a feeling of political obsequiousness on the other. He was one of the most strenuous supporters of the bill of pains and penalties against Queen Caroline, in 1820; and on that occasion he enunciated, with much emphasis, the slavish doctrine that the king could do no wrong, either morally or politically. This uncompromising defence of 'right divine' did not fail to secure the goodwill and patronage of his majesty, George IV.; for on the death of Archbishop Manners Sutton in 1828, his lordship was translated to the archiepiscopal see of Canterbury. The duke of Wellington was then prime minister, and imagined that he could rely on the support of the new primate in carrying the Catholic Emancipation Bill; but he was mistaken; for his grace declared that at his consecration he had sworn to stand by the Church of England; and he denounced the measures of the Government as irreligious and revolutionary. Thus, in 1829, and again in 1831, did the archbishop struggle, first, against emancipation, and next against parliamentary reform, when he declared that from these measures the church and constitution, the altar and the throne, were in danger of certain annihilation. They have, however, long become a part and parcel of the law of the land; and notwithstanding the solemn declarations and dark forebodings of our most reverend prelate, the throne and the altar still remain, and apparently on a firmer basis than ever. The fact is, that although his grace was a learned theologian and an estimable private character, he was neither a statesman, an orator, nor a politician, but a time-serving supporter of 'the powers that be,' and an uncompromising opponent of all liberal progress. He died in 1848, and was interred in Addington Church, near Croydon.

HOWRA, a town on the right bank of the Hooghly,

British India, opposite to Calcutta, of which it may be considered a suburb. It has shipbuilding yards, and is a terminus of the railway from Calcutta to the north-western provinces. (Johnston's *Gazetteer*.)

HOWTH. [DUBLIN.]

HOY. [ORKNEY.]

HOY, a small vessel, usually rigged as a sloop, and employed in conveying passengers and goods from place to place on the sea-coast.

HUCKABACK, a very coarse kind of linen cloth, commonly used for towels.

HUDDESFIELD, a market-town and parliamentary borough in the West Riding of Yorkshire, is situated 7 miles S.E. from Halifax, 26 miles N.W. from Sheffield, and 189 miles N.N.W. from London. At the last census the population of the entire parish was 52,254; of the parliamentary borough only, 34,877. The greater part of the houses are built of a light-coloured stone. The market-place is a large area, surrounded with good houses and shops. The trade of the town derives great advantages from its inland navigation, by means of the Ramsden and Huddersfield canals, both eastward and westward, and from the abundance of coal in the vicinity. The canal connecting the town with the Mersey is carried, at the highest canal level in England, through the chain termed the 'English Apennines' by a stupendous tunnel, $3\frac{1}{4}$ miles long.

The parish church was a small ancient structure, which was taken down in 1835, when a new one was erected in the perpendicular Gothic style. There are several other churches of the establishment, and there are also many places of worship for Methodists, Independents, Unitarians, Quakers, and Roman Catholics. The Sunday-schools and religious and educational societies connected with the town and county are liberally sustained. The Philosophical Hall is a Grecian building, which was completed in 1837. There are also subscription and law libraries, and a commercial news-room. The Infirmary is a large and elegant stone building in the Grecian Doric style, erected in 1830. The town also contains a national proprietary college, collegiate school, gymnasium hall, commodious cloth hall, banking company, several branch banks, &c. The manufactures comprise broad and narrow cloths, kerseymeres, flushings, serges, cords, pilots, mohair and sealskin cloths, and 'fancy woollen goods.' Silk spinning and cotton spinning and doubling are carried on, and the manufacture of cotton warps. The railway communication is very good, there being direct lines to the metropolis and the principal manufacturing towns, and good access to all parts of England, by means of the Great Northern and Manchester, Sheffield and Lincolnshire, London and North-Western, and Lancashire and Yorkshire railways. The borough returns one member to Parliament, and is also a polling place for the county. The number of registered electors in 1866 was 2138; and the population, 37,066.

HUDSON, HENRY, is eminent among those early navigators who sought a shorter passage to China than the circuitous route round the Cape of Good Hope. Nothing is known of him before 1607, when he was employed by some London merchants to command a ship fitted out to prosecute that object. After three unsuccessful voyages he undertook a fourth, in hopes of discovering a north-western pas-

sage, in April, 1610. In the course of June and July he sailed through the Strait, and discovered the Bay, both of which have since been called after his name. [HUDSON'S BAY.] The insufficiency of provisions exposed him and his companions to great hardship, and at last proved fatal to his scheme. The men became discontented and insubordinate, and while they were in the Strait on the voyage home, some of the boldest of the mutineers seized the captain and eight of his staunchest followers, and sent them adrift in an open boat. They were never afterwards heard of.

HUDSON, RIVER. [NEW YORK.]

HUDSON'S BAY is an extensive gulf on the eastern side of North America, and connected with the Atlantic Ocean by Hudson's Strait. Its length is 850 miles (between 51° and 66° N. lat.). It is 600 miles across in its widest part. The southern portion, called James' Bay, extends nearly 240 miles, and at its mouth (near 55° N. lat.), between Cape Jones, E., and Cape Henrietta Maria, W., it is 140 miles wide. The coasts are generally high, rocky, and rugged, and in many places precipitous, except along the south-western shores between Cape Henrietta Maria and Cape Churchill, where they are low and swampy, and frequently exhibit extensive strands. The depth of water in the middle of the bay has been taken at 150 fathoms, but it is probably greater. In the northern part lies Southampton Island, at the mouth of the Strait. The shores of the bay possess an inhospitable climate, being very much colder than places in Scotland in the same latitude. At Fort York, near the western shore, in lat. $57^{\circ} 2'$ N., the thermometer sometimes descends to 50° below zero; brandy freezes to a solid substance in rooms with a constant fire; and but for supplies obtained from more temperate regions existence would be impossible.

Numerous rivers run into Hudson's Bay, the largest being the Nelson. The Hudson's Bay Company have various 'ports,' or settlements on its shores.

HUDSON'S BAY COMPANY was incorporated by Charles II. under a royal charter dated the 2nd of May, 1670. The charter was given in favour of Prince Rupert, who was the first governor, the duke of Albemarle, Earl Craven, Lord Arlington, Lord Ashley, Sir John Robinson, Sir Robert Vyner, Sir Peter Colleton, Sir Edward Hungerford, and others; and it states that these parties having at their own great cost and charges undertaken an expedition to Hudson's Bay, for the discovery of a new passage into the South Sea, and for finding some trade in furs, minerals, and other commodities, had 'already made such discoveries as to encourage them to proceed further in their design, by means whereof there may probably arise great advantage to us and our kingdom.' With this view the charter grants to the company in perpetuity the sole trade and commerce of all those seas, straits, bays, creeks, and sounds, in whatever latitude they may be, that lie within the entrance of Hudson Straits, together with all the lands and territories upon the countries, coasts, and confines of the seas, bays, &c., aforesaid. The company thus obtained the privilege of exclusively trading with the Indians in the vast and not well-defined region called Rupert's Land, which comprised all the country that had rivers flowing into the great

inlet from which the company takes its name. This association founded several establishments, and has ever since prosecuted the trade under the direction of a governor and committee of management, chosen from among the proprietors of the joint-stock, and resident in London. The company's charter not being confirmed by Act of Parliament, it was considered that all British subjects were entitled to engage in the trade with those regions; and in conformity with this notion the North-West Company was formed in 1783, and proved a powerful competitor. This company had a settlement, called Fort Chippewyan, so far west as the Lake of the Hills, in 110° 26' W. long.; and some of the Indians trading with them came from beyond the Rocky Mountains. A great degree of jealousy and hostility arose between the respective agents of the two companies, which more or less impeded the operations of both for many years, until in 1821 a junction of the two was effected, and the trade has since been prosecuted peacefully and successfully.

In 1825 a license of exclusive trade with the Indians, over all that portion of the north-west territory not included in the charter, was granted to the company for twenty-one years. This license was renewed in 1835. The power of the company was thus greatly increased, and all the Indian territories opened to the operations of the association, which *now virtually ruled through seventy-five degrees of longitude, from Davis' Strait to Mount St. Elias; and through twenty-eight degrees of latitude, from the mouth of the Mackenzie to the borders of California. This extensive tract of country has, however, been gradually brought under the pale of civilization; and the company, though retaining its commercial supremacy, has lost much of the legal monopoly. The state of Oregon was given up to the United States in 1841; in 1859 the island of Vancouver, and likewise the district of British Columbia, were colonized, and the license withdrawn from the company. This does not in any way affect the original charter of Rupert's Land, and the company would seem to have lost rather a formal privilege than actual influence. In fact it is believed by competent authorities, that even if the fur trade were thrown entirely open, a long time would elapse before the trading of the company would cease to hold its pre-eminence, because of the wide-spread ramifications of their system, and because also of the ties of various kinds which bind the native hunters to them.

The company's vast territories are ruled by a governor-in-chief, invested with large powers, who, with the chief factors or agents, constitute the members of a council, which meets annually in June to review the events of the past year, and make arrangements for the ensuing one. The company send out yearly large quantities of blankets, cloth, guns, ammunition, knives, and miscellaneous articles, of which about one-third is for the use of their servants, and two-thirds for barter to the Indians for furs. The total number of persons in the company's employ is about 3000.

In 1863, a change was effected in the constitution of the company which in no way affected the charter, and the effect of which has been generally misunderstood. At that period the opening up of

the north-west territory attracted public attention in England, and it was generally surmised that the Hudson's Bay Company, from its wish to protect the trade in furs, was an obstruction to the settlement of that country. The duke of Newcastle, then secretary for the colonies, participated to some extent in that belief, and under his auspices an association of speculators came forward, who agreed to purchase the whole of the stock of the company at a stipulated price, provided they were insured so much of the stock as would give them a preponderance in the company. The governor and committee then in office having agreed to these terms on the part of the company, the whole stock was taken at the price agreed on by the International Financial Society, who fixed the capital at two millions sterling, which was issued to the public in 100,000 shares of 20*l.* each. Since then the company has greatly extended its operations, and will, no doubt, do so still more hereafter. Negotiations have been opened by Canada for the acquisition of the company's rights, and it is probable that in a few years immigration will have extended to the district of the Saskatchewan and the other territories east of the Rocky Mountains, extending along the southern frontier of British North America. Postal and telegraphic communication has been established between Canada and British Columbia across the company's territory. Ministers of the gospel of every denomination are protected and encouraged, and there is a bishop of the Church of England in the diocese of Rupert's Land.

In the year 1864 the exports from the Settlements of the Hudson's Bay Company to the United Kingdom were as follows:—

	Quantities.	Value.
Castor, ...	2,673 lbs. . .	£691
Feathers for beds, . . .	37 cwts. . .	311
Isinglass, ...	29 " . . .	961
Oil, train or blubber, . .	51 tuns. . .	2,368
Skins—Bear, ...	6,865 . . .	8,581
" Beaver, ...	77,886 . . .	29,208
" Fisher, ...	3,295 . . .	5,039
" Fox, ...	16,543 . . .	15,555
" Lynx, ...	3,350 . . .	1,703
" Marten, ...	102,208 . . .	71,120
" Musquash, ...	256,345 . . .	6,676
" Otter, ...	9,649 . . .	6,024
" Wolf, ...	6,170 . . .	3,290
" Other sorts, ...	— . . .	7,489
All other articles, . . .	— . . .	4,241
Total, ...		£163,257

The above includes goods to the amount of 44,103*l.* from British Columbia, all of which were, however, exported by the company. The imports in the same year from Great Britain to the Hudson's Bay Settlements, exclusive of British Columbia, were valued at 74,777*l.*, and consisted chiefly of clothing and provisions. [FURS AND FURRIERY.]

HUÉ, or HUÉ-FO, the capital city of the empire of Anam, Cochín-China, on the Hué river, about 10 miles from its mouth, in the China Sea. The population is not correctly known, but is supposed to be about 100,000. It has no parallel in the East, having been regularly fortified in the European style early in the present century. Its walls, mounting

numerous cannon, are upwards of five miles in circumference, and inclose an inner citadel, with the palace, and spacious barracks, large public granaries, an arsenal, and magazines, which, with other public buildings, are supplied with water by numerous canals, faced with masonry, and crossed by fine bridges. A garrison and fleet of galleys are usually stationed here.

HUE AND CRY was the old common-law process of pursuing with horn and voice all felons and such as had dangerously wounded another. This process is still used in England as a means of arresting felons without the warrants of a justice of the peace. Hue and cry may be raised either by the precept of a justice of the peace, or by a private person who knows of the felony, who should acquaint the constable of the vill with the circumstances and the person of the felon; if the constable is absent, hue and cry may be made without license. When hue and cry is raised, all persons are bound to join in the pursuit and assist in the capture of the felon. A constable, also, who has a warrant against a felon may follow him by hue and cry into a different county from that in which the warrant was granted, without having the warrant backed. The pursuers are justified in breaking the outer door of the house where the offender actually is, and are not liable to any punishment or suit if it should appear that the hue and cry was raised by mistake, but the person raising the hue and cry wantonly and maliciously may be severely punished as a disturber of the public peace.

A printed sheet called the *Hue and Cry* is issued three times a week from the police court, Bow Street, which contains descriptions of property stolen, notices of robberies, and descriptions of soldiers who have deserted. Copies of this paper are sent to the police offices throughout the country. The *Hue and Cry* is published at the expense of the Home office, and costs about 1200*l.* a year.

HUELVA, a seaport in the south of Spain, capital of the province of Huelva, is situated at the confluence of the Odiel and the Tinto, 63 miles W.S.W. of Seville. It has a good transit trade with Cadiz and Seville, and exports large quantities of fruit and matting to England and Portugal. The population is 8423.

HUGUENOTS was the name given to the early followers of the Reformed or Calvinist religion in France. The origin of the word has been variously accounted for, but was most probably a corruption of the German *eidgenossen* ('confederates,' or 'bound together by an oath'). By some it is said to be derived from the early meetings having been held on a heath near Tours, haunted by the ghost of Hugo Capet. The Roman Catholics used the name of Huguenots as a word of reproach against heretics. The word is now obsolete, and has been replaced by that of 'Réformés,' which is usually given to the disciples of Calvin, while the more general name of Protestants includes Lutherans. The wars and persecutions of the Huguenots are noticed in the articles *BARTHOLOMEW, ST.*; *CHARLES IX.*; *COLIGNY*; and *HÔPITAL, DE L.*, but for full details of the history of the Huguenots the reader is referred to Dr. G. De Félice's '*Histoire des Protestants de France, depuis l'origine de la Réformation jusqu'au le temps présent*,' of which there is more than one English

translation. D'Aubigné's '*History of the Reformation in the Sixteenth Century*' also contains some valuable information respecting the Huguenots.

HULL, or KINGSTON-UPON-HULL, is a borough and county of itself. It is the chief town in the East Riding of Yorkshire, and a port of first-class magnitude, situated on the north side of the estuary of the Humber, where it is joined by the river Hull. It is distant 174 miles N. from London. Hull returns two members to Parliament. The number of electors on the register in 1866 was 5566.

For municipal purposes, Hull is divided into seven wards, represented by thirteen aldermen and forty-two councillors. The mayor has the singular honour of having two maces and two swords, one given by Richard II., the other by Henry VIII. The boundaries of the parliamentary and municipal borough are identical.

This place took its name of Kingston from its purchase by Edward I., who saw the great natural advantages of its position, and determined on the foundation of a fortified town and port.

The town, under the name of Mytonwyk, appears to have been of importance in the time of Athelstan. In the civil war of Charles I. it was the first to close its gates against the king, and it successfully sustained two sieges by the royal troops in 1642 and 1643.

The citadel, which was on the east bank of the river Hull, at its junction with the Humber, has been pulled down, and its site is now converted into streets and shipbuilding yards. The garrison has been removed to the village of Paull, six miles lower down the Humber, where a new fort has been erected in a more commanding position. Hull has several good streets; and extensive warehouses, backed by narrow lanes, border the river, along which the town and suburbs extend for nearly two miles from the Humber.

The docks, built upon the site previously occupied by fortifications, communicate with each other, and have an aggregate length of 1807 yards, covering 87½ acres, including the West Dock, 17 acres, which was constructed in 1866. They are surrounded by broad quays and large warehouses, have a depth varying at high tide of from 20 to 27 feet, and are crowded with the shipping of all nations.

Hull has the advantage of being connected by railway with all the manufacturing towns of Yorkshire and the Midland counties, and forms the great outlet for the exportation of their goods. The number of vessels registered as belonging to the port in 1867 was 617, of 86,258 tons 'urthen. The total number of ships which entered the port in 1866 was 4111 (1,076,403 tons), two-thirds of which were engaged in the foreign and colonial trade, and one-third coastwise. The clearances in the same year amounted to 4018 (1,001,559 tons). The customs revenue for 1866 was 339,463*l.*, ranking in England, in this respect, next after London, Liverpool, and Bristol. The principal imports are timber, corn, wool, iron, flax, hemp, tallow, hides, pitch, spirits, sugar, tobacco, and wine; the exports, woollen and cotton manufactures, yarn, earthenware, hardware, and metals. The coasting trade is highly important, there being much traffic in coal. There is also a very extensive transit trade between the north of Europe

and America, *viâ* Liverpool. The merchants of Hull were the first in England to embark in the northern whale fishery, but this trade has nearly ceased. The town is an important steam packet station, and communicates many times weekly with London, Yarmouth, Leith, Berwick, Aberdeen, Hamburg, Rotterdam, Copenhagen, Havre, Dunkirk, and Antwerp; also with the other chief European ports.

In the town are large cotton and flax mills, extensive iron shipbuilding yards, manufactories for machinery, chain cables, ropes and canvas, potteries, tanneries, soap and chemical works, corn and oil mills. The manufacture of oil-cake is also carried on to a considerable extent. There is a branch of the Bank of England, and several other banks.

Among the chief public buildings are the royal institution and museum, guildhall, new exchange, custom-house, dock, pilot, excise, post, and stamp offices, public rooms, infirmary, Trinity house and Trinity almshouses. A handsome new town-hall was opened in January, 1866; and in the same year a merchant seamen's orphan asylum was completed. There is an equestrian statue of William III. in the Market Place, which is covered with leaf gold. The Wilberforce statue surmounts a fine fluted Greek Doric column, on a square pedestal. In the People's Park (about 14 acres in extent), is a seated marble statue of Queen Victoria; and there is a bronze statue of the late Dr. Alderson in front of the infirmary.

The most important educational establishments are the Trinity House School, where thirty-six boys receive a nautical education, the Hull Grammar-School, Proprietary College, Coggan's charity school for girls, many national and other schools, and various institutes.

The benevolent establishments include the general infirmary, founded in 1782, the Trinity House, instituted in 1369 for the relief of decayed seamen, the Charter House, or Maison Dieu, for the relief of the poor, several dispensaries and asylums.

The Botanic Garden, established in 1811, is about a mile from the town.

The Holy Trinity Church is the most ancient in Hull, and is very large. It is 272 feet long from east to west, and is a beautiful and ornate cruciform Gothic structure, with a pinnacled tower 140 feet in height. It was restored internally and externally in 1864; and St. Mary's Church was also enlarged and completed in the same year. There are ten other churches, and fifteen dissenting chapels.

The rapid progress made by this flourishing port within the last half century, is apparent from the following statistics. In 1821 it contained 9004 houses; in 1831, 11,888; in 1841, 13,927; in 1851, 18,428; in 1861, 20,581; and in June 1865, 24,768. In 1821 the number of inhabitants was 44,965; in 1831, 54,112; in 1841, 67,095; in 1851, 82,502; in 1861, 97,661; and in June, 1867, nearly 107,000. In 1836 the rateable value of property in Hull was 176,559*l.*; in 1861, 238,504*l.*; and in 1864, 280,000*l.* In 1836 the burthen of the vessels frequenting the port of Hull upon which dock dues were levied by the Hull Dock Company was 503,165 tons; in 1860, 1,215,203 tons; and in 1864, 1,216,815 tons. The value of the goods exported from Hull in 1859 was 12,980,587*l.*; in

1863 it was 13,556,254*l.*, and in 1865 it had increased to 15,865,528*l.* This amount is exclusive of coal and coke exports.

HULLMANDEL, CHARLES JOSEPH, inventor of the lithographic art, was of German descent, and born in London in 1789. He first commenced his experiments on the then newly-discovered art of lithography in Great Marlborough Street, in the year 1818, and there printed his own drawings taken from sketches made during his residence on the Continent. The success attending his efforts attracted the attention of the artistic world; and such was the encouragement he received, that he determined on devoting his entire time to the study and practice of lithography. The art being mainly dependent on the judicious application of chemical principles, he placed himself as a student under Professor Faraday. The first great improvement he effected was that of a graduated tint printed over a black and white impression, which imparted to it the appearance of a print on tinted paper, and gave a vast impulse to the encouragement of the art. It was the means of bringing out some of the splendid productions of Harding, Stanfield, Nash, and other eminent artists. Mr. Hullmandel also succeeded in producing various other improvements, such as printing in colours by means of different stones, and also printing from drawings made with a brush and liquid ink. This art he called Lithotint, for which he procured a patent. For this he received the reward which Louis Philippe of France had previously offered for the discovery. Several splendid works of art, executed by this process, soon afterwards made their appearance, which established the fame of the inventor, and confirmed the value of his art. He died in 1851.

HUMBER. [YORKSHIRE.]

HUMBOLDT, FRIEDRICH HEINRICH ALEXANDER, BARON VON, a celebrated naturalist and traveller, descended from an ancient, wealthy, and noble family in Pomerania, was born at Berlin on the 14th September, 1769. His father, Major Humboldt, served in the Seven Years' War as aide-de-camp to the duke of Brunswick, and was afterwards chamberlain to the king of Prussia. When he was only fourteen years of age, Alexander went with his brother William to Berlin to complete his studies under Læflier and Fischer for classics, Wildenow for botany, and Endel, Klein, and Dohm for political economy and philosophy. Between 1786 and 1788 he studied at the University of Frankfort-on-the-Oder, and in 1788 he repaired to Göttingen, where he studied philosophy, history, and the natural sciences under Heyne, Eichhorn, and Blumenbach. At Göttingen he became acquainted with George Forster, Heyne's son-in-law, who accompanied Captain Cook in his second voyage round the world, and who inspired his young friend with a desire to study the productions of the tropics. In 1790 he accompanied Forster and Genz in a tour through Germany, Holland, England, and along the two banks of the Rhine; and he published the result of his tour in a work entitled 'Observations sur les Basaltes du Rhin,' &c., which appeared at Berlin in 1790. At the close of 1790 he went to Hamburg, where he studied foreign languages and bookkeeping in the commercial school of Bosching; and though his family intended him for some office under the

government, his mother yielded so far to his passion for science as to send him to the mining academy at Freiberg, to extend and perfect his geological knowledge under Werner, who had then for one of his pupils the celebrated Baron Von Bach. The reputation which Humboldt had now acquired was such as to obtain for him the government appointment of assessor of the council of mines at Berlin, and soon afterwards that of director-general of the mines in the principalities of Anspach and Bayreuth. With the knowledge acquired in the discharge of these duties he wrote and published in 1793 his 'Specimen Floræ Freibergensis,' a work in which he described the cryptogamic and subterranean plants of the district. M. Galvani of Bologna had about this time founded a new science on the convulsive twitches of the nerve in the leg of a frog when touched with a knife. Humboldt rushed into this new field of inquiry with a zeal bordering on extravagance. He made wounds in his back by means of cantharides, in order that the metals of the galvanic circle might be better applied to the muscle. The results of these researches were published in 1796, and the French translation of the work, which appeared in 1797, entitled 'Expériences sur l'Irritation Nerveuse et Musculaire,' was enriched with notes by the illustrious Blumenbach. Upon the death of his mother on the 20th November, 1796, Humboldt had resolved to undertake some great voyage of discovery. With this view he sold his property in Prussia, and made a tour in Switzerland and Italy to examine the mountainous regions and volcanoes of those interesting countries. Shortly after his return to Berlin he set off for Paris, in order to purchase the instruments which were necessary for the execution of his plans, to study its valuable collections of natural history, and profit by the society of the illustrious men who then adorned the academies of the Institute. Working with Arago, Cuvier, and Gay-Lussac, he acquired in their laboratories and observatories the practical knowledge which he needed; and on their recommendation the directory authorized him to join the expedition under Captain Baudin, which was about to circumnavigate the globe, with permission to disembark wherever he chose. Owing to the war in Germany and Italy, the government withdrew the funds which had been granted for the expedition; and having become acquainted with Aimé Bonpland, who was to have accompanied Baudin as naturalist, it was arranged that Humboldt and he should visit the north of Africa and explore the chain of the Atlas mountains. When at Marseilles, the ship which was to convey them had not arrived after two months' delay. They set off, however, for Tunis; but being prevented from landing by the hostility of that state to France, they resolved to spend the winter in Spain, previous to a journey to Egypt. On their arrival at Madrid, the naturalists were received with the highest distinction. The king gave them permission to travel through all the colonies of Spanish America, and to visit the Marianne and Philippine islands on their return to Europe; and having eagerly accepted of this liberal offer, they quitted Madrid in May, 1799. On the 5th of June they set sail from Corunna in the ship *Pizarro*, and after visiting the peak of Teneriffe, they reached Cumana,

the capital of New Andalusia, on the 16th of July. After verifying his instruments, and making other preparations for his journey, Humboldt and Bonpland travelled through New Andalusia and Spanish Guiana, determining the geographical position of the most important stations, studying their natural history, observing atmospheric phenomena, and examining the antiquities of the country, and the manners and customs of the inhabitants. This exploration of South America was continued for five years, and whether we estimate it by the romance of personal adventure, or the value of scientific research, it is without a parallel in the annals of civilization. After having for seventy-five days navigated, in an Indian canoe, the Orinoco, the Apure, the Atrabapo, the Rio Negro, and the Cassiquari, they rested at Angostura in June, 1800; and after being detained for two months by the English blockade, they went at the end of the year to Havannah in Cuba, where they remained for above ten weeks. Quitting Cuba in March, 1801, with the view of joining Captain Baudin's expedition to the Philippine isles, and learning that this plan was impracticable, they went to Carthagena, ascended the Amazons in a voyage of fifty-four days, and after visiting various interesting regions, arrived on the 6th January, 1802, at Quito, where they spent five months. On the 23rd June, accompanied by Carlos Montufar, they ascended Chimborazo, nineteen thousand three hundred feet above the sea, and the highest point of the Andes ever reached by man. After visiting Lima in Peru, they embarked about the end of December, 1802, for Guayaquil, descended to Acapulco, and passing by Fasco and Cuernavaca, they arrived in April at Mexico. In this interesting kingdom they spent more than a year, visiting the mines of Moran, the singular waterfall of Regla, and on the 17th September, 1803, the mud volcano of Jorullo, one of the wonders of the New World. From Mexico our travellers went to Havannah, and from thence to the United States, visiting Philadelphia and Washington. Laden with large and valuable collections, they quitted America on the 9th July, 1804, landed at Bordeaux on the 3rd August of the same year, and repaired to Paris to prepare for the publication of their travels. Here Humboldt remained till March, 1805, when he visited Italy and Berlin in succession, and returned to Paris in 1807, where he remained for twenty years, refusing the most liberal offers from the Prussian government. During his short visit to Berlin we find him occupied in observing the solstices and equinoxes, and in recording the variations in the horizontal magnetic needle every half hour during several days and nights. His object in these observations was to study the nocturnal portion of the diurnal oscillation, but he unexpectedly detected the most capricious changes in the needle, which occasionally exhibited sudden and rapid movements, to which he gave the name of *magnetic storms* (accompanying the aurora borealis), a subject which has been prosecuted with great success by M. Arago and our distinguished countryman General Sabine. About the end of 1807 appeared the first parts of his great work, entitled 'Voyage aux Regions Equinoctiales des Nouveau Continent pendant les années 1799-1804, par A. De Humboldt et A. Bonpland.' A translation of

the personal narrative, by Helen Maria Williams, was published in five volumes in 1814-21; and between that year and 1817 the other parts were published in French and Latin, and drawn up by several distinguished individuals—Olmans for astronomy, Arago and Gay-Lussac for chemistry and meteorology, Cuvier and Latreille for zoology, Vauquelin and Klapproth for mineralogy, and Kunth for botany. In 1822 Humboldt accompanied the king of Prussia to the congress at Verona, and, along with Gay-Lussac, he made a scientific tour in Italy, visiting Venice, Rome, and Naples. On his return he spent some time in England, and in 1823 he published his 'Essai Geognostique sur le gisement des roches dans les deux hemispheres.'

In obedience to the urgent solicitations of the king, our author took up his residence in Berlin in 1826, and was welcomed in the warmest manner by all classes of the community. In the winters of 1827-1828 he delivered his celebrated course of lectures on the physical phenomena of the universe, which was afterwards expanded into his 'Cosmos.' In the spring of 1829, when Humboldt was about to enter his fifty-ninth year, he was invited by the emperor of Russia to undertake at his expense, and principally for the benefit of science, a journey to the eastern provinces of his kingdom, and to Central Asia, having for its main object the advancement of geology and terrestrial magnetism. Having eagerly accepted of this liberal offer, he associated with himself the celebrated naturalist, M. Ehrenberg, for the department of zoology and botany, and Gustavus Rose for chemistry and mineralogy, while he himself was to conduct the astronomical and magnetical observations. With M. Menschenin, a Russian engineer, as their guide and interpreter, the travellers left St. Petersburg on the 20th May, 1829, and embarking at Novogorod on the Volga, they passed by Casan to the Kirghese Steppe, visited Bolgari, the Tartar capital, and went by Persia to Ekatherineberg on the Asiatic side of the great Uralian chain. Advancing along the Southern Ural they arrived at Astrakan and the Caspian, and returning through the country of the Don Cossacks to Moscow, they reached St. Petersburg in November, 1829, having accomplished in six months a journey of two thousand three hundred and twenty geographical miles. The results of this great expedition have been given in two works—the one by Gustavus Rose and the other by Humboldt. The work of Humboldt, published in Paris in three volumes in 1843, is entitled 'Asie Centrale, Recherches sur les chaines de Montagnes, et la Climatologie comparée.' This work, dedicated to the emperor of Russia, led to the establishment of those magnetical and meteorological observations in various parts of the empire, and in the British colonies in Canada, Australia, South Africa, and St. Helena, by means of which our distinguished countryman General Sabine has been led to such important generalizations. In April, 1835, Humboldt suffered a severe loss in the death of his brother William, who expired in his arms. In the beginning of 1842 he accompanied the king of Prussia to England, and was present at the christening of the Prince of Wales. In 1843 and 1844, when in the seventy-fifth year of his age, he composed his remarkable work, dedicated to the king of Prussia,

entitled 'Cosmos: Essai d'une Description Physique du Monde,' which was published at Stuttgart and Berlin in 3 vols., 1847-51, and which was translated into English, under the patronage of its author, by Mrs. General Sabine, and also by Miss Otté, and into French in 1848-57 by MM. Faye and Goluski, under the auspices of M. Arago.

The intellectual services of Humboldt, which our limited space has enabled us but imperfectly to record, were honoured with rewards seldom conceded to the cultivators of literature and science. Among the decorations which he received from different sovereigns, that of grand officer of the legion of honour was doubtless the most welcome. In 1850, on the death of our illustrious countryman Mr. Cavendish, he was elected one of the eight foreign associates of the Academy of Sciences of the Institute of France, and he was an honorary or corresponding member of all the leading scientific institutions in the Old and New World. He was chancellor of the Prussian order *pour le Merite*, founded by Frederick the Great, the decorations of which have been, on his recommendation, bestowed on several of the most distinguished of our countrymen. In 1858, while occupied with the completion of his latest work, Humboldt was reminded of his own mortality by the death of his friend and fellow-traveller, Aimé Bonpland, who, after escaping from the tyranny of Dr. Francia, died at San Borgia in Brazil, in the eighty-sixth year of his age. In a short time after the intelligence of this event had reached him, Humboldt was seized with an illness which carried him off at Potsdam on the 6th of May, 1859, when he was within a few months of his ninetieth year. The loss of such a man, who was beloved by all ranks of society at Potsdam and Berlin, was felt as a public calamity, and every honour was paid to his venerated remains.

HUMBOLDT, KARL WILHELM, BARON VON, was born at Potsdam, June 22, 1767, and studied law in the universities of Göttingen and Jena. He was thirty-three when he published his first production, which was a critical essay on Göthe's poem of 'Hermann and Dorothea;' but this work at once established his fame, and it is still considered as a model of æsthetical criticism. In 1802 Humboldt was appointed resident, and a few years afterwards, minister plenipotentiary at the Holy See. In 1812 he was sent as ambassador to Vienna, and afterwards discharged the functions of minister plenipotentiary of Prussia, together with Hardenberg, at the Congress of Vienna. He continued his diplomatic career at Frankfurt, where he made himself conspicuous through his conciliatory eloquence in the delicate business of dividing Germany among its princes, and afterwards as ambassador at the court of St. James'. In 1819 he was appointed minister and a privy councillor at Berlin. Humboldt and the ministers Von Beyme and Von Boyen tried to persuade the king to be faithful to those liberal principles which he had proclaimed in 1813, and to introduce a general national representation. Unable to stem the king's policy, Humboldt, Beyme, and Boyen tendered their resignation, and Humboldt retired to Tegel, where he henceforth devoted all his time to literature. He died April 8, 1835. During forty years he had enjoyed the well deserved reputa-

tion of one of the greatest linguists of Europe. With the exception of one large work which he left unfinished, Humboldt composed only minor works, consisting of critical essays, poems, translations from the Greek, and remarks on the oriental languages, which he published at different periods. The greater part of them was collected by his brother Alexander, and published under the title, 'Wilhelm von Humboldt's Gesammelte Werke,' Berlin, 1841, 4 vols. 8vo.

HUMBOLDTINE, mineral *oxalate of iron*. This substance occurs crystalline and massive. The crystalline form is undetermined, but is yellow and opaque. The massive variety occurs in small, flattish, reniform pieces, of a fine earthy structure; colour greenish yellow.

HUMBOLDTITE. This mineral is a *boro-silicate of lime*. It occurs crystallized. Primary form an oblique rhombic prism; colour white and yellowish white. Opaque. Specific gravity, 2.99.

HUME, DAVID, was born at Edinburgh on the 26th of April, 1711. His father's family was a branch of that of the earl of Home, or Hume; but Hume inherited only a slender patrimony. His father died when he was very young, and his mother destined him for the law; but for this he showed no inclination, and it was eventually given up.

In 1737 he repaired to Bristol, with some recommendations to eminent merchants, but in a few months, finding that scene totally unsuitable to him, crossed over to France with a view of prosecuting his studies. He first went to Rheims, and thence to La Flèche in Anjou; and at these two places he composed his 'Treatise of Human Nature.' It was published in London in 1738, but fell dead-born from the press. In 1742 he published at Edinburgh the first part of his Essays, which was on the whole favourably received.

In 1745 Hume went to live with the young marquis of Annandale as a guardian, and afterwards acted as secretary to General St. Clair, principally during his military embassy to Vienna and Turin.

On his return from the Continent he resided with his brother in Scotland, and composed his 'Political Discourses,' and his 'Enquiry concerning the Principles of Morals.' These two works were published in 1752. In the same year he was appointed librarian to the Faculty of Advocates. He now formed the plan of writing the 'History of England.' Priding himself much on his own impartiality, he was bitterly disappointed, when, on the appearance of the first volume, he was accused on all hands of onesidedness.

In the interval between the appearance of the first and that of the second volume of his History, he published his 'Natural History of Religion,' against which a violent pamphlet was written by Warburton. The second volume of the 'History of England' was published in 1756. 'This performance,' he says, 'happened to give less displeasure to the Whigs, and was better received. It not only rose itself, but helped to buoy up its unfortunate brother.' 'The History of the House of Tudor' was published in 1759; and the two volumes, containing the earlier English history, which completed the work, in 1761.

He availed himself, in 1763, of an invitation from the earl of Hertford to accompany him on his embassy to Paris, where his literary fame secured him much attention. When Lord Hertford was, in 1765,

appointed Lord-lieutenant of Ireland, Hume remained at Paris as *chargé d'affaires* till the arrival of the duke of Richmond. He returned to England in the beginning of 1766, accompanied by Jean Jacques Rousseau, who, however, but ill requited his hospitality, and the year after was appointed Under-secretary of State. He held this appointment about two years, and then returned to Edinburgh. He died August 25, 1776, in his sixty-sixth year.

The editions of Hume's 'History' are numerous. The best edition of his philosophical works is one published in Edinburgh, in 1826, in four vols. 8vo. J. H. Burton, Advocate, Edinburgh, published a Life of Hume, some years since, with many letters never before published.

HUME, JAMES DEACON, was born April 28, 1774, at Newington in Surrey, and was educated at Westminster School.

At the age of sixteen, Mr. Hume was appointed to a clerkship in the London Custom House, and at an unusually early age he was selected to fill an office of much responsibility in the department. His value came to be highly appreciated by the government, and in 1823 he was appointed to reduce into one simple code the many hundred statutes (upwards of 1500) which at that time formed the Custom-house legislation. Three of the most valuable years of his life were devoted to the task; for the performance of which Mr. Hume was presented by the treasury with the sum of 5000*l.* over and above the salary of his office, from the duties of which he had been relieved during the period devoted to the task; and from that time scarcely any question of importance which had reference to the trade of the country was decided without his opinion having first been obtained. At length, in July, 1829, his services were wholly transferred to the Board of Trade, where an office was created for him as Joint-Assistant Secretary. Mr. Hume died January 12, 1842, in the sixty-eighth year of his age.

HUME, JOSEPH, the champion of economy in national finance, and for thirty-seven years foremost in the ranks of parliamentary liberalism, was born at Montrose in the year 1777. His father, a shipmaster, owner of two vessels, died when he was five years old. His mother, a woman of strong mind and great good sense, found herself unable, after a trial, to carry on her husband's business, and she, by industry and skilful management, reared her family on the profits of a cruckery shop. Joseph had the education which is seldom denied, when a parent is anxious for it, to a child-denizen of a Scottish burgh; and the deficiencies of the instruction given him he endeavoured to repair by his own exertions. Among his notable schoolfellows was his friend and fellow-worker of after-life, the late John Mill, the historian of British India. The medical profession was his own choice. Apprenticed at fourteen to a surgeon at Montrose, he migrated three years later to the University of Edinburgh, completed his medical studies, and in 1795 was admitted a member of the Edinburgh College of Surgeons. He made a voyage to India in 1796, and in 1797, after attending the hospitals, was admitted a member of the College of Surgeons in London. He now entered as an assistant-surgeon the service of the East India Company. He began his career with the

equipment of an indomitable energy, and of a disposition to be helpful and useful in any emergency. Even in the course of his first passage out he volunteered to supply the place of the purser, accidentally incapacitated, and discharged his extempore duties so well, that at the conclusion of the voyage he was presented with a testimonial by the captain, officers, and passengers; thus he landed with a reputation ready made. Observing that few of the company's servants knew the languages in use in Hindustan, he applied himself to master them. With this knowledge, and with his inborn aptitude for accounts and business, he soon added to his medical duties those of Persian interpreter, postmaster, and paymaster of the division to which he was attached on the breaking out of the war with the Mahrattas in 1803. He worked so hard and so successfully that when he returned to England in 1808, it was as the possessor of a fortune of 30,000*l.* or 40,000*l.* In 1809 he made a tour of minute observation through the United Kingdom, visiting every place of manufacturing importance. He passed the greater part of the years 1810–11 in foreign travel, visiting Spain, Portugal, Sicily, Egypt, Turkey, Greece, &c., keeping his eyes ever open to any practical arrangement which might be carefully imported into this country. It was at that early period that, struck by what he had seen at Palermo (as he once told the writer of this memoir), he pressed on the authorities at home the system of extramural internments, which has only recently been carried into effect. To these continental researches, he added a careful study of the constitution and political history of his own country. On his return to England in 1812 he entered the House of Commons as member for Weymouth, a vacancy occurring through the death of Sir John Johnstone. Mr. Hume was passing through the lobby of the house when Bellingham shot Mr. Percival, and it was he who seized the assassin, and held him fast until he was arrested. He had arrived from India with a strong belief in the excellence of the government as it was, and he took his seat on the ministerial side of the house. His views, however, were soon modified, and his advocacy of a liberal commercial policy so dissatisfied the trustees of Sir John Johnstone that they refused to return him to the new Parliament of 1812. His first recorded speech in the house was one in favour of popular education. For some years afterwards he devoted himself to political and social action out of Parliament, cultivating the acquaintance of advanced reformers such as Francis Place, and promoting the establishment of savings banks and of Lancasterian schools. During this period of absence from the House of Commons Mr. Hume began his exertions in the court of East India proprietors, where, in 1813, he fought single-handed the battle of free-trade. In 1818 he was returned to Parliament for the Montrose burghs, which included his native town, and he continued to represent them until 1830. With his varied knowledge, ever open to increase, his indefatigable industry, and his imperturbable temper, he soon took rank in the house as a liberal leader of no ordinary calibre. Other men might have larger intellects or greater oratorical gifts, but the usefulness of Joseph Hume was never vitiated by a suspicion that he wished either to play

the part of a demagogue or to grasp the spoils of office. To name the political and social 'causes' of which Mr. Hume was the unwearied advocate in the House of Commons and out of it, would be to recapitulate the programme of the liberal party from the commencement to the close of his parliamentary career. Financial reform was from first to last his peculiar question. His immense knowledge of the details of government departments was something startling, and his demands for retrenchment and economy were not of the vague kind which it is so easy to cultivate, but based on and supported by facts and figures familiar to him as the alphabet. When a 'job' or a piece of extravagance was proposed, 'What will Joseph Hume say?' was an expression which became proverbial. In the pre-reform era, one of his most notable achievements was the repeal which he procured of the combination laws; and when the reform bill came, he saw ministers of the crown endeavouring to gain popularity by carrying out the reforms which he had long promoted almost single-handed. It was his exertions—long, laborious, and costly—that gave the death-blow to Orangeism in the army and out of it in the years 1835–36. It was he who moved for the appointment of the import duties committee of 1840, which led to the tariff reforms of Sir Robert Peel. It is to Mr. Hume that the public owes the throwing open of such places as Hampton Court and Kew Gardens. He was the spokesman of every grievance, public and private; and to the last his house in Bryanston Square was the resort of all who had injuries to be redressed, or suggestions for improvement and reform requiring an advocate. During the latter years of his life he enjoyed, without the embarrassments of office, the position of a veteran minister; and, nearly the oldest member of the house, where he had never made an enemy, he was respected and esteemed by the leaders of all parties in Parliament. It should be added that though his name was identified with financial economy and retrenchment, Mr. Hume was always not only ready, but eager to support every claim on the public purse which had in view the social or educational elevation of the people, or indeed any object of genuine public utility; he may be said to have created the present system of lighthouses. He died at his seat, Burnley Hall, in Norfolk, on the 20th of February, 1855. From 1830 to 1837 he had represented the county of Middlesex, which he exchanged in 1837 for Kilkenny. In 1842 he was re-elected for the Montrose burghs, and continued to represent them till his death. The new writ for the Montrose burghs, rendered necessary by his death, was moved for by Lord Palmerston on purpose to deliver a eulogium on the character and career of their last representative. His lordship dwelt specially on the singular disinterestedness of Mr. Hume's long and laborious political career, and said of him that 'he took the lead in almost every branch of improvement and in every measure of improvement which has of late years been carried into practical operation.' Mr. Hume had married, in 1815, a daughter of the late Hardin Burnley, and to his public merits added the private virtues of an excellent son, husband, and father.

HUMIDITY is that property of a substance by which it communicates to a body in contact with it

some of a liquid which it may have absorbed; and the term is commonly applied to the atmosphere when it is in a state to deposit moisture upon bodies in it.

The humidity of the atmosphere is caused in a great measure by the evaporation of water from the seas, lakes, &c., of the earth; and the quantity of moisture which a volume of air is capable of containing depends upon the temperature. If that be increased, the power of receiving more vapour increases; and the atmosphere becoming saturated with moisture, if the temperature be suddenly lowered, a precipitation of water takes place.

The humidity of the atmosphere generally decreases from the surface of the earth upwards; and when the density of the lower strata is great, the clouds ascend into the drier regions, where they are readily absorbed. This circumstance accounts for the fact that, when the mercury rises in the barometer, the weather frequently becomes fair.

The effects of humidity on the dimension of bodies are various: when a watery vapour penetrates between the twisted fibres of cordage, which are vegetable materials, the cordage swells out transversely, and thus becomes shortened; while cords made of animal substances become relaxed by humidity and increase in length. Most salts absorb water, and thereby increase in weight.

HUMIRIACEÆ, a natural order of plants belonging to the syncarpous group of polypetalous Exogens. There are three genera belonging to this order, *Humirium*, *Helleria*, and *Sacoglottis*.

H. balsamiferum, a tree forty feet in height, is a native of Guiana. Its bark is thick, and abounds with a red balsamic fluid, which resembles styrax in smell; after it has exuded from the tree it becomes hard and transparent, and when burnt affords an agreeable odour. The negroes and natives of Guiana use the bark in slips for the purpose of flambeaux; they also use the wood in building their houses. The other species of *Humirium*, and also those of *Helleria* and *Sacoglottis*, yield resinous juices.

HUMMING-BIRD. [TROCHILIDÆ.]

HUMULUS LUPULUS, a perennial plant belonging to the natural order *Urticaceæ*, is a coarse twiner inhabiting hedges in many parts of Europe, and is also found apparently wild in the United States of America.

The female flowers, termed cones, strobili, or catkins, of *Humulus Lupulus*, when ripe, constitute hops, which, independent of their employment in brewing, are of considerable utility in medicine.

The valuable principle of the hop is called *Lupuline*, and is contained in little glands on the fruit. The superiority of the hop, as an ingredient in our malt liquors, depends upon the fact of its containing within itself several distinct and independent elements of activity, which the bitter herbs that have at different times been employed as a substitute do not possess. The bitter principle imparts to the beverage a tonic quality and an agreeable flavour; while at the same time an aromatic ingredient adds a warmth and stimulating property, and modifies the bitterness: it likewise contains an astringent principle (tannin), the effects of which are to precipitate the vegetable mucilage, and thus to remove from the beer the active principle of its fermentation: every attempt therefore to substitute an ordinary bitter

for that of the hop must necessarily fail, unless a compound can be so artfully constructed as to contain in due proportions the principles of bitterness, astringency, and aroma.

The aromatic bitter gives to the hop a very marked power over the digestive organs when debilitated. A narcotic property has also been ascribed to this plant, which is denied to it by some writers, who attribute the intoxicating power of beer entirely to the alcohol and carbonic acid which it contains. Yet there can be no doubt that tincture of hops, and even extract of hops, possess sedative powers, and often procure quiet and sleep where opium cannot be borne. Decoction does not seem to be a judicious mode of preparation, and should not be practised. Lupuline has been administered alone, but this does not possess any advantage over the tincture.

HUMUS (Lat. 'vegetable mould'), a name given by chemists and scientific agriculturists to that dark and crumbly soil which has been formed by the remains of plants exposed to the different stages of decomposition of rottenness. Thus when roots, wood, straw, or dung, lie upon or in the earth, they absorb moisture; and first becoming brown and soft, they afterwards assume a blackish-brown colour. Finally they become black and pulverulent, as may be easily seen on examining the superstratum of the soil in forest lands. In truth, vegetable fibre may be regarded as the principal producer of humus; such as leaves, straw, moss, peat, &c. When these substances turn to putrefaction and decay, their colour becomes dark, and they are converted into carbonic acid and water, which can be absorbed as nutriment by plants; for the fallen leaves and decayed roots, as well as the insects and worms which feed upon them, become subject to decomposition and decay when the vital principle is gone. Then the carbon they contain is converted into carbonic acid; and the humus, when air and moisture can act upon it, is by degrees still further decomposed, and thus continually furnishes fresh supplies of carbonic acid to the roots of plants. Of all the ingredients of soils humus possesses the strongest power of absorbing the moisture, oxygen, and other constituents of the atmosphere favourable to vegetation.

HUNDRED. [SHIRE.]

HUNDRED, in commerce, a numerical amount which varies in different countries. In England it is usually estimated at 112 lbs. In Riga and Elsinore, the great hundred is twenty gross, or 2880 pieces. In Belgium the hundred of articles, in general sales, is 164 pieces. The hundred deals or planks in Christiana are reckoned at 127; in Sweden at 120; in Westwyck at 124; and in some other of the timber-exporting places of the north, at 132.

HUNDRED, TRIBUNAL OF THE, was a legislative body at Carthage, instituted, like our House of Commons, for the purpose of balancing or counteracting the power of the senate and nobility.—The *Senate of Five Hundred* was also a celebrated tribunal at Athens, whose business was to deliberate on all measures of state, or matters of law, intended to be submitted to the people for adoption. They were liberally maintained at the public expense, and were required to meet every day for the despatch of business.

HUNGARIAN LITTORALE. [CROATIA.]

HUNGARY. Under the denomination of *Hungarian Hereditary Dominions* were formerly comprehended Hungary Proper, Slavonia, Croatia, Transylvania, Dalmatia, and the Military Frontier. After the unsuccessful revolution in 1849, the limits of the old kingdom of Hungary were much contracted, but the recent reconciliation between Hungary and Austria will tend to restore it to its ancient importance. It is inclosed by the Carpathian mountains on the north, Transylvania on the east, the Banate and Slavonia on the south, and Styria, Lower Austria, and Moravia on the west. It lies between 46° and 49° 35' N. lat., and 16° and 26° 20' E. long. The area is about 68,000 square miles, and the population nearly 11,000,000.

The country consists chiefly of an immense plain, and possesses generally a clay soil of extraordinary fertility; but along the rivers large swamps occur, owing to their low borders being so readily overflowed. There are also large tracts of sand, called *puzta*, interspersed with soda lakes, which dry up in summer and leave their beds incrustated with the mineral. From their general character they appear to have anciently belonged to the bed of an extensive inland sea. But both the sand and swampy tracts are rapidly diminishing in size, in consequence of extensive works energetically carried on for their reclamation. The climate varies considerably. In the districts nearest the mountains it is so cold that the winter may be said to continue from October to May, but in the southern districts snow seldom lies on the ground more than two or three weeks. The level tracts in the eastern part often suffer greatly from drought. Although, from want of care, in the swampy districts ague is prevalent, the climate on the whole must be regarded as healthy, and favourable to the development of physical strength.

Nearly the whole of Hungary lies within the basin of the Danube. The Theiss, itself a branch of the Danube, is one of the chief rivers, and its basin may be considered as forming a distinct part of Hungary. The Drave, the Raab, the Leitha, the March, the Waag, the Gran, &c., flow into the Danube. The Zagya, Sajó, Hernád, Bodrog, Koros, Maros, Gzemos, Temes, &c., flow into the Theiss. Of the lakes the most considerable are the Plattensee [*BALATON*], 46 miles long, and 3½ miles mean breadth, and the Neusiedler, about 24 miles long, and from 3 to 7 miles broad, both of which lie in the west part of the country. Many canals have been made in different tracts of Hungary, partly to drain the marshes and partly for the purposes of commerce.

In the abundance, variety, and value of its natural productions Hungary excels almost any country in Europe. Corn is the main product of agriculture, especially in the south. The Hungarian wheat is of the finest quality, and well known in the French and English markets. Fruit grows everywhere, even at the foot of the Carpathians. There are whole forests of cherry, plum, and chestnut trees. In the south, lemon and orange trees blossom the whole summer in the open air. The grape is most abundant; the wine of the Hegyalla district is renowned by the name of Tokay. The average yearly production of wine in Hungary is estimated at 400,000,000 gallons, of which at least one-third is available for export, and is now coming into favour

in the English markets. Tobacco is also extensively cultivated; but the crops of corn, grapes, and tobacco would all soon be very much increased by free trade, political security, and greater facilities of transport.

Of domestic quadrupeds the horned cattle are some of the finest in Europe. The breed of sheep has been much improved, and horses, swine, and poultry are largely reared. Bears, wolves, and various birds of prey are met with in the forests. Hungary has extensive works in metals of almost all kinds, except tin; and it produces likewise a great variety of precious stones, such as amethyst, agate, opal, jasper, Hungarian diamonds, garnets, &c.

The inland trade of the kingdom is as active as the means of communication will permit, and the foreign commerce is of importance, and rapidly increasing in extent. The exports consist of the natural produce of the kingdom; the imports chiefly of manufactures. The roads in many parts are still very bad, but extensive railway communication has been opened between the chief towns, and the resources of the country are in process of extensive development. A sound and equitable system of taxation, coupled with the recent revival of constitutional rights, will, no doubt, soon effect still greater changes.

Perhaps no country of the same extent contains such a variety of nations as Hungary. The Magyars, or proper Hungarians, were originally an Asiatic people; there are also Wallachians, Armenians, Germans, Italians, Jews, Servians, Russniaks, Slovacs, Croats, and Wends. The inhabitants, except the Jews, are Christians. The Roman Catholics have three archbishops and seventeen bishops. The United Greeks have four bishops. The Non-united Greeks have an archbishop and seven bishops. The Protestants have no bishops, but are governed by superintendents and synods.

Education, especially in its lower branches, is rapidly extending. Schools exist in every district. There are also a few academies, many gymnasia, a lyceum at Erlau, a university and two schools for philology at Pesth, a famous mining school at Schemnitz, and many others.

The constitution of Hungary is given in the article **AUSTRIA**.

History.—The oldest known inhabitants of Hungary were a nation of nomadic barbarians, originally issuing from Scythia or Western Tartary. They do not appear to have been known to the Romans until the beginning of the third century, at which time the Latins called them Pannonians. Under Attila, not unjustly named the 'Scourge of God,' they made an irruption into Gaul, and conquered its most opulent towns, and were rapidly sweeping towards Paris when Ætius, the Roman general, defeated them with immense slaughter near Troyes, in Champagne, in 451. Attila then withdrew into Pannonia; but soon recovering his losses, he poured, like a torrent, into Italy, captured its richest towns, ravaged its fairest provinces, and was about to carry his victorious arms into Gaul, when death arrested his career in the year 454.

Upon Attila's decease the Huns assumed the name of Hungarians, but of their progress during the fall of the Western and the rise of the Eastern empires, and of their wars, irruptions, and forays which are said to have occurred between the third and tenth cen-

turies, history preserves no authentic record. But it is certain that German missionaries carried a knowledge of the religion of the cross into their savage wilds early in the eleventh century, when Stephen, their chief, who had married the Emperor Henry's sister, was baptized, and received from the pope the title of the 'apostolic king.' He endeavoured to strengthen his throne and consolidate his kingdom by creating a hierarchy and an aristocracy. For this purpose he divided Hungary into ten bishoprics and twenty counties; the counts and bishops forming a council of state, with whose concurrence this sagacious monarch prepared a system of government, whose main features were long preserved. But the prosperity of the country was long impeded by the struggles which broke out in King Stephen's reign between the dominant forces of paganism and Christianity. Andrew I. (or Andreas) reigned from 1046 to 1061, when he fell in a battle with his brother Bela, who succeeded him on the throne. St. Ladislaus, by his genius and virtue, irradiated a period of Hungarian history which otherwise would present only a dark record of war and bloodshed. He subdued Slavonia and Croatia in 1089, and Calomann conquered Dalmatia in 1102. The boundaries of the kingdom were still further extended by Bela II. and Emeric, the former of whom subdued Bosnia, and the latter Servia.

A valuable impetus was communicated to the prosperity of Hungary by the introduction in 1148, under the auspices of Geysa II., of German colonists, who laid the foundation of its manufacturing wealth; and the gradual progress of commercial and industrial ideas exercised a favourable influence on the Magyars, who abandoned their wild rude life on the tented plain, and assembled in towns under the shadow of the law. Something of the grace and elegance of French civilization was introduced by Margaret, sister of King Henry of France, who married Bela III., an able and patriotic monarch. A severe blow, however, was given to the national welfare by a terrible irruption of the Mongols about the middle of the thirteenth century, and it required a long course of years to heal the wounds inflicted by those barbarous hordes.

Bela III. was succeeded by his son, Andreas II., who died in 1235. Then came Bela IV., and, in 1290, Andreas III., the last monarch of the Arpad dynasty, which became extinct at his death in 1301. A disastrous interregnum ensued, which was terminated by the interference of the papal power on behalf of Charibert. Charibert gained his crown by the sword, and preserved it by the sword, recovering the provinces of which the kingdom had been deprived, and adding to it Moldavia. This energetic sovereign was succeeded by less competent rulers, and Hungary was convulsed with internal feuds which continued almost uninterruptedly for several generations. A civil war was maintained between the nobles and the commons, during the reigns of Ladislaus V. and the Corvins, which afforded the Turcomans an opportunity of invading the distracted country. Led by Soliman the Magnificent, the Moslems completely annihilated the Hungarian forces in 1526. Their king, Louis II., was slain, and when the victorious soldiers of the crescent withdrew from the ravaged land, they bore with them

two hundred thousand Christian captives into slavery.

In 1526, the Hungarian states unanimously elected Ferdinand I., emperor of Germany, to the Hungarian throne. But the country still remained disturbed by the enmities of the Protestant and Catholic factions, and the Turks held many of its principal strongholds. For a century and a half, as the bulwark of Christendom, the frontier land between Christian Europe and Mohammedanism, it was subject to their invasions, which drained it of its best blood and exhausted its resources.

Leopold was elected king in 1655. As he attempted to encroach upon their liberties, the Hungarians revolted, and in consequence many of their leading nobles perished on the scaffold at Vienna. To complicate the misfortunes of the country, it was again invaded by the Turks, who, assisted by a large body of the insurgents, under the celebrated Tekeli, swept through Hungary, and invested the Austrian capital. The ruin of the Austrian empire seemed imminent, but this peril to Christendom was averted by the genius of Sobieski, king of Poland, who hastened to the succour of the emperor, and under the walls of Vienna gained a complete victory over the Moslems.

Hungary now submitted to the imperial crown, which, in 1687, was declared hereditary in the house of Hapsburg. It remained for many years tranquil and prosperous; and when the coalition of France, Bavaria, and Prussia threatened the Empress Maria Theresa with the loss of all her dominions, with the shout of 'Moriatur pro rege Maria Theresa,' the loyal Magyars drew their swords in her cause. She died in 1780, and was succeeded on the Hungarian throne by her son, Joseph II., emperor of Germany. In 1790, Peter Leopold became king, but reigning only five months, his eldest son, Francis, assumed the crown.

During the long wars of Napoleon the Hungarians ungrudgingly contributed their men and money to the defence of the Austrian empire; the Diets being convoked for no other purpose than to grant supplies, and be dismissed as soon as they spoke of grievances. But when Napoleon's power was crushed on the field of Waterloo, they naturally expected as a recompense for their sacrifices the social and constitutional reforms which the kingdom greatly needed. On the other hand, Austria was desirous of absorbing Hungary as an integral part of the empire, and of sweeping away the rights and privileges secured to her by the compact of 1687. To resist this unprincipled attempt the Hungarian party was formed in 1827, who continued for twenty years their patriotic exertions, and by their firmness baffled the intrigues of the Austrian government.

In 1847 the direction of the patriotic party was assumed by Louis Kossuth, a man of genius, political sagacity, and courage, who, gifted with extraordinary powers of eloquence, soon obtained a vast ascendancy over the minds of his countrymen. Under his leadership, the Hungarians demanded a responsible ministry, freedom of the press, and annual diets or parliaments. The French revolution of '48 had shaken nearly every European throne, and the emperor was in no position to disregard the voice of Hungary. He conceded all she asked, and, for the

first time for three centuries, the Magyars beheld at Pesth a truly national government.

As soon as Austria had shaken off her first alarm, she began to consider how she should undo what she had done, and recall the liberties she had reluctantly granted. For this purpose she secretly encouraged Jellachich, the ban of Croatia, to invade Hungary with his Serbs and Croats, hoping to profit eventually by the successes he might gain. Discovering the imperial designs, Hungary prepared for war; and the Diet voted funds for raising an army of 200,000 men. Both parties now stood unmasked. The emperor loaded favours upon Jellachich, who crossed the southern frontier of Hungary on the 9th of September with an army of 60,000 men. On his approach to Pesth, he was met by the Hungarian volunteers, strong in the consciousness of a just cause, and suffered a total defeat.

The imperial authorities now threw themselves actively into the struggle. They dissolved the Diet, appointed Jellachich military governor of Hungary, and declared the whole kingdom under martial law. The troops of Austria were poured into the country, in the belief that the 'rebellion' would be speedily crushed. One hundred and thirty thousand men, under Prince Windischgratz, constituted, indeed, a force to which, at first, the Hungarians could offer no resistance, and town after town fell into the hands of the Austrians. The Diet then retired to Debreczin; and Görgei, the commander-in-chief of the Hungarian levies, concentrated his army behind the Theiss. Elate with fond hopes, the emperor now issued a proclamation on March 4, 1849, declaring the national existence of Hungary terminated; as a corollary on which startling proposition, Görgei suddenly led his troops across the Theiss, dashed upon the Austrians, and in a series of engagements which extended over ten days drove back the enemy from point to point, until he finally crushed them at Godollo. Windischgratz was immediately removed from his command, and his successor evacuated Hungary with the wrecks of the imperial army.

On the 16th of April the Diet declared Hungary independent, and appointed Louis Kossuth governor. This step appears to have wounded the *amour propre* of Görgei, though he offered no open opposition; but thenceforth it can hardly be doubted that he played a traitor's part. Had he immediately marched upon Vienna he would assuredly have secured his country's freedom; but he elected to move towards Buda, and afforded Austria time to summon her troops from Italy, and to invoke the aid of Russia. In the month of June the combined imperial armies poured into Hungary from north and south, from east and west. An attack, however, which they hazarded upon Görgei's intrenched camp, near Komorn, was repulsed with a loss of 3000 men; and it is probable that his great military talents might still have been exerted on his country's behalf, but for his sudden and ill-advised removal from the post of commander-in-chief. It is true that in the following August Kossuth and his colleagues retraced their steps by placing the sole power in his hands as Dictator of Hungary; but the slight rankled in the mind of a man who was as vain as he was able, and he basely revenged himself by selling his country to Austria; for, ten days subsequent to his elevation, he

unconditionally surrendered his whole army, 32,000 men, with 144 pieces of artillery, to the Russian commander, at Villagos.

There was now no resource for Hungary but submission. The leading nobles solicited the emperor's clemency; Kossuth, Bem, Guyon, and others, too closely implicated in the rebellion to expect any mercy, made their way into Turkey. Austria pressed for their surrender; but the Ottoman government, supported by England and France, resisted the demand; and Kossuth afterwards repaired to England, where he was enthusiastically welcomed.

Komorn, the last stronghold of the Hungarian patriots, capitulated in October, 1849, and the whole of Hungary bowed beneath the Austrian yoke.

It is not, perhaps, for the interests of Europe that the land of the Magyars should have an existence separate and distinct from that of the Austrian empire; and it would probably be impossible for her to maintain her independence for many years. But every lover of liberty will sympathize with her courageous efforts to secure the advantages of a constitutional government, and the restoration of the rights guaranteed to her by the very treaty which confers her crown on the house of Hapsburg. What she failed to obtain by force of arms, she has now, however, obtained from Austria's necessities. The catastrophe at Sadowa opened the eyes of the emperor and his advisers to the fatal weakness of the empire, and it became their first care to effect a durable reconciliation between the crown and its Hungarian subjects. On June 8, 1867, the emperor was crowned at Pesth as king of Hungary, with a pomp and enthusiasm which recalled former and happier times, and took the oath of allegiance to the Hungarian constitution. All the principal demands of the Hungarian constitutionalists have been conceded by the Austrian cabinet under the advice of the emperor's sagacious premier, Baron von Beust, and the country has obtained the control of her own finances and militia, her rights of local self-government, her own Diet, and separate administration. In fact, her relations to Austria now in some respects resemble those of Ireland to England before the Union; and they have already much strengthened the position of Austria as a first-rate European power.

HUNGERFORD. [BERKSHIRE.]

HUNS, HUNNI, the name given by historians to several nomadic Scythian tribes which devastated the Roman empire in the fifth century. They inhabited the plains of Tartary near the borders of the Chinese empire for several centuries before our era, and it was to put a stop to their incursions that the Chinese built their great wall about two centuries before Christ. In after times they became divided into the Northern and Southern Huns. The northern Huns, being defeated by the Chinese about A.D. 93, emigrated westward as far as the Volga, where they defeated the Alani. They then encamped in the plains between the Volga and the Tánais, and as far south as the ridge of the Caucasus, where they remained for more than two centuries. Under the Emperor Valens they first crossed the Cimmerian Bosphorus, drove before them the Ostrogoths and Visigoths, and obliged the latter to cross the Danube, when the emperor granted them lands in Thrace. The Huns had frequent wars with the Romans. [ATTILA.]

After the death of Attila the various tribes under his sway quarrelled among themselves, and being attacked by the Goths they were driven back beyond the Tânaïs. Part of them settled in Pannonia, to which they gave the name of Hungary; but the present Hungarians, or Magyars, came from a different immigration.

HUNT, JAMES HENRY LEIGH, a celebrated poet, essayist, and critic, was born at Southgate, in Middlesex, 19th October, 1784. He received his education at Christ's Hospital; and his poetical talent displayed itself at such a singularly early age, that before he left school he had written a somewhat large number of verses, which his father published by subscription in 1801, under the title of 'Juvenilia.' Mr. Hunt next became clerk to his brother Stephen, an attorney, and then a clerk in the war-office, which he left in 1808, and became editor and part proprietor of the *Examiner* newspaper, which had just been started by his brother John. They were both tried for political libel in 1811, acquitted and tried again, and sentenced to pay a fine of 500*l.*, and to undergo two years' imprisonment. The libel consisted of the term 'a fat Adonis of fifty' as applied to the Prince Regent. The penalties were borne with patience and fortitude, and all offers on the part of the government to remit them on certain easy conditions were sturdily rejected. After the expiration of the term, Mr. Hunt, a sufferer in health no less than in fortune, returned to his old post, and continued to write as before for the *Examiner*, which long enjoyed the distinction of being the most ably edited and the most independent among the weekly metropolitan press. Mr. Hunt's editorship brought him into contact with several of the leading literary men of the day; and among the authors whose acquaintance he formed were Campbell, the two Smiths, Keats, Shelley, Coleridge, Hazlitt, Lamb, and Byron. In 1821 a new phase opened in Hunt's career. The cause of liberty was, it was thought, in danger of betrayal, and required its friends to be more active; and at Byron's invitation, Hunt determined to transfer the *Examiner* to other hands, and to proceed to Italy with a view to establishing, in conjunction with the author of *Childe Harold*, Hazlitt, and others, a journal in the interest of reform, to be christened the *Liberal*. Hunt describes in his 'Autobiography' the difficulties in which he personally stood in regard to a co-operation in the proposed undertaking. His wife was ill; he himself was ill; he had a large family; and his circumstances, not improved by government prosecutions, were not too flourishing. Altogether he was considerably embarrassed. At length the step was taken. He embarked in November, 1821. 'It was by Shelley's advice,' he says, 'that I acted; and I believe if he had recommended a balloon, I should have been inclined to try it.' Four chapters of the 'Autobiography' are devoted to an interesting narrative of Hunt's Italian experiences, and a good deal of space is occupied by gossip and anecdote. He remained in the peninsula four years, a portion of which time he and his family spent under Lord Byron's roof, and the juxtaposition was attended, as might have been expected, by occasional jars. On his return to England, Mr. Hunt resumed his literary labours, chiefly in the shape of contributions to serials, and in periodical works, some

of which were his own speculations. Among these were the *Literary Examiner*, 1817; the *Companion*, 1828; the *Tatler*, 1830-32, and the *London Journal*, 1834-35; and his talents gradually introduced him to the notice of persons able and willing to serve him. Mr. Hunt, before his visit to Italy, had published Nos. 1 to 4 of a quarterly review called the *Reflector*, and one hundred numbers of the *Indicator*, 1819-21.

His other principal works are—'The Feast of the Poets,' 1814; 'The Descent of Liberty,' a mask, 1815; 'Bacchus in Tuscany,' trans. n. d.; 'Hero and Leander,' n. d.; 'Story of Rimini,' 1816; 'Ultra-Crepidarius,' a satire on W. Gifford, 1819; 'Amyntas, a Tale of the Woods,' 1820 (from Tasso); 'Recollections of Lord Byron,' 1828; 'Sir Ralph Esher,' a romance, 1832; 'Captain Sword and Captain Pen,' poem, 1839; 'Legend of Florence,' play, 1840; 'The Palfrey,' poem, 1842; 'Christianism,' 1846; 'Men, Women, and Books,' a selection from his uncollected prose writings, two vols., 1847; 'The Town,' 1848; 'Autobiography,' three vols., 1850; 'Religion of the Heart,' 1853; 'Stories in Verse,' 1855; 'Old Court Suburb,' 1855. It was the intention of Mr. Hunt, had he been spared a little longer, to have republished the 'Religion of the Heart'; and there is a copy of this book, corrected in many places, and with 'Cardinomia, or Religion of the Heart,' added to the title in the author's hand. In 1847 Lord John Russell procured Mr. Hunt a pension on the civil list of 200*l.* a-year; and this reward, which he had amply won by his old political services and sacrifices, contributed with Shelley's commuted bequest to place him in tolerably comfortable circumstances. His later years were passed in tranquil seclusion and domestic privacy. It was his fortune to outlive the majority of those with whom he had associated at the outset of his career. He saw Keats, Shelley, Byron, Hazlitt, Lamb, and Coleridge sink successively to their graves; and although he did not offer in himself any striking example of longevity, he became at last almost a stranger to the men whom he saw around him, one of a generation which had prematurely vanished. Years rolled on, and his own time came. 'August 28 [1859], at the house of Charles Reynell, Esq., Putney, aged seventy-four, Leigh Hunt, Esq.,' forms a record of the melancholy event which the declining health of the deceased had led his friends for some time to anticipate. He died without pain, and death came so quietly that the sick man was hardly conscious of its approach; and his interest in life remained to the last. Those who wish to form a favourable, or even a fair estimate of Leigh Hunt, will judge him by his earlier productions (1813-20): the publication which will make his name live is the 'Story of Rimini,' 1816. Such as have only read his works are apt to form a very imperfect notion of the accomplished author; for they can know nothing of the riches and charms of his discourse, his gentleness of character, his forgiving nature, and his large heart. One of the noblest of modern political martyrs, he was also one of the most charitable and inoffensive of mankind. In person Hunt was tall and slender, and remarkably erect, even as an old man, in his gait. His hair, bleached by age, was in his younger days jet-black; and his features, though not handsome, were full of

intelligence. His dark, searching Indian eyes were peculiarly expressive, and there was a fire in them which was quenched only with life.

A selection from his Letters and Correspondence was published in 1862 by his son, Mr. Thornton Hunt.

HUNTER, JOHN, was born in 1728, at Long-Calderwood, a village near Glasgow, where his father possessed a small farm. Being the youngest of ten children, and his father dying when he was young, his education was almost entirely neglected. His whole time was devoted to the amusements of the country till he was seventeen years old, when he went to stay with his brother-in-law Mr. Buchanan, who was a cabinet-maker at Glasgow. Hunter worked at the trade for nearly three years. At the end of that time, hearing of the great success which his brother [HUNTER, WILLIAM] had met with in London as an anatomical and surgical lecturer, he wrote to offer him his services as assistant in the dissecting rooms. His offer was accepted, and in 1748 he commenced his anatomical studies, in which he at once distinguished himself both by his ardour and his skill. In 1749 Hunter became the pupil of Cheselden, then surgeon to Chelsea Hospital, where he attended for nearly two years, and in 1751 he went to St. Bartholomew's Hospital, and attended the practice of Mr. Pott. In 1753 he entered as a gentleman-commoner at St. Mary's Hall, Oxford, intending to practise as a physician: but he seems soon after to have given up this idea, for in 1754 he entered as a surgeon's pupil at St. George's Hospital, in the hope of becoming at some future time a surgeon at that institution. In the same year his brother made him his partner in the school, and he delivered a part of each annual course of lectures till 1759, when his constant and severe labours in anatomy, to which he had lately added comparative anatomy and physiology, began to affect his health so seriously that it became advisable for him to resort to some milder climate. With this view he obtained an appointment as staff-surgeon, and early in 1761 proceeded to Belle-Isle with the armament ordered to lay siege to that town. He afterwards went to Spain, and remained in active duty till the end of 1763, when a peace was negotiated, and, his health being completely restored, he returned to London, and commenced practice.

At first Hunter met with little success in his profession. His manners were rough, and he paid but little attention to his practice, regarding it only as a source from which he might obtain the means of carrying on the scientific investigations to which he was far more attached, and which he had steadily pursued while in the army. To defray the expenses which these entailed he again commenced lecturing on anatomy and surgery; but notwithstanding the talent and extensive knowledge which his lectures evince, they were little appreciated, and he never had a class of more than twenty pupils. Every year however, added to his reputation, and in 1767 he was elected a Fellow of the Royal Society, and in 1768 surgeon to St. George's Hospital. The latter appointment was of the greatest value to him; it increased his income, both by adding to his surgical reputation, and by enabling him to take pupils, from whom he received large fees. Among his pupils were

Jenner, with whom he remained throughout his life on terms of the closest intimacy, and Sir Everard Home, whose sister he afterwards married. From the time of his appointment to St. George's, Hunter's life was occupied with a constant and laborious investigation of every branch of natural history and comparative anatomy, physiology, and pathology, to all of which he devoted every hour that he could snatch from the requirements of an increasing surgical practice. In 1773 he suffered from the first attack of the disease of the heart of which he ultimately died. In 1776 he was appointed surgeon-extraordinary to the king; and soon afterwards inspector-general of hospitals, and surgeon-general. For many years after, however, his health seemed pretty good, and he was subject to slighter returns of the disease only when much excited or fatigued; but in 1785 the attacks became more frequent, and he was obliged to leave London. In the following years he became gradually more debilitated, and the slightest fit of anger was sufficient to induce severe spasms. In October, 1793, he was engaged in warm disputes with his colleagues at the hospital; and a remark being made by one of them at a meeting of the governors, on the 16th of the month, which Hunter regarded as an insult, he left the room that he might repress or at least conceal his rage, and had scarcely entered the adjoining apartment when he fell dead in the arms of Dr. Robertson, one of the physicians of the hospital.

John Hunter's museum consisted, at the time of his death, of upwards of 10,000 preparations, illustrative of human and comparative anatomy, physiology and pathology, and natural history. The principal and most valuable part of the collection, forming the physiological series, consisted of dissections of the organs of plants and animals, classed according to their different vital functions. He had a beautiful collection of nearly 1000 skeletons; of objects illustrative of natural history, consisting of animals and plants preserved in spirit or stuffed, of which he left nearly 3000; of upwards of 1200 fossils; and of monsters. The pathological part of the museum contained about 2500 specimens, arranged in three principal departments: the first illustrating the processes of common diseases and the actions of restoration; the second the effects of specific diseases; and the third the effects of various diseases arranged according to their locality in the body. Appended to these was a collection of about 700 calculi and other inorganic concretions. The museum was sold after Hunter's death. The government gave 15,000*l.* for it, and presented it to the College of Surgeons, London, by whom it has been greatly augmented and maintained.

For several years before his death Hunter had been anxious to form a complete catalogue of his collection, and to embody in one large work the results of all his labours and observations. He died when he had completed but a small portion of his design, and left only the materials, with which his successors might have completed a work which would undoubtedly have been the most valuable of its kind ever published. The formation of the catalogue was intrusted to Sir Everard Home, the brother-in-law and only surviving executor of Hunter; but from year to year he deferred his task, and, after supplying only two

small portions of his undertaking, he at length announced, that in accordance with a wish which he had heard Mr. Hunter express, he had burned the manuscripts, which he had taken without leave from the College of Surgeons, and among which were the ten volumes of dissections, and numerous other original papers. The Catalogue, however, is now formed in a manner which, although it cannot compensate for the loss of the other, confers the highest credit on those by whom it has been made.

Hunter is, by the common consent of all his successors, the greatest man that ever practised surgery. Considered merely as a surgeon, and with reference only to the direct improvements which he effected in its practice, he stands inferior to few: his improvement of the operation for aneurism was undoubtedly the most brilliant discovery in surgery of his century. He first described the important disease of inflammation of the veins; he first published lucid views on the venereal disease, and by his work on inflammation improved the modes of practice applicable to nine-tenths of the diseases which fall within the province of the surgeon. But it was less by individual discoveries than by the general tone of scientific investigation which he gave to surgical practice that he made it a science, rather than a mechanical art, and induced men of far higher attainments than those who had before practised it to make it their study.

As an anatomist and physiologist, his museum alone is sufficient to show that he has had no superior; and while his published works confirm this opinion, and exhibit what he knew, they add to the regret that so much more should have been lost.

His surgical works were published under the title of 'John Hunter's Surgical Works, with Life, by Palmer,' 4 vols. 8vo. His life was also written by Sir Everard Home, by Jesse Frost in 1794, and by Joseph Adams in 1816.

HUNTER, WILLIAM, was born in 1718 at Long Calderwood, near Glasgow. He was entered at the University of Glasgow in 1732, and remained there for five years studying for the church; but, while hesitating whether he should pursue that profession, he met with Cullen, who was at that time practising as a surgeon and apothecary at Hamilton. An intimate friendship was soon formed between them, the result of which was that Hunter determined to study medicine, and to practise in partnership with Cullen. Part of the agreement into which they mutually entered was, that each of them should alternately pass a winter at some large medical school, while the other remained in charge of the business in the country. Hunter visited London in 1741, where he resided with Smellie, the celebrated accoucheur, and studied anatomy under Dr. Nicholls, and surgery at St. George's Hospital. Dr. Douglas, to whom he brought a letter of introduction, engaged him soon after his arrival to assist him in completing an anatomical work which he was publishing, and to educate his son. He resided in the family till 1744, when Mr. Sharpe having resigned a lectureship on surgery to a Society of Naval Surgeons, Hunter was elected to fill his place, and at once met with the most marked success. In 1746 he commenced lecturing on anatomy, and in 1747 became a member of the Corporation of Surgeons. But he had always preferred

the practice of midwifery to that of surgery, and, several circumstances coinciding to give a favourable prospect of success, he determined in 1749 to confine himself exclusively to the former branch of the profession. In 1750 he took a Doctor's degree at Glasgow; in 1764 was appointed physician extraordinary to Queen Charlotte; in 1767 he became a Fellow of the Royal Society. His time was now so completely occupied in the practice of his profession, that he was obliged to give up a part of his lectures, and his brother John, Hewson, and Cruickshank were successively his partners. He amassed a large fortune, and died in 1783, with a reputation inferior only to that of his brother, of whom it was not his least honour that he had been the preceptor and first patron.

William Hunter's principal work was the 'Anatomy of the Gravid Uterus,' on which he was engaged for nearly thirty years. It contains thirty-four folio plates, most accurately and beautifully engraved from dissections by himself and his brother, illustrative of the most important subjects in obstetrics. He was also the author of numerous essays in the 'Philosophical Transactions,' and the 'Medical Observations.' He founded a medical school in a private house in Windmill Street, with a museum and dissecting rooms attached to it. His valuable museum he bequeathed to Dr. Baillie, who was to hold it for thirty years, and then to transmit it to the University of Glasgow, to which he left 8000*l.* for its maintenance and increase.

HUNTINGDON. [HUNTINGDONSHIRE.]

HUNTINGDON, SELINA, COUNTESS OF, born 1707, died 1791, was one of the three daughters and co-heirs of Washington Shirley, Earl Ferrers. She married, in 1728, Theophilus Hastings, earl of Huntingdon, who died October 13, 1746. She had many children, four of whom died in youth or early manhood. She became deeply religious, and may be said to have belonged to the Whitfieldian section of Methodism; but she chose to act herself as the founder of a sect. Her followers are distinguished as belonging to 'the Countess of Huntingdon's connection.'

HUNTINGDONSHIRE, an inland county of England, situated between 52° 8' and 52° 36' N. lat., and 0° 3' E. long., and 0° 30' W. long. It is bounded N. and N.W. by Northamptonshire, S.W. by Bedfordshire, and on all other sides by Cambridgeshire. The population in 1868 was 63,683. The area is 229,544 acres, of which, according to the official agricultural statistics, published in 1869, 205,417 are under cultivation—102,179 being devoted to corn; 17,240 to green crops; 12,310 to clover and artificial grasses, and 55,513 to permanent pasture. The number of cattle in the county in 1868 was 23,835; sheep, 167,277; and pigs, 23,130.

Surface, Rivers, &c.—Huntingdonshire has no high hills, but there are two or three elevated tracts. The principal rivers are the Ouse and the Nene, with their respective tributaries. The Ouse enters the county from Bedfordshire, near St. Neots, and, flowing past Huntingdon, enters Cambridgeshire at Earith, after a course of 23 miles in the county or on the borders, all navigable. The Nene has a short course along the northern border before it enters

Cambridgeshire. Whittlesea-Mere, Ramsey-Mere, and Ugg-Mere were large pools or lakes which have been drained and reclaimed. Whittlesea-Mere was the largest English sheet of water apart from the lake district, two miles and a quarter long by one and a half broad, abounding with fish and water-fowl, but since 1851 converted into corn fields and pastures, and occupied with farm buildings. A considerable part of the county is destitute of springs, and is supplied with water from ponds. Formerly it was a deer forest, but at present it is thinly wooded.

Geology, Climate, and Agriculture.—The south-eastern part of the county is occupied by the iron-sand and gault. The rest of the county, excepting the Fens, and perhaps a narrow strip on the western side, is occupied by the Oxford clay.

The climate is similar to that of the contiguous inland counties—mild and healthy, except in the Fens, where, in addition to the humidity, there is a great want of pure water. The soil, in general, is a deep loamy clay or loamy gravel, with good meadow land on the Ouse and Nene. The farms are large, and grain, with beans, rape, and clover, are the chief crops. Cheese, butter, and malt are sent to market. Agriculture generally is in an advanced state, especially in the Fens. The sheep are mostly of the Leicester breed. The hogs are Berkshire or Leicestershire, with various crosses.

Divisions and Towns.—Huntingdonshire is divided into four hundreds and 107 parishes. It is in the diocese of Ely and the Norfolk circuit. The assizes are held at Huntingdon. Two members are returned to Parliament for the county, and one for the borough of Huntingdon. The number of voters on the county register in 1869 was 3637. The following are the chief places:—

Godmanchester is three-quarters of a mile S.E. from Huntingdon. It was for many centuries famed for its very superior husbandry. It has a fine parish church, which was restored a few years since. There are an iron foundry and machine works, and some small manufactures of malt, oil cake, and leather. The parish, which forms part of the parliamentary borough of Huntingdon, contains a population of 2438.

Huntingdon, the chief town of Huntingdonshire, and a municipal and parliamentary borough, is 59 miles from London by the Great Northern, or 77 by the Great Eastern Railway. The town is on a gently rising ground on the north bank of the Ouse, and is connected with Godmanchester by three bridges. Very great improvements have been made in the drainage and sewage during the last few years. The principal street extends about a mile north-west from the bridge over the Ouse, and consists for the most part of respectable houses. St. Mary's Church is of perpendicular character; it was rebuilt in 1620, but had become much mutilated, until it was restored in 1862. All Saints has a fine perpendicular tower, with a good entrance; and another church has recently been erected by Lady Olivia Sparrow, on the site of the old theatre. There are four dissenting chapels, a good town hall, county gaol, hospital, and lunatic asylum, borough gaol, union, an endowed grammar school, and other educational establishments. The trade of the town is considerable, principally in malt, wool, and corn; and there

are manufactures of patent bricks and tiles for draining, two large breweries, and an iron foundry. The market is well supplied with corn and provisions. The municipal borough is governed by a mayor, four aldermen, and twelve councillors; population, 3816. The parliamentary borough formerly returned two members to the House of Commons, but the Reform Bill of 1867 deprived it of one. Population, 6272; number of electors (1869), 901. Oliver Cromwell was born here in 1599, in a house near St. Mary's Church, and was educated at the grammar-school.

Kimbolton is 9 miles S.W. from Huntingdon, and $87\frac{3}{4}$ from London by the Midland Railway. The town is small and unimportant. The church has a tower with a lofty spire, and contains some monuments of the Manchester family. There is an endowed grammar-school, and brewing, malting, tanning, and brick making are carried on to a small extent. Near the town is Kimbolton Castle, the residence of Queen Catherine after her divorce from Henry VIII., and now the seat of the Duke of Manchester. It has recently been renovated and much altered. The park is very extensive and well stocked with deer. The remains of Stonely Priory are also in the vicinity. Population, 1661.

Ramsey is 10 miles N.N.E. from Huntingdon, and $75\frac{1}{4}$ from London by the Great Northern Railway. The town derives its origin from a Benedictine abbey, founded on an island or dry spot in the marshes, called Ram's Ey, i.e., Ram's island, in the reign of Edgar, 969. It consists chiefly of one long street. The church is spacious, and has recently been restored. There are also eight dissenting and a new Roman Catholic chapel, and a large building called the Institution, used for meetings, lectures, &c. Population of the parish, 4500; of the town, 2354.

St. Ives is 5 miles E. by S. from Huntingdon, and $72\frac{1}{4}$ from London by the Great Eastern Railway. The town stands on a slope; the lower part, close on the bank of the Ouse, is liable to be inundated by the floods of that river. Brewing and malting are carried on, but there are no manufactures. Considerable business is done by means of the navigation of the Ouse. A new corn exchange was erected in 1864. In addition to corn, the market is one of the largest in the kingdom for cattle. The church is a light neat building, with some ancient portions, and there are several dissenting chapels. Population, 3395. Cromwell was a resident farmer at St. Ives, and acquired the popular title of Lord of the Fens from some displays of public spirit relative to their improvement.

St. Neots is 8 miles S.S.W. from Huntingdon, and $51\frac{1}{4}$ miles from London by the Great Northern Railway. A Benedictine monastery was early established here, to which the remains, or part of the remains of Neot, a Saxon saint, were transferred from Neotstock in Cornwall. The town is of respectable appearance, and has some good shops. The church is a remarkably fine edifice, and there are some dissenting chapels. The town contains an extensive iron foundry and manufactory of steam engines, gas apparatus, &c., as also some large breweries and steam flour mills. About a mile distant is also a very large paper mill. A new corn exchange was erected in 1863. Population of the parish, 3321.

Stilton is 13 miles N.N.W. from Huntingdon. It was once a market town, but has dwindled into insignificance. The *Stilton* cheese takes its name from this village, but no cheese of that kind is made there. It acquired the name from travellers on the great north road becoming acquainted with its quality at the village inn, the landlord of which obtained it from a relative in Leicestershire, the first and still the chief place of its production. The church of St. James has been thoroughly restored. Brick making is carried on. Population of the parish, 724.

Yaxley is 4 miles from Peterborough and 76 from London. The town is small and irregularly laid out. The church is a fine edifice, built partly in the perpendicular style, intermixed with others of an earlier date. There are dissenting chapels, and an endowed school; a brewery, some malt houses, and an agricultural implement manufactory, and in the vicinity are some market gardens. Population of the parish, 1411.

History and Antiquities.—Huntingdonshire is generally considered to have formed part of the territories of the Iceni, but it must at least have been on the western frontier of that nation, towards the Catyechlani. Upon the subjugation of Britain by the Romans, it was included in the province of Flavia Cesariensis. Two Roman stations are considered to have been in this county. The Roman Ermin Street crossed the county, from S. by E. to N. by W. The Via Devana crossed the county, from near Cambridge to Leicester.

In the earlier part of the Saxon period this county was included in the kingdom of the East Angles. It was subsequently annexed to Mercia. In the later period of the Anglo-Saxon dynasty it constituted an earldom, which continued till 1789, when it was supposed to have become extinct; but a claimant having made out a good title in 1819, it was revived, and still exists, the honour being enjoyed by a branch of the Hastings family.

In the civil wars of Charles I. Huntingdon was plundered in 1645 by the royalists.

Of the churches, Alwalton, Conington, Hartford, and Leighton Bromswold have some portions of Norman architecture. The tower of Chesterton church is a good specimen of early English, with a fine spire. Upton and Wootton churches have also some fine portions of early English architecture.

HUNTLY. [ABERDEENSHIRE.]

HURA, a genus of plants belonging to the natural order *Euphorbiaceæ*. *H. crepitans* is a tree abounding with milky juice. It is a native of the West-Indian Islands, Mexico, and Guiana, where it is called Monkey's Dinner-bell. The fruit of this tree is a depressed woody capsule, about the size of a middling apple, with from twelve to eighteen furrows which separate into as many cocci; each of these separates into two valves, and flies asunder with great elasticity when dry and fully ripe. The noise the fruit makes during this process has obtained for the tree its common name. The juice of the plant is exceedingly acrid, and a small quantity touching the eye will produce blindness. The seeds contain an acrid oil which is a drastic and dangerous cathartic.

HURD, RICHARD, D.D., was born in 1720,

and died bishop of Worcester in 1803. He went to Cambridge at a much earlier age than is now the custom, about fifteen; and his history from that time is that of a scholar, university man, author, and divine. The writings of Bishop Hurd are too many to be particularly named. The most remarkable are his 'Dialogues,' his 'Letters on Romance and Chivalry,' his 'English Commentary on the Epistle of Horace on the Art of Poetry,' and the ingenious Essays published with it, his 'Twelve Discourses on the Prophecies,' his 'Sermons,' and his Life of his friend Bishop Warburton. There is also an octavo volume of the correspondence between Warburton and Hurd, a very pleasing book.

HURDLES are straight flat rectangles of strong wicker work, about six feet long and three feet high, used in military exploits for fencing, barriers, or in the construction of hurdle batteries. In the latter, three of them are fastened at their ends in the form of a triangle, and the central space speedily filled up with earth. A number of these triangles are made to any ground plan, behind which a body of soldiers can intrench themselves in a very short time.

HURDWAR, a famous spot on the Ganges, on the right or west bank of the river, close to its emergence from the mountains, is deemed from its position one of the most sacred sites on the stream, and changes its aspect remarkably by an annual influx of visitors under the twofold influence of religion and trade. At the end of March and the beginning of April a great fair is held; and this being accounted the season most proper for ablutions, there is a prodigious gathering of pilgrims, merchants, and beggars from a wide area of Asia. The ordinary attendance averages from 200,000 to 300,000; but every twelfth year, when a particular festival is held, the number is said to be 2,000,000. The merchandise collected embraces the products of European and Asiatic industry, and also a large number of animals.

HURDY-GURDY. A stringed instrument, the tones of which are produced by the friction of a wheel acting the part of a bow against the strings, which are pressed by the fingers or by keys. It has two strings which always sound bass, like the drones of a bagpipe.

HURON, LAKE. [CANADA.]

HURRAH! an interjection used by the English as a shout of acclamation or applause. It is also used as a war-cry by English soldiers and sailors, at the most exciting times of an engagement.

HURRICANE. In the strict sense of the word a hurricane is a violent rotatory wind, which often sweeps over the Western Atlantic. In China a similar wind is called a 'typhoon,' and in India a 'cyclone.' Other winds of somewhat the same kind, but not so destructive, are called whirlwind, tempest, water-spout, land-spout, sand pillar, tornado, white squall, pampéro, &c. Hurricanes occur most frequently and with the greatest violence in tropical climates, chiefly because, in consequence of the very great heat which there prevails, the rarefaction of the air, and also the condensation of the vapour it contains into rain-drops, take place more suddenly and completely than in more temperate regions. Scientific men to this day are not quite unanimous as to the source and origin of these winds; but after many years of patient and extended investigation they have obtained such infor-

mation as to their form, course, and velocity, that they are enabled to issue directions to mariners by which their former devastating effects may to a great extent be prevented, and, in some instances, the storm itself rendered subservient to the purposes of navigation.

It was for a long time supposed that hurricanes were powerful winds which swept in a straight course along a certain track, which observation had shown to be nearly always used by them; and it was not till the late Mr. Redfield, of New York, and Colonel Sir. W. Reid, of the Royal Engineers, devoted themselves to the study of the subject, and learned those facts respecting the hurricane for which all who traverse the ocean must ever owe them a debt of deep gratitude, that any practical information on the matter could be issued for the benefit of sailors. It is now ascertained beyond a doubt that in hurricanes, tornados, typhoons, and other tempests of a similar character, the wind has a violent movement, in a circular or spiral direction, apparently about a mathematical axis; the latter having, at the same time, a progressive motion on the surface of the land or sea. The diameter of the circle within which the gyration of the wind takes place varies from a few hundred yards to several hundred miles, but the circular motion is, of course, limited to the circumference of the hurricane itself. The progressive motion is no greater than that of the general wind prevailing at the time, which, under circumstances so violent as to admit of the presence of hurricanes, may be somewhat faster than the usual rate. The circular motion is generally upwards of a hundred miles an hour, and is always in one unvarying direction. What formerly appeared to be the shifting of the wind is, in reality, only the progress of the storm, and shows that the ship, island, or whatever it may be, has come within the influence of another quadrant of the hurricane. For it must be evident that the velocity of the wind, in a revolving storm, must be the greatest and least respectively on opposite sides of the axis of rotation, in a diameter which is perpendicular to the path of that axis; for on one side the direction of the revolving current harmonizes with that of the progressive motion of the storm, and on the other it is contrary to it. The direction in which the storm always revolves is from right to left in the northern hemisphere, and from left to right in the southern—in each case contrary to the apparent course of the sun. This being so, it is evident that in a hurricane in the northern hemisphere, the prevailing wind at each of the four great points of the compass will be as follows:—At the northern margin an easterly wind; at the western margin a northerly wind; at the southern margin a westerly wind; and at the eastern margin a southerly wind. The intervening points, of course, are affected by winds modified of these, and the whole arrangement reversed exactly describes a hurricane in the southern hemisphere. With this knowledge the captain of a vessel, by simply observing the direction of a cyclone wind, can easily ascertain his position in the hurricane and how its centre bears from him, and he then only requires to know the way in which the wind will haul, to enable him to make such preparations as may insure the safety of the ship, or even to use the hurricane for the purposes of his voyage.

An acute observer can easily detect the indications of an approaching hurricane. The enormous volumes of vapour which the whirling air within the cyclone, and the external air rushing into it from without, collect and keep together, appear like a dense dark wall resting on the horizon, in the direction from which the hurricane is approaching. The sky also has a lurid and threatening aspect, the atmosphere becomes oppressively hot, and the clouds are tinted with a deep red or dark olive colour. The sun, moon, and stars shine with a pale and sickly light, and as the hurricane approaches, the wind at first moans fitfully and then roars. But as most of these warnings do not allow time for advantage to be taken of them, it is always best to rely upon the barometer, which is quite as certain, and always gives the earliest intimation of the approaching tempest. If the mercury suddenly shifts from high to low, or *vice versa*, and is followed by persistently high and unusual readings, a storm may be expected, and measures taken accordingly. By careful attention to the barometer the ship's position in the hurricane may also be determined, and much danger avoided.

Although so much is now known respecting the laws of storms, we have yet to learn their precise causes, the intervals between their recurrence, and other matters connected with them, before we can consider our knowledge on the subject thoroughly satisfactory.

The best works hitherto published on the subject are—Redfield's *Observations on Storms*; Piddington's *Sailor's Horn Book for the Law of Storms*, and *Conversations about Hurricanes*; Admiral Beaufort's *Remarks on Revolving Storms*; W. R. Birt's *Hurricane Guide*, and his article on Atmospheric Waves in the *Admiralty Manual of Scientific Enquiry*; Admiral Fitzroy's *Weather-Book*; Sir J. Herschel *On Meteorology*, &c.

CYCLONES, TORNADOS, and TYPHOONS, are specially described in separate articles.

HURTOIR, in fortification, the name of a long square piece of timber, which is placed at the head of the platform next to the interior slope of the parapet, for the purpose of preventing the wheels of the gun-carriage rolling down the slope.

HUSBAND. [WIFE.]

HUSBANDRY. In the oldest writings which have been handed down to us, the common operations of husbandry are mentioned, or alluded to, under the Greeks and Romans, in nearly the same terms in which we should describe them now. Considerable progress had been made in the tillage of the ground and in the breeding and rearing of the domestic animals. The practice of fallowing land, to restore its fertility, can be clearly traced to them. The colonies planted by the Greeks and Romans tended to diffuse a knowledge of husbandry among ruder nations.

The land in England consisted originally for the most part of woods, and of extensive pastures, in which sheep and cattle were bred, which constituted the chief wealth. A very small proportion of the soil was cultivated; and, while the population was thin, there was no difficulty in obtaining land which had never before been broken up, and which with little trouble or manuring produced moderate crops of corn. When the husbandmen began to congregate in villages for mutual defence, the best land nearest

to the habitations was cultivated, and the common pastures fed the cattle without much trouble or expense. Manure was seldom made; four times the seed was an average corn crop; and fields were fallowed every second year. Wheat was little cultivated; barley, rye, and oats were the principal produce. Many hogs were fed on acorns and beech-mast in the woods. Bread made of rye, barley, peas, or beans was the food of the labourers who were attached to the soil. The immediate tenants of the land cultivated a portion of the lands which they held for their own use, and let the remainder to smaller tenants, who, although born free, were little above the condition of the labourers, and lived much in the same manner. The live stock was frequently hired from the landlord. Oxen drew the ploughs; horses carried the produce to mill and market; and the implements were of the rudest kind.

The first English author of any note who wrote on husbandry was Sir Antony Fitzherbert, in 1523. The farmer of those days was a hard-working man. Money was seldom seen in his possession. He lived on the produce of his land, and fed his labourers at his own board. Wool was the principal article sold. The sheep were kept on extensive commons at little expense. The great difficulty was to keep them alive in severe winters, and many perished every year.

In the time of Elizabeth some attention began to be paid to the improvement of husbandry; the situation of the farmers appears to have improved; they began to acquire wealth and to increase their domestic comforts.

Cromwell encouraged husbandry; and works on husbandry published by Hartlib, Bligh, and Weston, introduced many improvements in the seventeenth century. From that time to the present day husbandry has improved slowly but regularly. With the increase of population, and a consequent increased demand for the produce of the soil, the cultivation of waste lands, and the granting of long leases to farmers, were resorted to with the best results. Jethro Tull, a gentleman who had a property near Hungerford in Berkshire, introduced a mode of cultivation which was prevalent in Lombardy, and was borrowed from the practice of gardeners, who sow and plant their vegetables in rows with wide intervals. Finding that in rich soils the produce was much increased by stirring the earth round the roots of plants, he formed a theory respecting the food of plants, which he imagined to be extremely attenuated earth. His theory was false; but the introduction of machines to drill the seed in rows, and of others to clean and hoe the intervals, which he principally suggested, has been of infinite use to the improved cultivation of the soil.

The rearing and fattening of cattle on the produce of arable land, which followed the introduction of sainfoin, lucerne, and other artificial grasses, and the cultivation of roots for the same purpose, have made a great change in the old systems. Manure is produced in greater quantity; the land is increased in productive power, and will bear more frequent crops of corn; better implements have been invented to save labour and do the work more completely; and good systems of draining have been introduced. The improvements which have been made in the breeds of cattle and sheep may be considered as entirely modern.

To enumerate the various works which have come

from the press on subjects connected with husbandry would be to give a catalogue of a large library. We can only mention some of the principal authors, such as Lord Kames, Marshall, Arthur Young, Sir John Sinclair, and Dickson. Of these, the most original, perhaps, is the first, but the works of Arthur Young are those which afford the fullest information on the state of British husbandry in the latter part of the eighteenth century, and which did most towards its improvement. The *Farmer's Magazine*, which appeared in 1800, has done much good in disseminating useful practices in husbandry; and later journals, some issued by agricultural societies, such as the Royal and Bath and West of England, have continued to impart similar benefits.

Different systems of husbandry have been prevalent at different times and in different parts of Great Britain.

The first and most inartificial is that which consists in breaking up portions of pasture-land and sowing corn on a slight ploughing, which cannot fail to be productive for some time. Several crops may thus be taken, until the land is so exhausted that the crop no longer repays the seed and labour. To extend this time, experience soon pointed out the crops which succeeded best after each other. Wheat or barley were probably the first crops; afterwards peas, beans, or oats, until the ground, being overrun with weeds, would be left to the renovating effect of time, and a fresh spot would be broken up.

The first improvement on this system is that of infield and outfield. The infield is cultivated more carefully, somewhat like a garden, and all the dung of the cattle is exclusively put upon this part. The outfield is a continuation of the first-mentioned system. The infield consisted of inclosures or open fields near the dwelling, which it was most convenient to cultivate as arable land.

The mode of recruiting lands which have been exhausted by crops or were overrun with weeds, by means of a fallow, seems to have been introduced into England by the Romans, but appears not to have been practised in Scotland till the eighteenth century. The alternate crop and fallow seem to have been later introduced than a fallow after several crops. The triennial system, which consists of a summer fallow, a winter crop, and a spring crop, was probably longer established than any other, and is still the practice in many parts of England.

During the last fifty years many of the old common fields in England have been inclosed and divided by special acts of Parliament; and where such has been the case, a better system of husbandry has generally followed. Clover and turnips are more regularly sown, and, on the light lands, take the place of summer fallow. Clover generally comes after a crop of corn, with which it was sown the preceding year in spring; and as most crops succeed well after clover, wheat was usually chosen for the next crop, as the most profitable. Thus arose the Norfolk (or alternate) system, without any very sudden departure from the old rotations. These changes, and the introduction of beans into the series, gave rise to the improved rotation of turnips, barley, clover, wheat, beans, wheat; after which the land is again cleaned and prepared for turnips with all the manure that can be spared.

As the English systems have taken their origin

chiefly from the infield cultivation, so the Scotch appear to have arisen from that of the outfield. Fallows were unknown; but the sowing of grass seed gave rise to the Scotch convertible system of husbandry, which is gaining ground daily, and bids fair, in remote situations where no manure can be purchased, to be firmly established. The convertible system is not very generally known or adopted in England, and is often confounded with the alternate system. The alternate system interposes a green crop between two white straw crops. On good land the convertible husbandry may consist of three or four years' tillage and three years' grass. Instead of sowing grass seeds after the land is exhausted, it has been found advantageous to accelerate the growth of grass by manuring the crop in which it is sown; and experience has proved that the richer the grass is the more productive are the crops which come after. The grass, instead of being a mere substitute for fallowing and manuring, is made highly profitable by feeding cattle and sheep; and the profit of the years when the land rests, as it were, by being depastured, is often as great as that of the years when it is cropped, and the risk and expense much less.

What renders the improved systems of British husbandry so superior to that of all other nations, is the attention paid to the perfection of the different breeds of domestic animals, especially the horse, the ox, and the sheep. In this respect British husbandry surpasses every other. No expense or trouble is spared to improve the qualities of cattle and sheep.

The great variety of new instruments which are daily invented, and some of which gradually come into use, however expensive they may appear, is another feature in British husbandry; and the letting out of drills and thrashing machines, which are kept for profit by men who have little or no land to cultivate, is a step to that division of labour which has done such wonders in manufacturing industry, and which will no doubt in time do the same in the operations of husbandry. A decided spirit of improvement has also of late years arisen among practical agriculturists, and not the least favourable symptom is, that it is now acknowledged 'much may yet be learned,' and that 'husbandry is still comparatively in its infancy.' The success, at length, of the reaping machine and steam plough is the crowning point of its progress hitherto; and this, conjoined with the extraordinarily developed trade in artificial and manufactured manures, is what indicates most perfectly the energy and enterprise of English agriculturists.

HUSKISSON, WILLIAM, one of the earliest official inaugurators of a liberal commercial policy in this country, was the son of a gentleman-farmer of good family and estate, and born March 11, 1770, at Birch Moreton Court, Worcestershire.

In 1783, when in his fourteenth year, William Huskisson was sent to Paris, and became an enthusiast in the cause of the French revolution. He was present at the taking of the Bastille in 1789, and became a member of one of the French clubs, from which, however, he soon withdrew. In the following year (1790) he became private secretary to Lord Gower (afterwards the Marquis of Stafford), who was then the English ambassador. After the events of the 10th of August, 1792, the English ambassador was recalled, and Mr. Huskisson returned with him to

England. In January, 1793, by desire of Mr. Dundas, he undertook the duties of a small office which had just been created for investigating the claims of French emigrants who were then thronging in crowds to England. Early in 1795 he was appointed under-secretary of state in the department of War and Colonies under Mr. Dundas. Towards the end of 1796 he was brought into Parliament as member for Morpeth. On the retirement of Mr. Pitt, he resigned his official situation. He was unsuccessful in procuring a seat at the general election in 1802, and did not appear again in Parliament until 1804, when he sat for Liskeard. He was secretary of the Treasury under the administration formed by Mr. Pitt in 1804, and, after the death of that minister, was an active member of the opposition. At the general election in 1806 he was re-elected for Liskeard, and after the dissolution of Parliament in 1807 he sat for Harwich, and continued to do so until 1812. From this period until 1823 he represented Chichester, in which neighbourhood he had, in 1801, purchased a small estate. From 1823 until his death he represented Liverpool.

On the retirement of the Whigs from office in 1807, Mr. Huskisson resumed his former post as secretary of the Treasury. He resigned office in 1809, along with Mr. Canning. In August, 1814, he was appointed chief commissioner of Woods and Forests. In 1823 he was made president of the Board of Trade, when he relaxed the navigation laws, the reciprocity acts, &c., under which, by an order in council, foreign ships in matters of importation and exportation were placed on an equality with British ships. Then followed a sweeping reduction of protective duties on foreign merchandise, which, in the case of silk manufactures, brought much odium on the proposer; but the expositions of his policy—clear and convincing—soon brought him converts to the new doctrine. After the death of Mr. Canning, in 1827, Mr. Huskisson held the office of secretary for the Colonies in Lord Goderich's cabinet; and he retained his post when this cabinet was broken up and the duke of Wellington became the head of a new ministry. On the 19th of May, 1829, the debate on the disfranchisement of East Retford took an unexpected turn, and Mr. Huskisson was called upon to redeem a pledge which he had given in a former discussion on the question; and he accordingly voted in favour of the bill and in opposition to his colleagues. After the debate, at 2 A.M., he wrote a note to the duke of Wellington, placing his resignation in his hands. Without any communication with Mr. Huskisson, the duke laid it before the king. The resignation of Mr. Huskisson was followed by that of Lord Palmerston, Mr. Grant, and several others who had belonged to what was called 'Mr. Canning's party.'

At the close of the session of 1830, Mr. Huskisson left London to be present at the opening of the Liverpool and Manchester Railway, on the 15th September. At Parkside, near Newton, Mr. Huskisson, with others, had got out of the carriage, when an alarm was given of the approach of an engine on the other line. Mr. Huskisson attempted to regain his seat, but fell at the moment when the engine passed, and was so much injured that he died the same evening.

Mr. Huskisson married in 1799 the youngest daughter of Admiral Milbanke, but had no family. On retiring from office in 1829 he entered upon the

receipt of one of six pensions of 3000*l.* a year, which the Crown was empowered to grant for long public services.

HUSS, JOHN, was born at Hassinetz, a village of Bohemia, of humble parents, about the year 1370. He studied in the University of Prague. Being ordained priest in 1396, he adopted the opinions of Wycliffe, and gave offence to the archbishop of Prague; but Huss was confessor to Sophia, queen of Bohemia, and was favoured by King Wenceslaus himself, and thus he was able to maintain his ground. In 1408 the heads of the university declared that whoever taught the opinions of Wycliffe should be expelled from that body. Huss identified his cause with that of his Bohemian countrymen, and the consequence was that the German students withdrew from the university and repaired to Leipzig. Huss afterwards became rector of the University of Prague, and inculcated the doctrines of Wycliffe, whose works he caused to be translated into Bohemian. In 1410 the archbishop of Prague ordered them to be publicly burned, and excommunicated those who adhered to the opinions contained in them. He also suspended Huss from his sacerdotal functions, but Huss assembled the people, and preached against the pope, against purgatory, and, above all, against indulgences. He was then summoned by the pope, John XXIII., to appear at Bologna to answer the charges against him, which neglecting to do, he was excommunicated. Huss, however, had a strong party in his favour, and, unwilling to encourage the disorders which arose, he retired to his native village. Some time after, on the death of the archbishop, Huss returned to Prague, and there publicly opposed a papal bull which had been just issued by the court of Rome against Ladislaus, king of Naples. Fresh tumults took place; Huss was cited to appear before the Council of Constance, and he obeyed in 1414, after receiving a safe conduct from the Emperor Sigismund. On arriving at Constance, however, he was arrested. His doctrines were condemned as heretical, and on the 6th of July he was burned. [CONSTANCE, COUNCIL OF.]

HUSSAR. This term was originally applied to the Hungarian horse-soldiers. Every twenty houses or families were ordered by Mathias I. to furnish to his army one horseman; hence from *husz*, twenty, and *ar*, pay, came the word 'hussar.' There are now hussars in every well organized army. In the British there are thirteen regiments of them, composed of light cavalry troopers, dressed in loose jackets and fur cap, and usually armed with a sabre and pistol.

HUSTINGS (Sax. *hustinge*), formerly the principal court of the city of London, in which the lord mayor and aldermen presided. According to Fleta, other towns, as York, Winchester, &c., had courts of the same name. It is now applied to the platform from which members of Parliament address the public at an election.

HUTCHESON, FRANCIS, the most eloquent and influential professor in the Scottish universities in the first half of last century, was born in Ireland, August 8, 1694. His father was a Presbyterian minister. After completing his studies at Glasgow, Hutcheson officiated for some time as minister to a Presbyterian congregation in the north of Ireland. In 1720 he first became known by the publication of

his 'Inquiry into the Original of our Ideas of Beauty and Virtue, &c., with an attempt to introduce a mathematical calculation in subjects of morality.' His essay 'On the Nature and Conduct of the Passions and Affections,' appeared in 1728, and in the following year he was appointed professor of moral philosophy in the University of Glasgow, where he was admitted to the degree of LL.D. His largest work, in 2 vols. 4to., entitled 'System of Moral Philosophy,' did not appear until after his death, which took place at Glasgow in 1747.

HUTCHINSON, JOHN, was born in 1674, at Spennithorne in Yorkshire. He received a good education, and he became steward to the duke of Somerset. Availing himself of the opportunities which his situation afforded him, he made a large and valuable collection of fossils, which, with his own observations, he consigned to the care of Dr. Woodward to digest and publish. This duty Woodward failed to discharge, but bequeathed the task and the collection to the University of Cambridge. In 1724 Hutchinson published the first part of a curious work entitled 'Moses' Principia,' in which he attempted to refute the doctrine of gravitation as taught in the 'Principia' of Newton. In the second part of this work, which appeared in 1727, he continued his attack upon the Newtonian philosophy. From this time to his death he published yearly one or two volumes in further elucidation of his views, which tend to show that the Old Testament contains a complete system of natural history, theology, and religion. They are written in a rambling and uncouth style, but evince a profound and extensive knowledge of the Hebrew scriptures. He died on the 28th of August, 1737.

HUTCHINSONIANS, the denomination of those who followed the philological and exegetical views of John Hutchinson. In their number they reckoned several distinguished divines in England and Scotland, both of the established church and of dissenting communities.

HUTTON, CHARLES, was born at Newcastle-upon-Tyne on the 14th of August, 1737. He manifested at an early period an extraordinary predilection for mathematical studies; and while yet at school he is said to have made considerable progress with little or no aid from his master. Upon the death of his father, which happened before he had completed his eighteenth year, he became teacher in a school at the neighbouring village of Jesmond, and some years afterwards his master, who was a clergyman, having been presented to a living, resigned the school in his favour. In 1760 Hutton married, and removed his establishment to Newcastle, where he met with considerable encouragement. While engaged in tuition, he wrote his first work, entitled 'A Practical Treatise on Arithmetic and Bookkeeping,' which appeared in 1764, and soon passed through several editions. In 1771 he published his 'Treatise on Mensuration,' 4to., London, and the same year, the bridge of Newcastle having been nearly destroyed by a great flood, he drew up a paper upon the best means of securing its future stability, which was afterwards published under the title of 'Principles of Bridges and the Mathematical Demonstration of the Laws of Arches,' Newcastle, 8vo., 1772. In 1773 he became a candidate for the professorship of mathe-

matics at the Royal Military Academy of Woolwich, and obtained the place after a severe competition. Hutton was elected a fellow of the Royal Society, and, upon the accession of Sir John Pringle to the presidency, he was appointed foreign secretary to that body, which office he continued to hold with the greatest credit until he was displaced by Sir Joseph Banks in 1778-79, on the plea that it was requisite the secretary should reside constantly in London. In 1775 the Royal Society instituted a series of experiments on the mountain Schellien in Perthshire, with a view to determine the mean density of the earth. These were conducted principally under the direction of Dr. Maskelyne, and when completed the labour of making the necessary calculations was allotted to Dr. Hutton, who was considered the most competent person for the undertaking. His report is contained in the 'Philosophical Transactions' of the year 1778. In the year 1779 the degree of LL.D. was conferred upon him by the University of Edinburgh. In 1781 he published his 'Tables of the Product and Power of Numbers,' London, 8vo., and in 1785 his 'Mathematical Tables,' containing the common, hyperbolic, and logistic logarithms, with the sines, tangents, &c., both natural and logarithmic, London, 8vo. To these succeeded his 'Tracts on Mathematical and Philosophical Subjects,' in 4to., London, 1786, which were reprinted in 1812, London, 8vo., 3 vols. In 1795 appeared his 'Mathematical and Philosophical Dictionary,' in two large quarto volumes, which for many years supplied works of a similar description with valuable information both in the sciences treated of and in scientific biography.

About this time he undertook, in conjunction with Drs. Pearson and Shaw, the arduous task of abridging the 'Philosophical Transactions.' The work was completed in 1809, in 18 volumes quarto. In 1806 he was attacked by a pulmonary complaint, which a few years after led to his retirement from the academy. Dr. Hutton died January 27, 1823, in the eighty-sixth year of his age.

Besides the works above mentioned, and the papers in the 'Transactions of the Royal Society,' Dr. Hutton was a constant contributor to the *Lady's Diary*, of which periodical he was editor for many years. His remaining works consist of—'Elements of Conic Sections,' 1787, 8vo.; 'A Course of Mathematics, designed for the use of Cadets in the Royal Military Academy,' London, 1798-1801, 3 vols., of which several later editions have appeared; 'Recreations in Mathematics and Natural Philosophy, from the French of Montucla,' London, 1803, 4 vols. 8vo., and some others.

HUTTON, WILLIAM, was born at Derby, of poor parents, 30th September, 1723. At the age of seven he was sent by his father to work in the silk mill at Derby, which occupation he quitted at seventeen, and was bound apprentice to an uncle at Nottingham, who was a stocking-maker. He ran away during his apprenticeship, and wandered as far as Birmingham, but distress compelled him to return to his uncle. In 1746 he taught himself the art of bookbinding, walked to London to purchase a few bookbinders' tools, and in the year 1749 commenced attending Southwell, fourteen miles distant from Nottingham, on the market-day; and here he rented

a shop at twenty shillings a year, and opened it for the sale of books. His object was to save a small sum to enable him to commence business in a large town; and in 1750 he took the lesser half of a small shop in Birmingham, at a rent of one shilling per week, and furnished it with a small supply of books. Five shillings a week covered all his expenses, and at the end of the first year he had saved 20*l*. Fortune continued to smile upon him, and in 1755 he married. In 1791 his property was destroyed during the Church and King Riots at Birmingham that year, but after great difficulty he succeeded in recovering 5390*l*. from the county. He now relinquished business in favour of his son. He had filled successively all the local offices of the town. In 1781 he published his 'History of Birmingham;' and this was followed by other works, of which the principal were—'Journey to London,' 1784; 'The Court of Requests,' 1784; 'The Hundred Court,' 1788; 'History of Derby,' 1790; 'The Roman Wall,' 1801.

Mr. Hutton died 20th September, 1815, a few days before the completion of his ninety-second year. In 1816 his daughter published 'The Life of William Hutton, stationer, of Birmingham, and the History of his Family: written by himself.' An edition of this work was published in 1841, in the series of 'Knight's English Miscellanies.'

HUVEAUNE, River. [BOUCHES-DU-RHONE.]

HUY, a town of Belgium, in the province of, and 17 miles S.W. from Liege, the capital of an arrondissement, and romantically situated on the river Meuse. The name is pronounced *Wé*. The town is fortified, has a line of railway, a college, ironworks and breweries, a citadel, &c. There are also leather, tile, paper, glue, and other factories, and a brisk trade in corn. In 1862 the number of inhabitants was 10,632. Peter the Hermit was interred in the abbey of Neufmoustier, which he founded at Huy on his return from the first crusade.

HUYGENS, CHRISTIAN, was born at the Hague, April 14, 1629. His father, a poet and a mathematician, who died in 1687, at the age of ninety, had been counsellor and secretary to three successive princes of the house of Orange. The subject of this article, his second son, from his boyhood showed an aptitude for mathematical and mechanical studies, and in 1645 he prosecuted them at the University of Leyden. In 1646-48 he studied civil law at Breda. In 1649 he accompanied a count of Nassau to Denmark; and in 1655 he visited France. He then remained in Holland till 1660, when he went again to France, and in 1661 to England, both which voyages he repeated in 1663. In 1665 he was invited to France by Colbert, where he remained from 1666 to 1681, with the exception of two trips to Holland in 1670 and 1675, for health. This consideration prompted his final return to Holland in 1681: he was again in England in 1689, and died at the Hague, June 8, 1695.

Huygens wrote on the quadrature of the hyperbola and on that of the circle. In this last work he gives some new and very close approximations to the quadrature of the circle. He was also engaged in a controversy with James Gregory on this subject.

His 'Horologium,' and 'Horologium Oscillatorium,' appeared in 1673. In the first of these tracts Huygens simply describes the application of the pen-

dulum to the clock, of which improvement he is the inventor. The idea came to him in 1656, and the pendulum employed was the common circular one. In the second he describes the well-known but now disused apparatus by which the geometrically isochronous or cycloidal pendulum was obtained. But this is the least part of the celebrated work before us, which contains four distinct and new discoveries of first-rate importance. The first is that of the cycloid being the curve all whose arcs measured from the lowest point are synchronous. The second is the invention of the involution and evolution of curves, in which the proposition is established that the cycloid is its own evolute. The third is the method of finding the centre of oscillation, being the first successful solution of a dynamical problem, in which connected material points are supposed to act on one another. The fourth is the announcement (without demonstration) of those relations between the centrifugal force and velocity of a body revolving in a circle, which were afterwards proved by Newton in the 'Principia.' It thus appears that Huygens was in complete possession of the solution of the problem of circular motion. Had his mind not been preoccupied by the Cartesian system, it is most probable that he would have gone at least to the extent of deducing Kepler's laws from the assumption of gravitation.

In his optical writings Huygens took up the theory of undulations in opposition to that of emanation, which was adopted by Newton. By this theory he gave a sufficient explanation of the phenomena of reflexion and refraction, and also of that of double refraction, in which Newton could not succeed; that is, he gave an explanation of all the prominent phenomena of optics. The undulatory theory is now almost universally received, and Huygens must be considered as the founder of it; for though Hooke had previously advanced the notion, yet he made no application of it to the explanation of phenomena.

After completing his more profound researches, Huygens spent the evening of his days in the composition of his 'Cosmotheoros (Theory of the Universe), or Conjectures respecting the celestial bodies and their inhabitants.' This interesting work, which, being translated into German and Dutch, passed through two English and two French editions, was written at the age of sixty-five, a short time before he died; and so great was the interest which he felt in its publication, that on the approach of death he earnestly besought his brother to carry his wishes into effect. 'He mentions,' says Sir David Brewster in his 'More Worlds than One,' 'the great pleasure he had derived from the composition of it, and from the communication of his views to his friends. About to enter the world of the future, the philosopher who had added a new planet to our system, and discovered the most magnificent and incomprehensible of its structures, looked forward with a peculiar interest to a solution of the mysteries which it had been the business of his life to contemplate. He was anxious that his fellow-men should derive the same pleasure that he did from viewing the planets and the stars as the seat of intellectual life, and he left them his theory of the universe—a legacy worthy of his name.'

Huygens is distinguished by correctness, penetration, and a freshness of intellect which never left him. Before he was in possession of the formal differential

calculus he was able to supply its place. His power of acquisition lasted to the end of his life. He was near sixty when he read the 'Principia,' and past that age when he began to study the 'Calculus' of Leibnitz. At that time of life persons seldom change old opinions; but Huygens accepted the theory of Newton immediately.

HUYSUM, JAN VAN, was born at Amsterdam, in 1682. The father, a picture-dealer and painter, was the instructor of his son, who soon became celebrated as a flower and fruit painter. His flowers are more beautiful and true to nature than his fruits. He is equally successful in the accessories. He was the first who painted flowers on a light ground. His colours still retain their lustre, and his pictures are still held in the highest estimation. He died in England in 1749. He had three brothers, all painters; one of them, Jacob, came to England, and was chiefly occupied in copying the pictures of his brother Jan, which copies are doubtless reputed to be by the more celebrated brother.

HYACINTH. Few spring flowers are more worthy of cultivation than the hyacinth, whether we regard its varied shades of rich colour or the sweetness of its perfume. The soil and climate of Holland seem to be peculiarly adapted to this plant, for, however well the imported roots may flower in England for the first season, they soon degenerate. It is, however, probable that this arises in some degree from want of skill in the cultivation; for some gardeners have been successful in growing the same roots for several years in succession. The compost used at Haarlem is rotten cow-dung, rotten leaves, and fine sand. The bed into which this compost is to be put must be taken out to the depth of three feet, its bottom made firm, and a few stones thrown into it in order to keep it dry. It must then be raised considerably above the level of the surrounding soil with the compost already prepared. The best season for planting is from October to the beginning of November, and the early sorts planted at this time will begin to show their flowers in the beginning of April.

As hyacinths are planted in autumn, and bloom early in the season, they never require any water, and, as soon as the flowering is over, the more dry the ground can be kept the better it is for the bulbs. When the leaves turn yellow and are withered, which will take place in about a month after the plants have gone out of flower, the bulbs must be carefully taken up and dried.

Hyacinths are frequently grown and flowered in water-glasses. Sometimes before they are put into the glasses they are planted in pots, and when the roots have grown a little they are taken up and washed, and placed in the glasses, or they are placed in the glasses at first. The water must be frequently renewed, or it will soon become fetid and offensive. To prevent their growing long, weak, and pale, so as to flower badly, they should be kept close to a window, where they can be constantly exposed to bright light all day long. In order to secure their pushing out their roots before the leaves lengthen, they should always be kept in the dark for a fortnight or three weeks after they are first placed in the water-glasses, care being taken at that time that the water and the bulbs are not in contact. The moisture that rises

into the air will be sufficient to induce the bulbs to put forth roots; and the total absence of light will prevent the leaves from being stimulated into growth.

HYACINTHINE, a mineral of a brown green colour, transparent, and crystallized in rectangular eight-sided prisms; the fracture imperfectly conchoidal. *Hyacinth* is one of the names given to the brown or yellow crystals of Zircon.

HYÆDES. [TAURUS.]

HYÆNA. In his last subdivision of the digitigrade Carnivora Cuvier includes two groups, the Hyænas and the Cats. It appears to us that the Hyænas constitute a family including the Proteles [AARD-WOLF], and linked by the latter to the Civets. [VIVERRIDÆ.]

The Hyænas are distinguished by having their fore legs longer than their hind legs, by their rough tongue, great and conical molar or rather cutting-and-crushing teeth, projecting eyes, large ears, and a deep and glandular pouch beneath the anus.

Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{4-4}{4-4} = 34$.

The false molars, three above and four below, are conical, blunt, and very large. The upper flesh-tooth (carnassière) has a small tubercle within and in front, but the lower one has none, and presents only two trenchant points. The whole of the dental and molar organization, and indeed the whole cranial structure, appears to have been formed with a view to the bringing into the most available action the formidable natural instruments which enable the Hyænas to break the hardest bones.

The Hyænas are ferocious, cowardly, nocturnal animals, and in some countries where they swarm in legions, are the dread of whole districts, in which, however, they in some manner repay the injuries they commit by their services as scavengers. They seldom attack men, unless forced in self-defence, but often carry away children, and destroy sheep, asses, calves, and even cows. The strength of their neck and jaws is prodigious, but their hinder quarters seem to be comparatively feeble, and they run along with a sort of shuffling gait. During the day they conceal themselves in caverns, amidst ruins, and in other obscure retreats. They are skulking, prowling, and, poetically speaking, mysterious beasts. Their wild howlings during the hours of darkness are well calculated to appal even man; and the timid beasts upon which they habitually prey crouch panic-struck, or take to flight. Then it is that these savage and yet cowardly carnivoræ feel themselves confident of success, and prey upon their unresisting victims.

The strength of these animals and their power of dragging away large bodies is strikingly exemplified in Colonel Denham's narrative. At Kouka he relates that the Hyænas, which were everywhere in legions, grew so extremely ravenous, that a good large village, where he sometimes procured a draught of sour milk when on his duck-shooting excursions, had been attacked the night before his last visit, the town absolutely taken by storm, notwithstanding defences nearly six feet high of branches of the prickly tulloh, and two donkeys, whose flesh these animals are, according to our author, particularly fond of, carried off, in spite of the efforts of the people.

The hyænas are confined to Asia and Africa, at

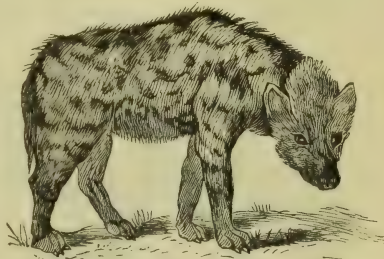
least in the present day, and the following species are known:—

1. The Striped Hyæna (*Hyæna striata*, Zimmerman). Colour variable, generally gray, irregularly barred with brown or blackish brown. A mane runs along the spine from the back of the head, which mane is bristled up when the animal is roused to anger. Locality—India, the mountains of Caucasus, and the Altaic chain, Asiatic Turkey, Syria, Persia, Barbary, Senegal, and Central Africa generally. Susceptible of domestication.



Striped Hyæna (*Hyæna Striata*.)

2. The Spotted Hyæna (*Hyæna crocuta*, Erxleben; *H. Capensis*, Desmarest). This is the Tiger-wolf of the colonists of the Cape.



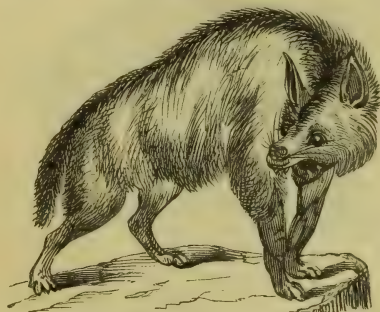
Spotted Hyæna (*Hyæna crocuta*.)

General colour, gray or grayish brown, irregularly spotted with black. Locality, Southern Africa.

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the Spotted Hyæna. He states that Mr. Shepstone, in a letter from Mamboland, relates that the nightly attacks of the wolves, as the Hyænas are generally called, have been very destructive amongst the children and youth; for within a few months not fewer than forty instances came to his knowledge wherein that beast had made a most dreadful havoc. 'To show clearly,' says that gentleman, 'the preference of the wolf (Spotted Hyæna) for human flesh, it will be necessary to notice that, when the Mambookies build their houses, which are in form like bee-hives, and tolerably large, often eighteen or twenty feet in diameter, the floor is raised at the higher or back part of the house, until within three or four feet of the front, where it suddenly terminates, leaving an area from thence to

the wall, in which every night the calves are tied, to protect them from the storms or from wild beasts. Now it would be natural to suppose that, should the wolf enter, he would seize the first object for his prey, especially as the natives always lie with the fire at their feet; but, notwithstanding this, the constant practice of this animal has been in every instance to pass by the calves in the area, and even by the fire, and to take the children from under the mother's kaross, and this in such a gentle and cautious manner, that the poor parent has been unconscious of her loss until the cries of her little innocent have reached her from without when a close prisoner in the jaws of the monster.' Mr. Shepstone then particularizes two instances within his own knowledge, one of a boy about ten years of age, and the other of a little girl about eight, who had been carried off by this species, and wretchedly mangled, but recovered by the attention of Mr. Shepstone and his friends. Notwithstanding this ferocity, the Spotted Hyæna has, it is stated, been domiciliated in the houses of the peasantry, 'among whom,' says Mr. Bennet, 'he is preferred to the dog himself for attachment to his master, for general sagacity, and even, it is said, for his qualifications for the chase.'

3. The Villose Hyæna (*Hyæna villosa*, Smith; *H. brunnea*, Thunberg). Colour, a dark brownish gray, with blackish stripes on the limbs. Locality, South Africa. This is the Straand-wolf of the Cape colonists, so called from its frequenting the sea-coasts. The Straand-wolf devours carrion and such dead animal substances, whales for instance, as the sea



Villose Hyæna (*Hyæna villosa*.)

casts up: but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blauw-berg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning animal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the daytime in the mountains, or in the thick bush, which extends in large patches throughout the sandy district in which it is usually found.

Fossil Hyænas.—Fossil Hyænas occur abundantly in the third period of the tertiary deposits (Pliocene of Lyell), especially in the ossiferous caverns.

HYÆNA DOG (*Lycæon tricolor*, Brookes; *Canis pictus*, Desmarest; *Hyæna venatica*, Burchell), the Cape Hunting Dog. This daring and ferocious animal, one of the pests of Southern Africa, is a complete dog, or *Canis*, in the form of the skull and the characters of the teeth; it has, however, as in the hyænas, only four toes on the anterior feet, and the same on the feet behind. In figure it is tall, lightly built, but muscular and well proportioned; the limbs are long, the ears large and erect, the jaws powerful, and the teeth strong. Its aspect is wild and fierce, and its disposition treacherous. The fur is close, and of a sandy yellow, irregularly clouded and blotched with black and a little white. The tail is somewhat bushy and of moderate length. The colour is subject to variation. Mr. Burchell, who brought into this country the first specimen, states that it hunts in packs, at night by preference, but frequently in the day. He describes it as swift, fierce, and active, so that only those animals which are gifted with great fleetness can escape from it. It attacks sheep openly and fearlessly; it approaches oxen and horses more cautiously, advancing upon them by stealth, biting off the tails of the oxen, and injuring the horses, especially young colts, so severely that they rarely survive.

HYALÆIDÆ, a family of *Pteropoda*, according to the systems of Lamarck and Cuvier, but belonging to the family *Thecosmata* (order *Aporobranchiata*) of De Blainville. M. Rang, in his 'Tableau Méthodique,' follows De Férussac in making the *Hyalæidæ* a family, and enumerates the following genera as composing it—*Cymbulia*, *Limacina*, *Hyalæa*, *Cleodora*, *Cuvieria*, *Euribia*, and *Psyche*.

Animal furnished with a head, but it is not distinct, with a third natatory membrane smaller and intermediate at the ventral part; mouth situated at the bottom of a cavity formed by the union of the locomotive organs. Shell nearly always present, and very variable in form.

HYALOSIDERITE (Gr. *hyalos*, 'glass,' and *sideros*, 'steel'), a crystallized mineral, of a yellow-brown colour; the surface metallic, and the internal lustre vitreous. Its specific gravity is 2.87. Its component parts consist of silica, lime, alumina, magnesia, soda, protoxide of iron, and potash.

HYBODUS, a genus of fossil fishes placed in the order of *Placoidians* by M. Agassiz, 'Recherches sur les Poissons Fossiles.' The information which M. Agassiz has collected concerning this extinct group of fishes appears to be considerable, yet only in a few instances (from the lias of Lyme Regis and Bristol) has he been able to reconstruct the whole skeleton. The species of *Hybodus* are supposed to amount to twenty-two, and extend from the new red sandstone to the chalk, inclusive.

HYBRID is the term applied by naturalists to the offspring of different species of animals and plants. For the hybridity of animals and birds see the articles **MULE**, **HORSE**, **CANARY BIRD**, &c.

The subject of the hybridization of plants was first investigated by Kölreuter at the end of the eighteenth century. To produce a hybrid plant requires the interference of man, who cuts away the stamens of the flower of which the pistil is to be impregnated with pollen of another species, and carefully prevents all access of pollen except that which he has inserted.

It is very seldom that the result is successful, but when a hybrid is obtained, it is sure to exceed the parent plants in the size and abundance of its fruit, brilliancy of its flowers, and other qualities.

HYDATICA, a genus of fossil plants (probably aquatic) from the coal formation.

HYDATIDS (*Idæria*, a vesicle, from *Idæa*, 'water'). This name has been applied to various bladder-like productions, which are sometimes found in the bodies of men and animals.

The term hydatid comprehends, firstly, several species of entozoa, or parasitic animals, which have a distinct independent vitality; secondly, the simple unattached cysts which are frequently met with; and lastly, what have been called false hydatids, which are vesicular bodies, either entirely or partially connected with the tissues by which they are surrounded.

Hartmann in 1686 first clearly observed that many of the bodies, or cyst-like tumours, called hydatids, were distinct living beings, or parasitic animals. Since his time the subject has been more thoroughly investigated, and there is now no doubt of the animal nature of a large number of hydatids. Pallas arranged all the cystic entozoa, except the common globular hydatid, or *Acephalocyst* (which was only considered as a simple serous cyst before the time of Laennec), under the genus *Tenia*, on account of the similarity of structure between their mouths and those of the tape-worm. Cuvier and other French naturalists gave all these entozoa the generic name of *Hydatid*, but Rudolphi has since shown that they cannot be all placed in one genus, but should be divided into several genera, as *Cysticercus*, *Cœnurus*, and *Echinococcus*, to which may be added *Acephalocystis*. [ENTOZOA.] Several species of *Cysticercus* are enumerated, but the most common are *C. tenuicollis* and *C. cellulosus*. *C. tenuicollis* is met with frequently in the peritoneum and pleura of ruminating animals and pigs. It is often generated in the disease of sheep called the rot, where another entozoon, the *distoma*, or fluke-worm, is met with in the ducts of the liver. The *C. cellulosus* is found generally lodged in the tissues of the muscles between the fibres; it occurs sometimes in man, but more frequently in animals, particularly in the hog, where it causes the disease called measles or leprosy. Of the genus *Cœnurus* the species *C. cerebralis* is found in the brain of sheep, oxen, and other ruminating animals. The hydatids belonging to the genus *Echinococcus* consist of a cyst containing a number of small animals of low organization. The *Acephalocyst* is a simple unattached vesicle, varying in size from a millet-seed to a child's head, filled with pellucid fluid, furnished with no kind of appendix or head, generally associated with numerous others, and contained in a common cyst, which is also filled with fluid.

Hydatids may be developed slowly, and occasion so little inconvenience, that persons in whom they have been discovered after death may not have suspected disease of the organ in which they existed during life. Occasionally they cause so much irritation that suppuration may take place either around or within the common sac, which may burst externally or into a serous or mucous cavity. In either the first or last case the hydatids will be discharged, and the patient may recover; but if the cyst should communicate with

a serous cavity, as the peritoneum or pleura, fatal inflammation will occur.

With respect to the treatment for the prevention or removal of hydatids, it must necessarily, from the obscure notion of the symptoms of the presence of these animals, be of a very uncertain kind.

HYDE, EDWARD, EARL OF CLARENDON, an illustrious statesman and historian, was born on the 18th February, 1608, and was the third son of Henry Hyde, Esq., of Denton, in Wiltshire, a member of a respectable family which for centuries had been settled in Cheshire. He studied at Magdalen College, Oxford, and afterwards in the Middle Temple. His legal studies were not prosecuted at first with great assiduity, and he spent much of his time in the company of gay and dissolute associates. Ill health too, and subsequently a strong attachment to the daughter of Sir George Ayliffe, whom he married in 1629, diverted his attention from his professional pursuits. This lady died six months after their marriage, and in 1632 he married the daughter of Sir Thomas Aylesbury, by whom he had six children, four sons and two daughters.

After his father's death Hyde found himself in possession of a competent fortune. In the spring of 1640 he was returned to Parliament by the constituencies both of Shaftesbury and Wootton Bassett, and made his election to serve for the latter. The borough of Saltash returned him to the Long Parliament, in November, 1640. Up to the time when a bill was passed for preventing the dissolution of Parliament without its authority and consent, Hyde had acted with the moderate portion of the popular party, and indeed had obtained several important reforms; but the democratic tendency of this measure caused him to change his views. He now gave his support to the church, defended the prerogative of the crown, and became one of the three councillors appointed by the king to consult upon and conduct his affairs. These councillors, however, were by no means responsible for all the king's actions. Charles sometimes acted without their consent and knowledge. For instance, in the attempt to seize the five members, his advisers were wholly ignorant of his intention, and were displeased and dejected by the perfidy and rashness of the act.

The queen quitted England in 1642, and Charles left London, not again to reside there until he was a prisoner. Hyde followed him to York, and continued to act as the king's adviser until the civil war broke out. He accepted the chancellorship of the exchequer, and was knighted and sworn a member of the privy council. In 1645 the king thought fit to send the prince of Wales into the West, and to name Hyde one of the councillors to attend upon and direct him. Hyde eventually accompanied the prince in his flight, and landed with him at Jersey, where the prince left him to join the queen in France. Hyde now felt his position to be so dangerous, that he made his will, and wrote letters to be delivered to the king and prince after his death. It might be expected that under such adverse circumstances his spirits would have failed, but constant occupation sustained them; he collected all the materials that he was able, and commenced his 'History of the Rebellion.'

In September, 1648, Hyde rejoined the prince

at the Hague; and here he heard of the execution of the king.

The disposition of the Spanish court towards the youthful Charles II. disposed him to send an embassy to Madrid. Hyde and Cottington were appointed, and during fifteen months negotiations were carried on by them without the establishment of friendly relations. At length the ambassadors received the command of the king of Spain to retire. Hyde quitted Madrid in 1651, and lived at Antwerp with his family until the autumn, when the king returned to Paris. Here he conducted the principal business of the English court, relieving its pecuniary embarrassments as far as his own poverty would permit him, until the Restoration, when, from a powerless and poverty-stricken guardian of an exiled king, he suddenly rose to be the 'first in place, favour, and authority, among the ministers of a monarch, who, while invested by the public with sovereign power, still evinced towards him the deference of a pupil.'

The part that Hyde took in the principal measures that occupied the parliaments after the Restoration may be learned from Lord Clarendon's 'Life,' in Mr. Lister's 'Life of Clarendon,' and Burnet's 'History of his own Times.' We pass to the narration of an event of immediate personal importance to the lord chancellor (the appointment had been conferred on him before the Restoration), which occurred in the autumn of 1660. Anne Hyde, his daughter, had contracted an attachment to the duke of York, the result of which was a secret marriage, celebrated in time to legitimize their first child. This marriage was offensive, not only at court, but also to the chancellor, 'who broke out,' as he tells us, 'into an immoderate passion against the wickedness of his daughter.' The king, assured that there had been no artifice or collusion on the part of Hyde, created him a baron, under the title of Lord Hyde of Hindon. On the occasion of the coronation, which took place in April 1661, the further dignity of the earldom of Clarendon was conferred on him, and he received from the king a gift of 20,000*l*.

Hyde took an active part in the king's marriage with Catherine of Portugal, the negotiation of a loan from the king of France, and the sale of Dunkirk. The opposition of the chancellor to the king's inclination to Catholicism, as well as to other wishes he had formed, diminished his share of royal favour, and gave opportunity to his enemies to cabal against him. But an attempt made by the earl of Bristol to impeach the chancellor for high treason proved ridiculously unsuccessful, and he still continued at the head of affairs. A series of disastrous events, however—the embarrassment of the country at home, and its disgrace abroad—all contributed to diminish his popularity. His influence was successfully undermined, and by the king's command he resigned the great seal on the 30th of August, 1667. The duke of Buckingham was then restored to office.

Seventeen articles of impeachment against Clarendon were then drawn up by a committee of the House of Commons; but the accusation founded upon them was rejected by the Lords, and during the contention that followed the ex-minister quitted the kingdom. A bill for banishing and disenabling Clarendon was passed by the Lords on the 12th of December, and by the Commons on the 18th.

The public life of Clarendon was now at an end; he was permitted by the king of France to reside within his kingdom, and at Moulins he commenced the continuation of his 'Life.' In the spring of 1674 he procured a house at Rouen, which was his last residence. Repeated attacks of gout had enfeebled his constitution, and he expired December 9, 1674, in the sixty-fifth year of his age.

Clarendon's abilities were very great. He was a weighty and dignified speaker, and an able man of business—shrewd, prompt, and laborious; and he combined an earnest desire to uphold the Constitution and promote the welfare of the country, with a sincere regard for the honour of the Crown. As an historian, he displays great insight into character, and considerable powers of description; his style, though generally laboured, often rises into eloquence. Amid prevailing profligacy and corruption he was personally pure and incorrupt. In private life he was blameless, and he was a warm and steady friend; but his temper was hot, harsh, and arrogant, and he was deficient in docility and tact. The principal works of the great historian are, besides his 'History of the Rebellion,' his own 'Life,' 'A Short View of the State of Ireland,' 'A Brief View of the Errors in Hobbes's Leviathan,' and a 'Collection of Tracts.'

HYDE, SIR NICHOLAS, chief-justice of the King's Bench in the reign of Charles I., was the uncle of Chancellor Clarendon, and had the honour of instructing him in the knowledge of law. Sir Nicholas had been employed by the duke of Buckingham in preparing his answer to the articles of impeachment drawn up against him by the House of Commons, and from gratitude for his services on that occasion the duke procured him the appointment of chief-justice in 1626. The most important trial upon which Sir Nicholas Hyde presided was the one in which Sir John Eliot, Hollis, and Valentine were indicted for forcibly holding down in his chair the speaker of the House of Commons while certain resolutions were passed at the violent close of the Parliament of 1627. The court refused to allow the prisoners their Habeas Corpus, and inflicted fines upon them of considerable amount. He died at Hinton Lodge, Hampshire, August 26, 1631, aged fifty-nine. His son, Lawrence Hyde, became principally remarkable for the personal share which he had in furthering the escape of Charles II. after the battle of Worcester. The circumstances are told in a manuscript written by Hyde's cousin, Colonel Gounter. This manuscript is now in the British Museum. He died in 1682.

HYDE, THOMAS, D.D., was born 29th June, 1636, at Billingsley, near Bridgenorth, in Shropshire. He received his first instruction in the Oriental languages from his father, and afterwards studied them under Wheelock, in the University of Cambridge, where he remained about a year. At the age of seventeen he repaired to London, to assist Walton in editing the Polyglott Bible. In 1658 he entered Queen's College, Oxford; in 1659 was appointed under-librarian of the Bodleian; and in 1665 principal librarian. In 1660 he became a prebendary of Salisbury, in 1678 archdeacon of Gloucester, and in 1682 took the degree of D.D. On the death of Pococke, in 1691, Hyde was appointed Laudian professor of Arabic; and not long afterwards Regius professor of Hebrew, and canon of

Christchurch. He resigned the librarianship of the Bodleian in 1701, and died on 18th January, 1703.

Hyde possessed an accurate knowledge of almost all the Asiatic languages which were at that time accessible to European scholars. His most celebrated work is entitled 'Veterum Persarum et Magorum Religionis Historia,' Oxford, 1700; reprinted in 1760.

HYDE PARK, an inclosure of about 390 acres, forming an excellent place for open-air recreation in the heart of the west-end of London. It was formerly known as Hida Manor, and belonged to Westminster Abbey, but became crown property on the dissolution of the monasteries in the reign of Henry VIII. In the year 1550 the French ambassador hunted with the king in Hyde Park, which was then well stocked with game, and kept as a royal inclosure. Nearly the whole of Kensington Gardens were then included in the park; the separation was not made till the time of George II., but they still remain virtually an extension of Hyde Park, and bring the whole space into one area. The Serpentine is a long canal-like piece of water, covering fifty acres, and much used for rowing, bathing, and skating, which was formed by the order of Queen Caroline out of a number of small ponds. Hyde Park has been fashionable for drives and promenades ever since the reign of Charles II. Rotten Row is a road in it devoted exclusively to equestrian exercise, where the fine gravel is always allowed to remain loose. Adjoining to this road the International Exhibition Palace of 1851 was built. The carriage drive on the northern bank of the Serpentine is called *The Ladies' Mile*. Near the Piccadilly entrance, and opposite Apsley House, stands Sir R. Westmacott's bronze statue of Achilles, erected in honour of the late duke of Wellington.

HYDER-ALI-KHAN-BAHADOOR, Sultan of Mysore, a formidable opponent of the British rule in Hindustan, was the son of the chief general of the rajah of Mysore, and born in 1717. Until the age of thirty-three he was comparatively unknown. In 1750 he commanded a contingent against the Maharrattas, fighting in concert with the French. Ascending step by step, in 1759 he reached the rank of commander-in-chief of the rajah of Mysore. After one or two turns of fortune, Hyder not only established himself firmly as prime minister, but pensioned off his master with three lacs of rupees yearly, and became in 1761 the undisputed ruler of Mysore. From this moment he applied diligently and successfully to the increase of his power. His encroachments led to an offensive alliance between the Maharrattas, the Nizam, and the late East India Company; but he found means not only to break up this confederacy, but to engage the Nizam in war against his late friends the British, in 1767. This war was carried on, little to the advantage of the British, for two years, when at last Hyder, by a bold and able stroke, placed himself in a position to prescribe terms of peace, of which the chief conditions were a mutual restitution of conquests, and an alliance in defensive wars. In 1770 the Maharrattas invaded Mysore, and reduced Hyder to great difficulty. He recovered himself, however, and in 1780 burst with a vast army into the Carnatic. He met with continual success, and refused any terms of peace. The war, therefore, continued on the same footing until Madras was

reduced to a frightful state of famine, when the death of Hyder, in November, 1782, relieved the English from danger. His son, Tippoo, concluded peace on the terms of a mutual restitution of conquests.

HYDERABAD, a province of India, Nizam's territory, occupying the whole centre of the Deccan, and entirely surrounded by British territory, between lat. $15^{\circ} 10'$ and $21^{\circ} 46' N.$, long. $74^{\circ} 40'$ and $81^{\circ} 30' E.$ The area is estimated at 95,337 square miles, and the number of inhabitants at 10 millions. The soil, when well manured, bears any kind of crops, without regard to season. Sheep are extensively pastured all over the country. Horned cattle are used as beasts of burden; honey and bees'-wax are plentiful. The chief products are rice, wheat, maize, mustard, castor-oil, sugar-cane, tobacco, cotton, indigo, and fruits, including the vine and melon, with valuable timber. The manufactures are for home use, and comprise cotton and woollen fabrics, and silk—the raw material for the latter, called *tussore*, being gathered in the woods, the produce of a wild worm. Raw and dressed hides, dye-stuffs, gums, and resins, are the chief articles of commerce. [NIZAM'S TERRITORY.] *Hyderabad*, 'Lion's Town,' the capital of the Nizam's dominions, is a walled city, on the river Musi, 389 miles N.N.W. Madras. The population is stated to be 200,000. In the suburb, on the left side of the river, is situated the British residency, a splendid pile of buildings, communicating by a very fine bridge with the city and palace. The public buildings comprise a fine mosque, the Chahâr Minâr ('four minarets') used as a school of arts and sciences, and many other mosques and bazaars. Among the artisans are lapidaries, noted for their skill in cutting precious stones. Silks, with gold embroidery in the weft, turbans, and trinkets, are manufactured. There are several very large tanks in the neighbourhood. (Johnston's *Dictionary of Geography*.)

HYDERABAD, the capital of Scinde, British India, is a town containing 25,000 inhabitants, situate four miles from the east bank of the Indus, in lat. $25^{\circ} 22' N.$, long. $68^{\circ} 28' E.$ It has a fortress and ramparts, flanked by round towers, and is very picturesque. The atmosphere is very dry, and the weather in December and January is pleasant and bracing. Hyderabad is connected with Kurra-chee by a railway, which terminates at Kottree, on the western bank of the Indus. The town is famous for its manufactures of such arms as swords, spears, matchlocks, and shields.

HYDRA, a fabulous monster, to destroy which was one of the twelve labours of Hercules. Its origin is uncertain, some making it the issue of Styx and the Titan Pallas, and others of Echidna and Typhon. It is said to have inhabited the marshes of Lernæa, in Argolis; and to have had many heads, which grew up again as often as they were cut off. The number is variously stated from nine to one hundred. A subtle and deadly poison issued from its numerous mouths.

HYDRA (Gr. *hydor*, 'water'), a genus (and the only one) of the family of the *Hydridae*, of the order Gelatinosi, and class Polypti. Cuvier describes the hydra as among the simplest but most curious of all animal creation in its organization, merely consisting of a small gelatinous horn, provided with filaments

that act as tentacula. Even the microscope discovers nothing in its form but a transparent parenchyma; yet these animals can crawl and swim, and even walk, by attaching the ends of their bodies alternately, like leeches or caterpillars. 'They are usually attached,' says Mr. Dallas, 'to some aquatic plant, and their most favourite station is among the rootlets of the duck-weed, so common in all our ponds. The animal, when extended, consists of a long gelatinous cylinder, attached by one extremity to the sub-aquatic plant, and furnished at the other with very long tentacles, which it stretches about in the water in search of the minute animals on which it feeds.'



The Hydra.

The reproduction of the hydra is by gemmation, or budding, which appears in small tubercles on different parts of the parent animal; and these tubercles separate on arriving at maturity. In warm weather the young hydrae, by the process of gemmation, are produced very rapidly; and, what is still more extraordinary (as Baker observes, in his 'Natural History of the Polype'), 'the young ones themselves often breed others; and those others sometimes push out a third or fourth generation before the first fall off from the parent. Wonderful as these modes of reproduction may appear, they are surpassed by the artificial multiplication of the animal by the division of the body. This was discovered by Tremblay, in his 'History of Polyypes,' in 1774. He says, 'I have opened a polype on my hand, extended it, and cut the simple skin of which it is formed in every direction; I have reduced it to little pieces, and, in a manner, minced it. These little pieces of skin, both those which did and those which did not possess arms, became perfect polyypes.'

These polyypes are extremely voracious, and feed only on living animals. The larvæ of insects, worms, and the minute crustaceous animals which swarm in all waters, constitute their principal food. 'Sometimes two polyypes,' says Mr. Dallas, 'will seize upon the same worm, when a dispute, of course, ensues, which occasionally ends in a very singular manner. If the weaker of the two does not feel inclined to let slip a booty for which he has perhaps been waiting

with extended tentacles for several days, it sometimes happens that each polype swallows the end which has fallen to his share, until at length the worm being all gone, the mouths of the pair come into actual contact. They now find themselves in a position of considerable difficulty, which is sometimes terminated by the breaking of the worm; but if this does not take place, the larger or stronger of the two seizes upon his antagonist, and swallows him, worm and all. After a time the swallowed polype emerges uninjured from his living tomb.'

There are different species of this genus; as the *Corine*, the *Cristatella*, the *Pedicellana*, *Viridis*, *Oligactis*, &c.; but the most curious are the *Vorticellæ*, which abound in stagnant fresh waters, and are arranged as shrubs, plumes, or other agreeable forms; but they are generally too minute for observation by the naked eye.

HYDRA (constellation, *ὕδρως* in Ptolemy), the Water-snake, one of the old constellations. From the time of Arátus downwards it has always been a triple figure: a long snake, represented as trailing upon the ground, bears upon his back a cup (Crater), and nearer to his tail is seated a crow (Corvus). The mythological meaning is altogether unknown.

The great length of this constellation has caused it to be divided into four parts, which are designated as Hydra, Hydra et Crater, Hydra et Corvus, and Hydræ Continuatio. The first contains the head and body up to about ten and a half hours of right ascension, all near to and south of the bright star Regulus; the second contains the cup and the parts of the body adjacent; the third the crow, with the parts of the body adjacent; and the fourth (beginning at about thirteen hours of right ascension) contains the tail.

HYDRACIDS are such acids as contain hydrogen instead of oxygen as the acidifying power: hydrobromic and hydrochloric acids are examples. Their acidity is in general very strongly marked. They contain only one equivalent of hydrogen, and, when acted upon by metallic oxides, they lose their hydrogen by its combining with the oxygen of the oxide, and the results are water and a chloride. All the hydracids are gaseous, and are easily combined with water, forming solutions which possess the well-known and strongly-marked properties of sourness, acting upon carbonates, and reddening vegetable blue colours. They are all artificial products.

HYDRANGEA, a well-known genus of hardy shrubs, of which one species is commonly cultivated for the sake of its beautiful flowers. It is a native of China and Japan, and was originally observed in the gardens of Canton by Loureiro, who took it for a primrose, and called it *Primula mutabilis*. When this plant is hardy enough to survive the winter, it grows to a considerable size, and when covered by a multitude of its very large round heads of rosy flowers, becomes a magnificent object. To grow it in perfection it should be planted in the open ground in rich soil. During winter it should be covered with a mat well stuffed with straw.

HYDRANT, a machine, with suitable valves and a spout, by which water is raised and discharged from the main conduit of an aqueduct.

HYDRAS/PIS (Gr. *hýdor*, 'water,' and *aspis*, 'a shield'), a genus of river tortoises, of the family *Emyda*, in which the sternum is solid and narrow.

HYDRATES. The term hydrate is usually applied to compounds which contain water in definite proportion, which does not impart regularity of form, or, in other words, give crystals with the body with which it so unites. Thus, when water is added to potash, it may form with it either water of solution, water of crystallization, or water which constitutes it an hydrate; and it is observable that, while water of solution has comparatively little affinity for the substance with which it is combined, water of crystallization has more, and water with which the body constitutes an hydrate has the greatest affinity of all.

HYDRAULIC PRESS. [HYDRAULICS.]

HYDRAULICA (Gr. *hydor*, 'water,' and *aulos*, 'a musical pipe'), an organ acted upon by water, and mentioned by ancient writers as producing musical sounds by the compression of water on a large vessel filled with air, by which pressure the air was forced from the vessel into the pipes of the instrument. Its particular construction, however, is not exactly known; but from Athenæus (who attributes the invention to Ctesibus), Plutarch, Hedytus, and others, we learn that it was capable of a great variety of harmony. Claudian speaks of its 'innumera voces,' or numberless tones. But the art of constructing these hydraulic organs appears to have been lost with the destruction of the Roman empire; and the Barbarians attempted in vain to recover it.

HYDRAULICS. This term is applied to the art of constructing machines in which water is employed as a moving power, or by which that fluid is put in motion; and it necessarily includes the principles by which such machines are executed. The art of constructing docks, quays, or any building whose foundations are laid under water, is denominated hydraulic architecture. Of this subject a brief notice will first be offered.

No countries in Europe possess more advantages with respect to naval power than Great Britain and Ireland. The islands and headlands on their coasts form excellent natural ports; and these, where necessary, have been converted into secure harbours by every means which the science of the hydraulic engineer could devise. The breakwaters at Plymouth and Portland, the lighthouses which have been raised in the ocean, and the vast docks at the principal seaport towns, are so many practical examples which render the British Isles a complete school for the study, in detail, of every subject connected with this branch of science.

Hydraulic architecture chiefly now involves the construction of masses of masonry whose foundations are laid in the beds of rivers or in that of the sea, such as the piers of bridges, quays, jetties, and breakwaters; also the formation of artificial harbours and docks for shipping, and locks at the falls on rivers or canals. In all these cases great precautions are requisite to secure the foundations, and give the superstructure sufficient strength to resist the hydrostatical pressure of water which may find its way under or behind, and cause the destruction of the works. The starlings of the old bridges at London and Rochester were examples of the rude methods anciently employed in this country for building in water. Caissons resting on piles driven deep into the ground under the intended work are occasionally employed when the

water is not very deep and the soil good. But no work of magnitude can be considered as secure whose foundations are not laid by the engineer in the bed of the water; for this purpose the part on which the construction is to be raised should, if possible, be laid dry by inclosing it within a coffer-dam, and actually drawing off the water by engines.

From an opinion that the oscillations of the particles of water in waves take place in vertical directions, and because waves become broken in ascending an inclined plane, it has been of late proposed to make the faces of sea-walls quite upright; but since in storms the sea is driven with violence against any object before it, the stability of a wall or breakwater seems to require that its sea-face should have a certain slope. In very deep water, probably the best method of forming an embankment is to allow large blocks of stone, with small fragments intermingled, to descend by gravity into the water, as in the construction of the breakwaters at Plymouth and Portland.

Machinery of some kind for the purpose of raising water in order to drain lakes or marshes appears to have been introduced into Egypt at a very remote period, and the hydraulic machines described by Vitruvius in the tenth book of his 'Architecture' are sufficiently simple to allow the supposition that they had been invented at a very early epoch. That writer mentions a wheel with buckets, which took up water from a reservoir on the ascending side of the wheel, and discharged it on the opposite side, in consequence of the reversion of their position. He, moreover, notices a species of chain-pump, and the spiral machine of Archimedes. All these were intended for the same purposes, and were turned either by the impulse of a stream in which they were placed, or by men walking upon them; that is, probably, on the exterior circumferences of the wheels attached to the axles of the machines. Water-wheels for grinding corn are also described by Vitruvius; and, lastly, the same writer gives a brief and obscure indication of an hydraulic organ for producing modulations of sound.

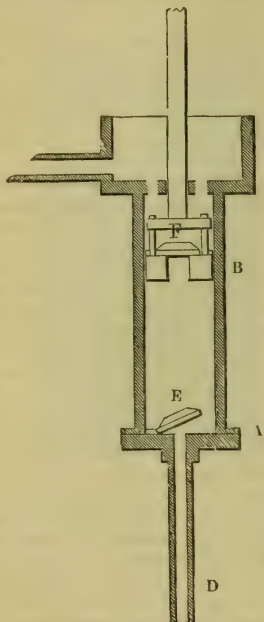
Since those days hydraulic machinery has been brought to the state in which it now exists by many successive improvements. It may be remarked, however, that on account of the high degree of perfection which, within a few years past, the steam-engine has attained, the employment of hydraulic machines for raising great quantities of water, or as first-motors with respect to extensive works of any kind, has of late considerably diminished. Yet where the circumstances are favourable, as when a supply of water for working the machine can be readily obtained, the latter, from being less expensive in their construction, are still preferred to the former.

The principal hydraulic machines which are in use for domestic or general purposes are the Siphon, the Screw of Archimedes, the various kinds of Pumps, the Hydraulic Press, and Wheels turned by water. For the first two, see **SIPHON** and **SCREW OF ARCHIMEDES**. These and others will be now briefly described.

The common pump is a machine for raising water by the pressure of the atmosphere: it consists of a cylindrical body, or barrel, A B, from the lower part of which a tube, D, descends into the water contained in the well or reservoir. In the interior of the cylin-

der is a movable piston, *F*, surrounded with leather in order that it may be water-tight, yet capable of moving up and down with freedom. The piston is perforated, and the orifice is covered above by a valve which opens upwards: a similar valve, *E*, at the bottom of the cylinder or barrel, covers the upper extremity of the tube which leads to the well.

The piston being raised by means of the handle, the air contained in the tube, *D*, tends by its elasticity to occupy the lower part of the cylinder, which it enters by forcing up the valve, *E*; and its elasticity diminishes in consequence of its occupying a



greater space than before. Hence the air exerts on the surface of the water within the tube, at *D*, less pressure than that which the external air exerts upon the water in the well; and the water consequently rises in the tube to a certain height. The valve, *E*, then falls over the orifice, and the piston being depressed, the air contained between it and the bottom of the cylinder will be condensed; in which state it will force up the valve, *F*, and escape at the top of the pump. The valve, *F*, then falls; and, if the piston be again elevated, the water will rise higher in the tube, *D*, for the same reason as before. The operation of raising and depressing the piston being repeated a few times, the water will at length enter into the cylinder through the valves *E* and *F*; after which it will, at each stroke of the piston, be driven through the spout. Since the column of water in the pump is supported by the pressure of the atmosphere on the water in the well, it is evident [PNEUMATICS] that the greatest height of the piston above the surface of that water can never exceed thirty-three feet.

That which is called a lifting-pump is frequently

similar in construction to the common pump above described; but the lower valve, *E*, is always below the surface of the water in the reservoir, and so also the piston, *F*, when depressed to the bottom of the cylinder or barrel. On raising the piston, the water above it is lifted up, and the pressure of the external atmosphere forces the water of the reservoir to enter into the cylinder through the valve, *E*. Then, by successive depressions and elevations of the piston, the water is at length raised to the top of the pump, and discharged by the spout.

The forcing-pump is one in which the water, when raised in the barrel, is driven through an orifice in its side by the depression of the piston, *F*, which is solid, or without a perforation; it is also, in general, provided with an air-vessel, into which the water is forced, and whence, by the elasticity of the condensed air, it is made to issue through a pipe inserted in the upper extremity.

For raising water from great depths and in large quantities chain-pumps, as they are called, have been frequently employed. In this machine a chain, carrying a number of flat circular pistons, passes round a wheel at the upper, and sometimes also at the lower extremity, each piston, as it goes over the wheels, being in part received in the intervals between the radii. The wheel being put in motion, the pistons descend in a barrel on one side, and enter from below into another on the ascending side, when, pushing the water before them, they raise it into the reservoir, from whence it escapes by a pipe.

Pumps of this kind are frequently fixed in inclined positions; and it is when the inclination of the barrel is about $24\frac{1}{2}$ degrees, the distance of the pistons from one another being equal to their diameter, that the greatest quantity of water is raised.

The hydraulic press was invented by Mr. Bramah, and is a machine of very great power in compressing bodies or lifting weights; or, again, in drawing up trees by the roots, or piles from the beds of rivers. The annexed engraving gives at a glance in section the general details of an hydraulic press. See also Plate 3, fig. 1.

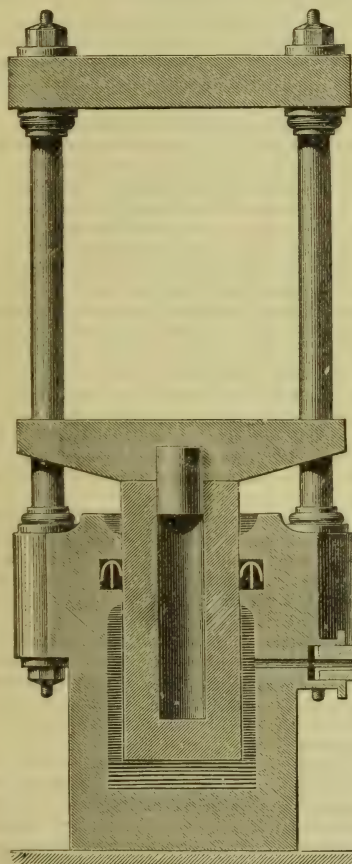
ABCD is an iron cylinder in which works the piston, *EF*. At the bottom of the former is inserted a strong iron piston-rod, *HG*, which passes through the end, *AB*. Let *abcd* be a small tube opening into the part of the vessel *A E F D*, and having a valve at *ab* opening inwards. Let *A E F B* be filled with water, as also a part of the small tube, *abcd*; the pressure of a single pound applied at *h* to the piston-rod, will produce a pressure upon *EF* which will be to the former as the area of the cylinder, *ABCD*, to the area of the tube, *abcd*.

If we suppose the diameter of the cylinder to be ten inches, and that of the piston in the forcing-pump to be one quarter of an inch, then the proportion between the surfaces of the pistons will be that of 1600 to 1; and on the principle of the equal pressure of fluids in every direction, the force with which the piston, *EF*, is raised is to the resistance against the lower surface of that in the forcing-pump in the same proportion.

Water may be made to act as a moving power against wheels by its weight, its momentum, or by both combined. In the first case the wheel is provided with a number of buckets, or troughs, into

which the water is received near the level of the axle of the wheel; the vessels thus filled becoming heavier than those on the other side, the wheel is made to revolve by that excess of weight merely. But if the water fall into the troughs from a channel on a level with the top of the wheel, or at least above the axle, the wheel will revolve both by the weight and by the momentum which the water acquires by its fall. This is called an *overshot* wheel. See Plate 1, fig. 1.

Again, if the lower part of the wheel be placed in a stream of water which is made to act on float-boards fixed on the circumference, the machine has

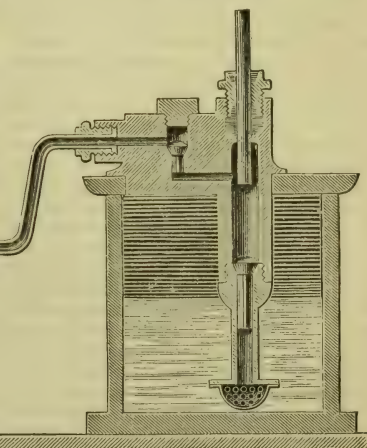


the name of an *undershot* wheel. (Plate 1, fig. 2.) Lastly, when the wheel is placed in a sort of channel, or *race*, as it is called, which is formed between two projections of masonry below the bed of the upper portion of the stream, and so as to coincide very nearly with the lower quadrant of the wheel's circumference on that side, the water descending from the stream upon float-boards, or troughs, and thus acting both by its momentum and weight, the machine is called a *breast-wheel*. See Plate 1, fig. 3.

Many contrivances have been adopted for enabling the troughs of an overshot wheel to retain, during

their descent, as much as possible of the water which, by entering into them, causes the wheel to revolve; and one of those, which Dr. Robinson considers the most effective, consists in making the side of each trough with three boards parallel to the axle of the wheel: that which is nearest to the *sole* or convex surface of the wheel having its breadth in the direction of the radii and equal to half the interval between the troughs, which is usually about one-fortieth of the circumference of the wheel; and the two other boards making a very obtuse angle with one another, the upper edge of the third being rather above the lowest board in the next higher trough. Mr. Smeaton's inference from his experiments is, that in small works the rim of an overshot wheel should have a velocity of about three feet per second only; but in large works it may be greater. He estimates the greatest quantity of work performed at about two-thirds of the power expended. A *horizontal wheel* differs in no respect from an *undershot*, except in the circumstance of its being placed horizontally, instead of vertically, as represented in Plate 1, fig. 4.

The theory of undershot wheels is very imperfectly known; but it seems, from the experiments of De Parcieux and Bossut, that a sensible advantage is gained by inclining the float-boards to the produced radii of the wheel at an angle of about twenty degrees, each board when at the lowest place having its edge turned towards the upper part of the stream. Such inclination will cause the water to accumulate along the float, and thus act by its weight as well as its pressure; the floats should consequently be rather



broader than the depth of the current of water which they intercept.

If a stream of water, $B A$ (Plate 1, fig. 5), impinge on the float-boards of an undershot wheel, $w H$, and escape from it the very instant after it has made its impact at E, F, C , the quantity of water which actually impinges will be to the whole quantity which passes by it in a given time, as the difference between the velocities of the water and wheel to the absolute velocity of the water.

To observe the effective weight of water in the buckets of any overshot wheel, $A B C$ (Plate 1, fig. 6),

let the buckets, *a b c v d e*, be loaded with water. The equilibrium will be destroyed, because the weight of the water will lie all upon one moiety of the circumference, and cause it to preponderate.

It has been determined by experiment that the effect of the wheel is the greatest when its velocity is about half the velocity of the stream; and it is asserted that the efficacy of an overshot wheel is more than double that of an undershot wheel of equal magnitude.

Mr. Smeaton considered that a breast-wheel unites in some measure the advantages of both the others; for when the water strikes at a certain point below the surface of the stream, and afterwards descends in a circular arc upon the floats, the effect of such a wheel will be the same as that of an overshot wheel when the latter is acted on by a head of water equal to the difference of level between the surface of the reservoir and the point where the wheel is struck, together with that of an undershot wheel which is acted on by a head equal to the difference of level between the point where the wheel is struck and the surface of the water below.

Bossut made various experiments on the motion of water-wheels. The first were with a wheel such as that represented in Plate 2, fig. 1, which had at first 48 float-boards, but which he reduced successively to 24 and 12. The cord, *c o s*, over the pulley, *o*, raises the weight, *p*. From the first experiments it appeared that, the weight raised being the same, the wheel will turn with a greater velocity when the number of paddles are 48 than when they are 24, and greater with 24 than when they are reduced to 12. In another course of experiments, the wheel employed was like that represented in figs. 2 and 4, Plate 2. Here the power was greater with 24 paddles than 12, but it was very little increased by using 48. He also employed such a wheel as is represented in fig. 3. Figs. 5 and 6, Plate 2, represent different views of a machine used by Smeaton in experiments on *undershot* wheels.

Below are enumerated some of the principal hydraulic engines used for raising water. Figs. 2 and 3, Plate 3, represent the screw of Archimedes, which consists either of a pipe wound spirally round a cylinder (fig. 3), or of spiral excavations formed by spiral projections from an internal cylinder (fig. 2). The Germans have a similar machine they call the water-screw, which has its spiral projections detached from the external cylinder in which it revolves.

Hero's Fountain (Plate 4, fig. 2) consists of two vessels, *K L M N* and *O P Q R*, which are close on all sides. A tube, *A B*, passes through the upper vessel without communicating with it, and through the top and almost to the bottom of the under vessel. Another tube, *S T*, is soldered to the top of the under vessel and the bottom of the upper vessel. A third tube, *G F*, is soldered to the top of the upper vessel, and reaches almost to its bottom, and is open at both ends, but with a very small orifice at *G*. Water poured in at *A* descends through *A B*, and compresses the air in *O P Q R*, *K L M N*, into the spaces *O P C* and *K L E*, and is forcibly ejected through *F G*.

Fig. 3, Plate 4, is an irrigating engine designed to raise water to a great height, and is constructed much on the same principle as the fountain above described.

Boswell's Apparatus (Plate 5, fig. 1) is intended to be used with the *Hungarian Machine*, or any similar engine. By comparison of the two figures, we easily distinguish the source, *A*, the basin of water, *I*, to be raised, the receivers, *B* and *C*, the tubes, *b b*, *d d*, *h h*, *n n*, &c., common to both.

Fig. 2, Plate 5, is called the *Ram Siphon*. It is intended to procure a discharge of water from a high point in one continuous stream. The water passes from *A* through the siphon, *A L C R*, shuts a valve at *C*, opens the ascension valve, *E*, and escapes from *M* in a jet.

The *Hydraulic Pendulum* (Plate 5, fig. 3) is designed to produce, by the uniform discharge of a reservoir of water, an alternating or vibrating motion.

Whitehurst's Machine (Plate 6, fig. 1) is employed for the purpose of raising small quantities of water to great heights. *A* is the original reservoir, its upper surface being parallel with the bottom of the reservoir, *K*, to be filled. This apparatus has been greatly improved by Montgolfier in the production of the *Hydraulic Ram* (Plate 6, fig. 2). In this the water is seen to enter the tube at *B*, and ascend through the tube, *G H*, to the receiving reservoir.

The *Hydraulic Clock* is represented on Plate 7.

Hydraulic Machinery has been successfully applied to the production of seamless lead and block tin tubes from solid blocks of these metals, the pressure employed being so great that solid tubes of equal thickness can be made from scraps of lead while in a cold state. An ordinary machine is capable of producing tubes, $\frac{1}{4}$ -inch bore, at the rate of three miles per day; and in the works of Messrs. J. & W. Weems at Johnstone, near Glasgow, is a hydraulic cylinder, 33 inches bore, which was erected by that firm for the manufacture of solid brass tubes by pressure.

Blocks of brass, composed of zinc and copper, were introduced into a steel container on the top of the ram, and submitted to a pressure of from 3000 to 4000 tons, resulting in the separation of the particles of the zinc from the copper, and their combining to form a zinc pipe, while the copper remains in the bottom of the container; thereby separating by pressure the atoms blended together by fusion, and proving that the particles of zinc and copper which enter into the composition of brass are only mechanically arranged, and not chemically combined, as hitherto believed.

Bursting of Hydraulic Cylinders.—The bursting of hydraulic cylinders, when worked up to 2 or $2\frac{1}{2}$ tons pressure per square inch, has long been a constant source of annoyance. Messrs. Weems have made a series of experiments relative to the rupturing action of water as it obtains ingress and egress to the intermolecular spaces of hydrostatic cylinders, distinctly proving that the entrance of the water into the substance of the cylinder is in effect equivalent to slicing off a ring of the metal either inside or outside, and so proportionately reducing its resistance to the internal fluid pressure.

The action of the water may be referred to an annular series of wedges inserted into every possible crevice in the cylinder walls, and driven in to rend the cylinder, so that as each wedge penetrates the metal, the tenacity of the metal is proportionately diminished; and the greater the pressure, the conse-

quently greater distance will the water obtain vent into the metal of the cylinder, when rupture is very easily effected. Under moderate pressures water will always interpenetrate so porous a substance as cast iron, and distribute itself over the surface, at first in the form of very fine particles, which by and by aggregate, and may be seen to run like rain drops in lines extending downwards.

Messrs. Weems, by a recent patent, have overcome this difficulty, and ordinary hydraulic cylinders are thereby rendered considerably stronger within their working limits. The remedy for this evil consists in placing a thin lining of copper, or other material, having great density, and, consequently, high impermeability, between the liquid and the cylinder; that is, a cylindrical lining is fitted closely to the bored interior of the ordinary cylinder. Hydraulic cylinders of this description may be worked at a constant stress of 3.5 tons per square inch. Cylinders, as ordinarily constructed, say of 12 inches bore, and liable to burst at $2\frac{1}{4}$ tons, are bored out to 14 inches bore (giving an extended area) lined with copper, and thus rendered infrangible at a constant pressure of 3 tons per square inch.

HYDRIODIC ACID. [IODINE.]

HYDROBATES. [FULGULINÆ.]

HYDROBORACITE (Gr. *hydor*, 'water,' and *boracite*), a white red-spotted mineral, obtained from silicated peroxide of iron. Its specific gravity is 1.9; and its constituent parts, according to Dr. Thomson, are boracic acid, 49.22; water, 26.33; lime, 13.74; magnesia, 10.71.

[The Greek word *ὑδωρ* (*hydor*, 'water') is of very general application in the form of a prefix to scientific terms, especially in botany, zoology, mineralogy, and chemistry; as *Hydrocotylæ* (water cavities), in botany, a tribe of umbelliferous plants, of which the *Hydrocotyle*, or Pennywort, is the type, and so called from its growing in moist situations; *Hydrocyon* (water-dog), in zoology, a genus of fishes, of the family Salmonide; *Hydrolite* (water-stone), a prismatic crystallized mineral, of snowy whiteness, composed of silica, water, alumina, peroxide of iron, and potash; and 2.05 specific gravity; *Hydrophides*, in zoology, a family of Water-snakes, furnished with poisoned fangs, and belonging to the order Ophides; *Hydrophilidæ* (water-loving), a family of coleopterous insects, of the tribe Lamellicornes; *Hydrosaurus* (water-lizard), a genus of Saurian reptiles, analogous to crocodiles; *Hydroselenates* (water-selenite), in chemistry, a class of salts, formed by the combination of hydroselenic acid with salifiable bases; *Hydrosulphurets*, a class of salts produced by the combination of hydrosulphuric acid with salifiable bases; *Hydrotellurates* (water-tellurium), a kind of salts resulting from the combination of an acid composed of hydrogen and tellurium with salifiable bases.]

HYDROCARBONATE, a mineral obtained from New Jersey, consisting of water, magnesia, and carbonic acid, with traces of silica and peroxide of iron.

HYDROCARBONS, a series of chemical compounds consisting of carbon and hydrogen. They are generally grouped under three leading divisions—1, *Hydrocarbons homologous with Olefant Gas* ($C^4 H^4$); 2, the *Hydrocarbon Radicals of the Alcohols* ($C^4 H^6 O^2$, &c.); 3, *Hydrocarbons homologous with Marsh Gas* ($C^2 H^4$). Under the first class we

have *Methylene* ($C^2 H^2$), *Ethylene* ($C^4 H^4$), *Tritylene* ($C^6 H^6$), *Butylene* or *Oil Gas* ($C^8 H^8$), &c. It will be seen here that the members of this class differ from each other in definite proportions: thus, if we continue the list, the next in the series is *Amylene* ($C^{10} H^{10}$); this is followed by *Hexylene* ($C^{12} H^{12}$), until we come to *Cetylene* ($C^{32} H^{32}$). In the second class we begin with *Methyl* ($C^2 H^3$), then we have *Ethyl* ($C^2 H^5$), *Butyl* ($C^6 H^9$), and so on. In the third class *Marsh Gas*, or *Hydride of Methyl* ($C^2 H^4$), takes the lead; then comes *Ethyl* ($C^4 H^6$), &c. [OILS.]

HYDROCELE (from *ὑδωρ*, 'water,' and *κεφαλή*, 'a tumour') is a collection of watery fluid in the tunica vaginalis testis. The treatment consists, 1st, in the evacuation of the fluid by tapping; and 2nd, in preventing it from accumulating again by exciting such active inflammation of the opposite surfaces of the tunica vaginalis as may produce their adhesion and the obliteration of the cavity.

HYDROCEPHALUS (from *ὑδωρ*, 'water,' and *κεφαλή*, 'head'), water in the head, is a name applied to two diseases nearly peculiar to infancy and childhood, which are distinguished as the acute and the chronic.

Acute Hydrocephalus is a most frequent and fatal disease of the early stages of life. It occurs most commonly between the first and the eighth year. The child is frequently ill for several days before the inflammatory symptoms become evident: it is liable to momentary giddiness while moving quickly, is fretful and nervous, and its rest is disturbed; it loses its appetite, its bowels are costive, and the motions offensive. The eyes become heavy, the face pale, the features devoid of animation, and the child complains of heaviness of the head. The symptoms more surely indicative of the disease are more intense pain in the head, to which the child constantly carries its hand; intolerance of light, sound, and motion; disturbed sleep, with grinding of the teeth, the child frequently waking with a scream; the pulse is slow and irregular. The appetite is lost, the evacuations from the bowels are unhealthy, and vomiting ensues. The abdomen, if previously distended, now falls in, and becomes quite flat. Stupor, interrupted by screams, follows. After these symptoms have continued for some hours or days, there will sometimes be a temporary recovery of sense; but this promising state is soon interrupted by convulsions, complete loss of sight and hearing, and inability to swallow; the extremities become cold, and death follows.

The treatment must vary in the different stages of the disease, but will generally consist in endeavouring to subdue inflammatory action, in removing any causes which may, directly or indirectly, keep up irritation of the brain; and lastly, in the later stages, in supporting the strength of the system.

Chronic Hydrocephalus.—The disease to which this name is applied is correctly denominated *Water in the Head*, being always accompanied with a considerable collection of watery fluid in the cavity of the head, sometimes within the membranes of the brain only, and exterior to the organ itself, but more frequently in the ventricles or cavities of the cerebral hemispheres, which are then distended to the form of a sac. The quantity of fluid is sometimes so great as to cause an increased size of the skull,

amounting to great deformity. The disease generally arises before or very soon after birth; and the cranial bones not being completely ossified at the time of its commencement, they become separated to a distance from each other, and the sutures remain open for a long period. When the disease comes on after birth, its early progress is very insidious.

In the majority of cases medical treatment is quite useless.

HYDROCHARACEÆ, a small natural order of endogenous plants inhabiting ditches, lakes, and rivers, in various parts of the world. None of the species are of any known use, except the *Valisneria alternifolia* of India, which is used for the purpose of conveying water mechanically to sugar in the process of refining it. *Valisneria spiralis* is remarkable for its spiral flower-stalk, which enables it to accommodate itself to the depth of the stream in which it floats, so as to keep its flowers above the water.

HYDROCHLORATES, the name of a genus of salts, formed from the combination of hydrochloric acid and salifiable bases.

HYDROCHLORIC ACID, a colourless gas of a pungent odour, and a strong acid taste, but not so offensive as chlorine itself. It is also known as muriatic acid. It is heavier than air, and has a specific gravity of 1.2474. Exposed to a pressure of forty atmospheres it liquefies. It is incombustible. When it escapes, it produces white fumes by condensing the moisture in the air. It is exceedingly soluble in water, by which it is instantly absorbed. A lump of ice put into a jar of hydrochloric acid gas liquefies quickly, and absorbs the gas. The solution of this acid is of great use in the laboratory. It is prepared by placing three parts of fused chloride of sodium in a retort, and, very gradually, adding five parts of oil of vitriol. The tube by which this liquid is introduced should be bent twice on itself, and have a bulb blown on one portion of the bent part. The retort is connected with a series of Woulfe's bottles: 'in the first a small quantity of water is placed, to detain any impurities; the second bottle may contain four parts of water, and should be immersed in a vessel of cold water, as the condensation of the gas is attended with a great disengagement of heat. On applying a gentle heat to the retort the acid comes over and is condensed. For manufacturing purposes the decomposition is effected in iron cylinders, and only one-half of sulphuric acid described above is used.' A mixture of hydrochloric and nitric acid forms *aqua regia*, so named from having the power to dissolve gold, 'the king of metals.'

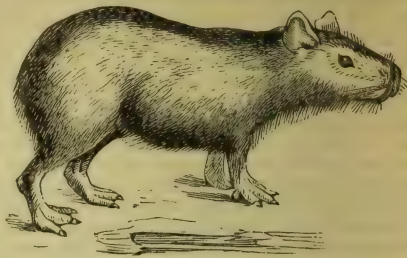
HYDROCHÆRUS, Brisson's name for the *Capybara* of Marcgrave, *Cochon d'Eau* of Des Marchais, *Cabiai* of Buffon.

$$\text{Incisors, } \frac{2}{2}; \text{ molars, } \frac{4-4}{4-4} = 20.$$

Molars compound, the posterior teeth the longest, and formed of numerous laminae, which are simple and parallel; the laminae of the anterior molars forked. The other characters are principally found in the four anterior and three posterior toes with which the feet are furnished (all of which are armed with large nails, or rather hoofs, and united by

membranes), the compressed muzzle, the absence of the tail, and twelve teats.

The only species is *Hydrochærus capybara*, *Cavia capybara* of Gmelin, *Sus hydrochæris* of Linnæus.



Capybara (*Hydrochærus capybara*).

Head very large and thick; nose wide; whiskers long and stiff; eyes large; ears rounded and moderate; legs short; hair of the body short and rough, a little like hog's bristles, but finer; colour reddish brown above, yellowish below; size of a rather small two-year-old pig, being probably the largest of existing *Rodents*.

The Capybara is confined entirely to the New World, and found in the neighbourhood of the great rivers in Brazil, Guiana, and Paraguay; some say that it occurs as far north as the Isthmus of Darien.

Marcgrave states that the Capybara lives upon herbs and fruits: that it is a nocturnal animal, swimming across rivers and torrents in search of food, and raising such a horrible clamour as to have terrified the narrator before he knew the cause. He says that they wander in infinite congregations about the banks of the rivers, and, as they are slow of foot, that they save themselves from the hunters by swimming, but that, notwithstanding, large numbers are killed. Pennant, who quotes Muratori, says that it runs slowly, swims and dives remarkably well, and keeps for a long time under water, feeds on fruits and vegetables, is very dexterous in catching fish, which it brings on shore and eats at its ease, sits up and holds its prey with its fore-feet, feeding like an ape, takes its food in the night, and commits great ravages in gardens; keeps in large herds, and makes a horrible noise like the braying of an ass.

Marcgrave speaks of the flesh as tolerably good food, especially if it be roasted. The head, he says, is considered a delicacy. Cuvier also says that the flesh is tender and of a good flavour.

HYDROCORISÆ (Gr. *ὕδωρ* 'water,' and *κόρις* 'a bug'), a tribe of hemipterous or half-winged insects, comprehending the Water-bugs, the Water-scorpions, and the Boatmen. The Hydrocorisæ differ from the Land-bugs (*Geocorisæ*) in having minute antennæ beneath the eyes.

HYDROCOTYLE, a genus of plants belonging to the natural order *Umbelliferae*, and to the sub-order *Orthospermeæ*. Upwards of ninety species of plants have been referred to this genus. *H. vulgaris* is a native of Great Britain and throughout nearly the whole of Europe, in marshy, boggy places, and on the margins of rivulets on a peat soil. This plant is commonly called Pennywort, on account of its leaves lying flat on the ground and having the size

and form of a piece of money. The notion that it produces disease in animals feeding on it is incorrect; but it occurs in damp places, where animals that feed are likely to be attacked with rot and other diseases.

Of the large number of species of this genus few, if any, are used in the arts or medicine, and none of them are sufficiently ornamental to lead to their cultivation.

HYDROCYANIC ACID, or *Prussic Acid*, probably exists ready-formed in several vegetable products, as the leaves of the cherry-laurel and the peach-tree, but it is generally prepared by the action of hydrochloric acid on bi-cyanide of mercury. It is a colourless liquid, with a strong and peculiar odour; its taste is at first cooling and afterwards burning, and it is extremely poisonous. Its specific gravity is 0.6969; it boils at about 80° , becomes solid at about 5° Fahr., and then crystallizes in fibres. As an acid its powers are but feeble. It is so very volatile that, when dropped on paper, the sudden evaporation of a portion of it renders the remainder so cold that it solidifies; and this effect is produced even when the temperature of the atmosphere is nearly 70° . The vapour of hydrocyanic acid has a specific gravity of 0.9363, air being 1. With water and alcohol it combines in all proportions.

Hydrocyanic acid is composed of H^1 , Cyanogen¹. In the state of vapour it consists of equal volumes of those two gases. Neither condensation nor expansion occurs during the combination of the gases which form the acid.

Hydrocyanic acid, especially if it be exposed to light, is subject to spontaneous decomposition. It forms but few salts.

For the medical properties, see **PRUSSIC ACID**.

HYDRODYNAMICS. Under this word are usually comprehended the conditions of equilibrium and of motion in non-elastic fluids, with the resistances which they oppose to bodies moving in them. The subject consists chiefly in investigating by mathematical reasoning, or in showing from observation and experiment, the laws relating to the discharge of fluids through orifices and tubes in vessels or reservoirs, and to their motions in canals or rivers.

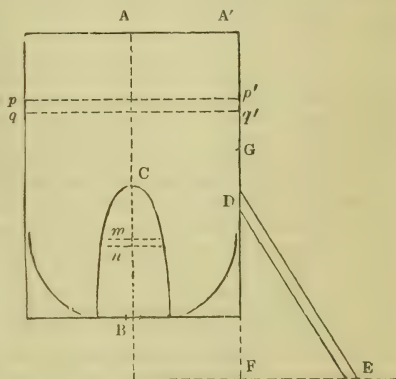
Concerning the laws of the motions of fluids as they were known to the ancients, little can be said; the only notice of this branch of science, even in the time of the Roman empire, is contained in the treatise 'De Aquæductibus,' which was composed by Frontinus in the reign of Nerva or Trajan. Even at the end of the sixteenth century, the cause of the ascent of water in pumps was little known. Galileo could give no better reason for it than that it was caused by an attraction which he supposed the piston exercised on the water; and we are indebted to Torricellius for the discovery that the rise of the water is owing to the pressure of the atmosphere on the water in the well in which the pump is immersed. The Marquis Poleni wrote, in 1695, a work entitled 'De Motu Aquæ mixto,' and, in 1718, another concerning the flow of water through orifices and short tubes.

The 'Principia' of Newton contains (lib. ii. sect. 7) a series of propositions concerning the motions of fluids, with investigations of the resistance made by fluids to bodies moving in them; and it may be said

that his theory forms the groundwork of all our knowledge concerning that subject.

Daniel Bernoulli (in 1738) was the first who applied the higher branches of mathematical analysis in the investigation of general equations relating to the problems of hydrodynamics, and the like was done by D'Alembert in 1744. The researches of Euler, La Grange, Laplace, and other continental mathematicians, have since contributed greatly to establish the principles of the science on an analytical basis. The laws of the motions of fluids in canals and rivers were, with every possible precaution to insure accuracy, determined experimentally by the Abbé Bossut in 1771, and by the Chevalier Du Buat in 1786.

In investigating the circumstances attending the discharge of fluids through orifices, it is usual to suppose the fluid to be divided into an infinite number of indefinitely thin laminæ perpendicular to the axis, A B, of the vessel in which it is contained,



and that in the descent of the fluid these laminæ preserve their parallelism till they come near the orifice, when they assume the shape of a funnel, about which the fluid is stagnant. Let the vessel be cylindrical or prismatic, in a vertical position, and have an orifice whose height is C B. Now, if $p'p'q'q'$ be a vertical section through such a lamina, its area perpendicular to the axis being represented by a , and if a' be the area of the orifice C B; also, if g express the force of gravity, h the height A B, and u the velocity of a particle of fluid at the bottom of the orifice; then the relation between the velocity, u , and the height, h , may be found from the equation

$$0 = -\frac{a^2}{2a^2}u^2 - gh + \frac{1}{2}u^2;$$

or considering the orifice as infinitely small, so that a' and the whole first term of the second member vanishes, we have $0 = -gh + \frac{1}{2}u^2$; whence $u = \sqrt{2gh}$.

Now gh expresses the weight of a prism of fluid having unity for the area of its base and whose height is h ; and this is the pressure of the fluid against a small orifice at the bottom of the vessel: but while the height, h , is the same, the pressure is the same whatever be the position or inclination of the orifice;

therefore $\sqrt{2gh}$ will express the velocity at the same depth, whether the orifice be at the bottom or side of the vessel. By the theory of forces this is equal to the velocity acquired by a body in descending by gravity through a height, h , equal to that of the column of fluid, the orifice being infinitely small.

It may be concluded from the above value of u that the velocity of a fluid, spouting upwards through an orifice in a vessel, would cause it to ascend to the level of the upper surface of that in the vessel, if the resistance of the air were abstracted.

It follows also that the velocities of spouting fluids, at different depths below the upper surface, are proportional to the square roots of the depths; that the quantities of fluids discharged in equal times at different depths in the vessel, the latter being constantly full, are to one another in a ratio compounded of the areas of the orifices and the square roots of the depths; and the quantity of water which would be discharged in a given time, t , through an orifice, a , in a vessel kept constantly full at the height h , is expressed by $a't\sqrt{2gh}$.

The velocity u or $\sqrt{2gh}$ expresses the length of a cylinder of water which would flow through the orifice in one second; consequently the time of discharging from a cylindrical or prismatic vessel, the area of whose base is a and whose height is h , a quantity of water equal to that which the vessel will contain, the latter being, however, kept full during all the time that the water is flowing, will be found by making ah equal to $a't\sqrt{2gh}$; whence t (the time required) $= \frac{a}{a'}\sqrt{\frac{h}{2g}}$. The value of g is 32.167 feet or 386 inches; and in these values of u and t it is evident that the areas and height must be of the same denomination as g .

When a vessel is suffered to discharge itself gradually, the velocity of the effluent water diminishes continually; and if the vessel be an upright cylinder or prism, the time (t) in which the vessel would be completely emptied will be obtained, the orifice being small, from the equation $t = \frac{a}{a'}\sqrt{\frac{2h}{g}}$; and com-

paring this with the above value of t , or the time in which an equal quantity would run off, the vessel being kept full, it would be found to be double the latter.

Next, if it were required to determine the quantity of water which would flow through an orifice of finite magnitude when cut in the vertical side of the vessel, which is kept constantly full, it must be observed that the velocity of the effluent fluid at different points in the depth of the orifice varies as the square root of the distance of the point from the upper surface. Now let AB ($=h$) be the vertical height of the water in a vessel in one side of which is formed the orifice whose axis is CB ($=h'$), and let the interval between the parallel lines m, n , represent a vertical section through an indefinitely thin lamina of the effluent water. Then, if the orifice were rectangular, and its breadth were represented by b , the quantity of fluid discharged through the orifice in the time t would be

$$\frac{2}{3} b t \sqrt{2g} \left(h^{\frac{3}{2}} - h'^{\frac{3}{2}} \right);$$

and if the orifice extended from the bottom to the

top of the vessel, having then $h' = 0$, the expression

would be $\frac{2}{3} b t \sqrt{2gh}^{\frac{3}{2}}$. If a rectangular orifice of the same form and magnitude were situated at the bottom B , with its longer side ($=h$) horizontal, the breadth b being very small in this, and also in the preceding case, the quantity discharged in the same time t , the velocity of the effluent water being now equal in every part of the orifice, and being that which is due to the whole height h , would be expressed by $b t \sqrt{2gh}^{\frac{3}{2}}$. The discharge found above is manifestly equal to two-thirds of this quantity.

In the second book of the 'Principia,' Newton shows that many of the particles of water, previously to issuing from an orifice in a vessel, converge towards the orifice in every direction; so that after passing it, they form a stream of diminished breadth, which he called the *vena contracta*. By careful measurement he found the diameter of the latter and that of the orifice to be to one another in the ratio of 21 to 25; and he infers that the velocity in the contracted stream must be to that at the orifice inversely as the squares of those numbers, that is, nearly as $\sqrt{2}$ to 1. Hence, finding from experiment that the velocity in the said stream was equal to that which a body would acquire by falling through the whole height of the fluid column in the vessel, he concludes that the mean velocity in the orifice must be that which is due to half the height of the same column. In practice, when water is made to flow through a small orifice in a thin plate, it is found that the quantity discharged in the time t may always be represented with sufficient accuracy by the expression $0.62 at\sqrt{2hg}$, a being the area of the orifice.

The results of experiments tend to show that, when the height of a head of water in a vessel and the diameter of an orifice in its base or side are given, the discharge of water through a tube inserted in the orifice (its length not exceeding three or four times its diameter) is to that through the simple orifice nearly in the ratio of 12 to 11; and it is observed that, with a given diameter at its farthest extremity, the tube which is formed to coincide as nearly as possible with the natural figure of the *vena contracta* affords the greatest discharge.

A cylindric horizontal tube, $MOPN$ (Plate 1, fig. 1), is attached to a reservoir, $ADCB$. The plug which closes the orifice of the tube, MN , is suddenly removed. The tendency of the particles would first be to describe two parabolas, Mmx , Nny . But mixing with each other they destroy the parabolas, and the fluid has then a constant tendency to contract. The length of the tube, however, causes the water to accumulate, and it issues from the mouth a full stream, though with diminished velocity. But should a tube, mnr , be inserted into a vessel, $ABCD$ (Plate 1, fig. 2), the velocity will be increased nearly in the sub-duplicate ratio of the length of the pipe. And even with a horizontal cylindrical pipe, if proper adjutages be applied, it is possible to increase the expenditure of water in the ratio of 24 to 10, as may be seen in Plate 1, fig. 3. If the plane in which the aperture is pierced be not horizontal, the fluid vein forms a curve in form of a parabola, until the jet, by resistance of the air, loses its shape. This may be exhibited by the apparatus

represented at Plate 1, fig. 4. ABCD is a vessel of iron or copper; PM is a forcing tube, by which the air is condensed in the receiver, which is partly filled with water; QR denotes the tube, and S is a stop-cock between the tube and the receiver. As soon as this cock is turned the compressed air drives the water through the tube.

It is customary to express the slope or inclination of a pipe or canal, when uniform, by the quotient arising from the division of the vertical height of one end above the other by the whole length. But in the case of a reservoir, as AB, having a conduit-pipe DE, let A' be the surface of the water, and E, in the horizontal line FE, be the lower orifice of the pipe. Then, if A'G expresses the height due to the observed velocity at E, GF will be the height necessary to overcome the friction in the pipe, and

GF
DE is considered as the effective slope.

The passage of water through long pipes is greatly retarded by adhesion and friction in the interior, by the resistance experienced where bends take place, and by the disengagement of air. The general rules deduced from the experiments of Abbé Bossut at Mezières, in 1799, are—that the discharges in given times, with pipes of the same length and with the same head of water, are proportional to the squares of the diameters; and when the diameters are equal, the discharges are inversely proportional to the square roots of the lengths of the pipes. A pipe whose length was 600 fathoms, and which was 12 inches in diameter, when the head of water was 12 feet, afforded a discharge amounting to about $\frac{1}{10}$ th; and a pipe of equal diameter, whose length was 2340 fathoms, when the head of water was 20 feet, discharged only $\frac{1}{10}$ th of that which would have been obtained from a simple orifice.

The orifice or pipe through which water is allowed to flow is called *adjutage*; and it may be mentioned here that, by writers on hydrodynamics, short pipes appied as above are denominated *additional pipes*.

Plate 2, fig. 1, illustrates an experiment on the motion of water through long tubes. EFGD is a vertical section of a principal reservoir, containing about 30 cubic feet of water, and communicating by means of a close tube with a secondary reservoir, HKLM, containing about 6 cubic feet, and kept at this height by the supply being regulated from FEDG. To the secondary reservoir was fixed a tin pipe, about 8 or 9 inches in diameter, the other end of which entered into a box of the same metal, with two apertures, A and B, either of which might be opened at pleasure, and to which tin pipes were fixed, capable of being lengthened or shortened at pleasure. Fig. 2, Plate 2, shows a horizontal section of the same reservoir and its appendages, the conduit pipes mentioned above being represented by *at* and *bu*.

In a weir or jetty the water is projected over a waste-board, AB (Plate 2, fig. 3), and the depth of the orifice is measured by the depth of the upper edge of the plank below the level surface of the water.

Experiments were made by Bossut on the theory and construction of jets d'eau. The reservoirs he employed are represented in Plate 2, figs. 4 and 5.

A tin tube, OE, shut or stopped at the extremity E, but opening into the vessel ABCD. The tubes were 6 feet long, the one in fig. 4 being $3\frac{2}{3}$ inches in diameter, and that of fig. 5 only $\frac{3}{4}$ of an inch. In the points F is fixed an adjutage 2 lines in diameter, in G another, 4 lines in diameter; and in N a third, 8 lines in diameter. In fig. 13, at the point K, was fixed a conical tube, KM, and at I a cylindrical tube, IN.

If the water of the river experienced no resistance from the sides and bed, its motion would go on continually accelerating from its source to its mouth, like a solid body falling by the action of gravity; and the consequences would be, that besides the destruction ensuing from the violence of the torrents in the lower lands, the moisture would be drawn from the soils in the upper regions, which would thus become incapable of supporting vegetable and animal life. The adherence of the particles of water to each other, and the friction against the beds, produce a resistance which increases with the velocity of the current, and becomes at length equal to the accelerative force of the descent; and then a uniform motion is established.

But, when a current is in a state of equilibrium, the velocities in different transverse sections of the river may be very unequal, on account of the variations in the areas of those sections, through all of which the same quantity must flow in the same time; since otherwise the equilibrium of the river would not be permanent. It follows that the products of the areas of the sections multiplied by the velocities in each must be equal to each other, and that the velocities in different sections must be inversely proportional to the areas of those sections.

The mean velocity of water in a river may be expressed approximatively by the formula

$$307 \sqrt{\frac{r}{l}},$$

in which *r*, commonly called the mean radius, is in inches the quotient arising from a division of the area of a transverse section of the river by the breadth, the latter being measured on the surface of the bed; and *l* is in inches the extent of a portion of the river, between two points in its length, whose difference of level is one inch. And by experiment it has been found that, if *v'* = the velocity at the surface of the river, *v''* the velocity at the bottom, and *v* the mean velocity as above (all being expressed in inches per second), we shall have

$$v'' = (\sqrt{v' - 1})^2 \text{ and } v = \frac{1}{2}(v' + v'').$$

The mean velocity in any one section may be practically found, tolerably near the truth, by placing in it a rod of wood loaded at one end with a weight sufficient to allow it to float upright in still water. The greater velocity at the upper surface will make the rod incline towards the direction of the stream; and, consequently, when it has acquired a state of equilibrium, it will float in an oblique position; the top of the rod will move slower than the water at the upper surface of the river, and the bottom will move faster than that in the lower part. Hence, the mean velocity of the water in that part of the breadth of the river may be considered as nearly equal to the observed velocity of the rod.

A knowledge of the velocity at the bottom of a

river is of considerable use in enabling the hydraulic engineer to judge of the action of the stream on its bed; and it is evident that, to insure permanency, the accelerative force of the water should be in equilibrium with the tenacity of the channel. It is stated that a velocity of 3 inches per second at the bottom will remove fine potter's clay: a velocity of 6 inches will lift fine sand; that of 12 inches will sweep away small gravel; 24 inches will roll away rounded pebbles; and 3 feet per second will carry along angular stones of the size of an egg. Bossut found that, when the velocity of the stream was just sufficient for lifting the sand, a ridge advanced about 20 feet in a day.

When a body moves in a fluid at rest, its anterior surface being perpendicular to the direction of the motion, if an indefinitely thin lamina of fluid be supposed at every successive instant of time to be displaced, the resistance experienced by the moving surface may be considered equal to the weight of a column of the fluid whose base is the surface pressed, and whose height is that which is due to the velocity; that is to say, the resistance may be supposed to be equal to the pressure which would produce the same velocity at an orifice in the base or side of a vessel. Therefore, if the velocity be represented by v , the

height due to that velocity is equal to $\frac{v^2}{2g}$; then a

representing the area of the moving surface, and D the specific gravity of the fluid, we shall have $\frac{a v^2}{2g} D$

for the pressure against that surface, or the resistance experienced by it, in moving through the fluid. But when the anterior surface of the moving body is oblique to the direction of the motion, the resistance above found must be diminished on account of the inclination. If the number of fluid filaments which act against the surface is constant, the above expression must be multiplied by the square of the sine of the inclination; if variable, by the cube of the sine of inclination, in order to have the effective pressure against the oblique surface.

If a cylindrical body, terminated in front by an equilateral cone, move through a fluid in the direction of its axis, it can easily be shown that, in theory, the resistance experienced is one-fourth, and if the body be terminated in front by a hemisphere, the resistance is one-half of that which would be experienced by the same cylinder if it were terminated in front by a plane perpendicular to its axis.

The circumstances attending the resistances experienced by bodies of various forms and lengths, when caused to move in water, were at a recent period made the subject of numerous experiments, which were carried on by Colonel Beaufoy in the Greenland Docks. Ample details of these valuable experiments were published, and the following are some of the more important results:—

The friction of bodies moving in water is equal to a power of the velocity whose exponent is 1.949.

The pressure sustained at the head-end varies in rather a higher ratio than the square of the velocity, when the velocity is small, and the exponent diminishes with an increase of velocity.

The diminution of pressure on the stern, caused by the fluid not pressing so strongly there when the

body is in motion as when at rest, varies in a lower degree than the square of the velocity; and the exponent diminishes with an increase of velocity.

A globe experiences about one-third of the resistance which is encountered by a cylinder.

A globe cut in halves, and separated by the intervention of a cylinder whose base and length are each equal to a diameter of the former, experiences a diminution of resistance which, compared with that of a complete globe, is nearly equal to one-fifth of the latter.

Bodies whose head-ends are formed with curve lines have great advantage in respect of resistance over those formed with right lines.

The greatest breadth of a moving body should be at a distance from the head extremity equal to two-fifths of the body's length, that the body may move through the water with the least resistance.

Increasing the length of a solid of almost any form by the addition of a cylinder in the middle greatly diminishes the resistance with which it moves, provided the weight in water continues to be the same.

By comparing the resistance of bodies near the surface with those having similar head and stern ends, and which were immersed to the depth of six feet, those at the surface were found to experience more retardation than the others.

The apparatus with which M. Bossut performed his experiments on the percussion of fluids is given on Plate 3, figs. 1 and 2. The beam, $A B$, was three feet six inches; at one extremity was fixed a scale, at the other a plate of copper. The vessel, $x y b z$, contained the water.

HYDROFLUORIC ACID, a compound of fluorine and hydrogen, which was first made known by Scheele. The properties of this acid are, that it is fluid, clear, colourless, and volatile; and when it escapes into the air, which it does at about 60° , it forms with the moisture of it white fumes. Its vapour is extremely pungent and irritating, and it acts strongly on vegetable blues. The specific gravity is 1.06. It acts upon and decomposes glass with great facility, on account of its affinity for the silica which it contains. And hence it has, to a certain though not to a very useful or ornamental extent, been employed to engrave on glass. It is supposed to consist of $H^1 F^1$. When the acid is brought into contact with certain metals it is decomposed, hydrogen gas being evolved, and a metallic fluoride formed. With metallic oxides it forms a fluoride and water.

HYDROGEN, an elementary gas, the lightest of all known bodies. It may be obtained in several modes, but it is usually procured by the decomposition of water, by causing some substance to act upon it which has affinity for its oxygen and none for the hydrogen, so that this element is separated, and assumes the elastic or gaseous state.

The properties of hydrogen gas are, that it is colourless, inodorous, insipid, and it has resisted all attempts which have been made to condense it by the united agency of cold and pressure. 100 cubic inches weigh only 2.15 grains. It refracts light powerfully; by heat it is merely expanded, and suffers no change by the action of electricity, and in electrical decompositions of its compounds it is evolved at the negative pole. This gas extinguishes flame by itself; but

when it meets with a supporter of combustion, as oxygen, it burns readily, and with a continuous but feeble flame, and much heat. When mixed with oxygen, a taper causes immediate and loud explosion, attended with the formation of water by the combination of the gases. It is irrespirable for any length of time.

It is very sparingly soluble in water, 100 cubic inches taking up only about one inch and a half of the gas. Hydrogen, neither in the gaseous state nor in solution, possesses either acid or alkaline properties. When mixed with oxygen gas, and the mixture gradually burned into a small jet, intense heat is generated. When a very small jet is burned, the flickering nature of the flame causes musical sounds when a tube of glass or metal, or even of paper, is held over it. Its atomic number is the foundation of the scale of chemical equivalents, being = 1.

Hydrogen unites with all other elementary gaseous bodies, and forms with them compounds of vast importance and utility: thus with oxygen it forms water; with nitrogen, ammonia; with chlorine, hydrochloric acid; with fluorine, hydrofluoric acid. It combines with bromine to form hydrobromic acid. By its union with several non-metallic solids, as with carbon, iodine, phosphorus, selenium, and sulphur, it forms compounds of very different properties; for an account of these we refer to the substances above-named, except those which it forms with carbon, and which will be now considered under the head of—

Carburets of Hydrogen.

The compounds of carbon and hydrogen may be divided into four classes: the gaseous, liquid, solid, and hypothetical.

Gaseous Carburets.

Carburetted Hydrogen Gas is frequently produced in coal mines, and called Fire-damp. When mixed with air and exposed to flame it occasions dreadful and destructive explosions. It is also generated in stagnant pools by the action of the carbon of decomposing vegetable matter upon water. Carburetted hydrogen gas is colourless, nearly inodorous, and insipid. Water absorbs about 1-60th of its volume. It is fatal to animals, extinguishes flame, but is highly combustible when it meets with a supporter of combustion, and extremely explosive when mixed with it. It burns when a taper is applied to it in contact with the air with a yellow flame, and on account of the carbon which it contains it yields much more light during combustion than pure hydrogen gas. 100 cubic inches weigh very nearly 17·2 grains. Its specific gravity, compared with air, is 0·554. It consists of 4·3 grains of hydrogen gas combined with 12·9 grains of carbon. It is composed of $C^1 H^2$.

Olefiant Gas, or *Bicarburetted Hydrogen*, is prepared by mixing in a retort three volumes of sulphuric acid and one volume of alcohol: when heat is applied decomposition readily takes place. It is a colourless elastic fluid: when pure it has but little odour and is tasteless. It is soluble in about eight times its bulk of water; it is destructive of animal life, is not inflammable, unless a supporter of combustion be present, and then it burns with a dense white light, or, if mixed with air, it explodes with great violence

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on the contact of flame. 100 cubic inches weigh 30·1 grains. It consists of $C^2 H^2$.

Chloride of Hydrocarbon is a colourless volatile liquid; odour æthereal, taste sweetish, insoluble in water, specific gravity 1·2, that of its vapour 3·4 (air = 1), boiling point about 150° Fahr., burns with a green flame, depositing charcoal, and evolving hydrochloric acid. It is composed of Olef.¹ Chl.¹

Iodine and Olefiant Gas combine to form *Iodide of Hydrocarbon*, or *Hydriodide of Carbon*. It is a solid, colourless, crystalline body, has an aromatic odour, a sweetish taste, and is very dense; neither water nor acid or alkaline solutions act upon it. It consists of Olef.¹ I.¹

Bromine and Olefiant Gas unite to form *Bromide of Hydrocarbon*. It is fluid, colourless, very volatile, has a penetrating æthereal odour, and a very sweet taste. It is heavier than water, very slightly soluble in it; at about 22° Fahr. it becomes solid. It consists of Olef.¹ Br.¹

Liquid Carburets of Hydrogen.

These are very numerous. Those which we shall first describe are all composed of six of carbon and one of hydrogen by weight.

Caoutchen, obtained by subjecting caoutchouc to distillation. It is a colourless fluid, and has a peculiar and æthereal odour; specific gravity, 0·666. It remains liquid at 14° Fahr. and boils at 582°.

Ceten, procured by distilling ethal with anhydrous phosphoric acid. It is a colourless oily liquid, which boils at 527°: the density of its vapour is 7·884.

Eleon, an oily liquid obtained by distilling metaoleic and hydroelaic acids. It boils at 230°, and the density of its vapour is 4·488.

Etherine, a highly volatile liquid. [ETHERINE.]

Eupion. [EUPION.]

Heveen, obtained by the distillation of caoutchouc with sulphuric acid. It is a comparatively dense fluid, its specific gravity being 0·921, and it boils at 579°.

Naphtha.—This is a colourless, limpid, very volatile liquid, with a strong peculiar odour. Its specific gravity is 0·753; it boils at 176° to 212°: the density of its vapour is 2·833: it remains liquid at 0°. It is insoluble in water, but combines in all proportions with alcohol, æther, petroleum, oils, and sulphuric acid. It is very inflammable, and burns with much smoke.

Olein, procured by distilling metaoleic and hydroelaic acids. It is a fluid which boils at 131°, and the density of its vapour is from 2·875 to 3·02.

Benzine. [BENZINE.]

Volatile Oils.—Oil of copaiva, juniper, lemons, black pepper, savin, and turpentine, are all formed of $C^{10} H^8$.

Solid Carburets of Hydrogen.

Hatchetine. [HATCHETINE.]

Ozocerite.—This substance is soft, unctuous, gives a greasy stain to paper; semi-transparent; by transmitted light, of a brownish-yellow colour; by reflected light, yellowish-green and opalescent; odour slightly fatty, which is more perceptible when melted. It fuses at 140° Fahr., attains its greatest fluidity at about 160°, and begins to boil at 250°.

Paraffin, at common temperatures, is a fatty but rather firm solid; it is tasteless, inodorous, and its density is 0·87; at 111° Fahr. it melts into an oily

U

liquid, and evaporates without change; it burns with a pure white flame.

Solid Oil of Roses is crystalline, and becomes liquid at 95° , and boils at 586° to 572° .

Idrialin is solid, insoluble in water, either cold or hot: it imparts to sulphuric acid a beautiful blue tint.

Naphthalin is solid, colourless, and crystalline; when quite pure it is nearly inodorous, but has generally a disagreeable odour; its taste is pungent and somewhat aromatic; it is unctuous to the touch, heavier than water, in which it is insoluble when cold, and only slightly dissolved if hot. It fuses at about 180° to 200° , assumes a crystalline texture on cooling, volatilizes slowly at common temperature, and boils at 410° Fahr.

Chlorine and *Naphthalin* combine to form a solid and a liquid compound. The solid chloride is insoluble in water, and nearly so in alcohol; it melts at 320° , but it may be distilled unchanged. The liquid chloride has a light yellow colour, an oily appearance, is heavier than water, and insoluble in it.

Paranaphthalin is supposed to be a mixture of naphthalin and paraffin.

Caoutchouc. [CAOUTCHOUC.]

Hypothetical Carburets of Hydrogen.

These are such as have never been obtained in a separate state, but which are considered as compounded radicals or bases. *Ethyl* or *Ethule* is one of the number. [ETHYL.] Another, supposed to be the basis of pyroxilic spirit, is called *Methelin*. It is observable that some of these compounds, as naphthalin ethyl, and more especially methylen, act the parts of alkalies, by combining with and saturating acids, and producing crystalline salts with them; and it is a curious circumstance that methylen, which is a theoretic carburet, appears to possess the most extensive power of combination: indeed, it may perhaps be on this very account that it has not yet been isolated.

It is scarcely possible to enumerate all the various compounds of carbon and hydrogen; the progress of organic chemistry is increasing the number every year.

HYDROGRAPHIC OFFICE, an important Government department connected with the Admiralty, where all navy surveys are received; and from them official charts are prepared, and published at a moderate price for the use of naval captains and navigators in general. The art of lithography is here very extensively employed.

HYDROGRAPHY (Gr. *hydor*, 'water,' *graph*, 'to write,') bears the same relation to the sea as geography does to the land. It is a description of the coast-lines, currents, shoals, soundings, islands, and of all things necessary for navigators to know. It includes the surveys of dangerous places, the construction of charts and maps, and the issue of sailing directions for all parts of the globe. In England there is a hydrographical department in connection with the navy, which is constantly employed in making and correcting charts, for which purpose they employ officers in different parts of the world to make observations. In the year 1864 they sold 119,138 charts, and 2248 books of sailing directions, which brought into the exchequer 6420*l*. The total cost of the department in 1864 was 53,807*l*., and in 1865 it was 50,576*l*. The hydrographer is usually a captain in the navy, and receives 800*l*. a

year in addition to half-pay. The cost for drawing and engraving charts is about 6000*l*. annually, and an equal sum for printing and mounting them. The chief expenses, however, are those relating to coast and other surveys, being about 30,000*l*. annually.

HYDROLEACEÆ, a very small and unimportant natural order of monopetalous exogenous plants, allied to *Convolvulaceæ*, with which they were once united. They are weeds inhabiting the East Indies, with alternate glandular or stinging leaves, monopetalous regular flowers, with a gyrate inflorescence, definite stamens, a superior polyspermous two or three celled fruit, and seeds with the embryo lying in the midst of fleshy albumen. In their gyrate inflorescence they correspond with *Boraginaceæ*.

HYDROMETER (*ὕδωρ*, 'water,' and *μέτρον*, a 'measure') is an instrument for determining the relative densities or specific gravities of fluids. By specific gravity is meant the ratio that the weight of any volume of a substance bears to the same volume of water. Thus a cubic foot of alcohol weighs 793 ounces, while the same quantity of water weighs 1000 ounces, so that the specific gravity of alcohol is said to be $\frac{793}{1000}$ or .793. A cubic foot of sulphuric acid weighs 1841 ounces, and has, consequently, a specific gravity of 1.841. The principle of the hydrometer is this:—It is known that when a body is immersed in a fluid it loses as much of its weight as is equal to the weight of that portion of the fluid which it displaces. Hence, if the same body be immersed successively in two different fluids, the portions of weight which it will thereby lose will be directly proportional to the specific gravities of those fluids. The body in this case is supposed to be specifically heavier than the fluid. If it be lighter it will float upon the surface, so that its tendency to descend, or its weight, will then be entirely counteracted by the fluid; from which it appears that, when a body floats upon the surface of a fluid, the weight of the portion of fluid displaced is equal to the entire weight of the body. Now, since the weight of the fluid displaced by a floating body is constant (being always equal to the weight of the body), whatever may be the density of that fluid, it is obvious that if we can determine how much of the body is immersed we may immediately deduce the specific gravity of the fluid; because, when the weight is constant, the specific gravity varies inversely as the bulk.

Upon this principle is constructed the well-known instrument called Sykes' Hydrometer, which is now used in the assessment of the spirit revenue of Great Britain. It consists of a thin brass stem about six inches in length, passing through and soldered to a hollow ball of the same material, and about one inch and a half in diameter. To the inferior extremity of the stem, from which the hollow ball is about one inch distant, a permanent pear-shaped weight is attached; so that, when the instrument is placed in a fluid, the other extremity may float perpendicularly to the surface. There are also ten weights of different magnitudes, by the successive application of which the instrument may be sunk so as to obtain the complete range of specific gravity, from that of pure alcohol to that of distilled water. In fact, so exact and correct is the instrument now made that the addition of even a quart of water to 100 gallons of any spirit may be easily detected; whereas the

most experienced palate, or any other test, will fail to discover the deception even if to the extent of twenty gallons of water to the same quantity of spirits. Although rather difficult to convey a clear idea of the instrument and its use in print, in practice its application is exceedingly simple, when guided by the rules and tables which always accompany it.

The most convenient method of obtaining the specific gravities of fluids is by means of what chemists call a 'thousand-grain bottle.' This is a bottle of a globular form, with a ground glass stopper, so adjusted as to contain exactly 1000 grains of distilled water, at the temperature of 60°, Fahr., and accompanied by a weight, which is an exact counterpoise for the bottle when thus filled. In order to determine the specific gravity of a fluid by this means, it is simply necessary to fill the bottle with that fluid at the temperature of 60°, and place it, together with the adjusted weight, in the opposite scales of a delicate balance; then the number of grains which it will be found necessary to add to one of the scales, in order to produce equilibrium, will be the difference between the specific gravity of the fluid and that of water, taken at 1000. For other forms of Hydrometers see *AREOMETER*.

HYDROMETRIDEÆ, a family of insects belonging to the order *Hemiptera*. This family was established by Dr. Leach, and is thus characterized:—Rostrum with two or three distinct joints; labrum very short; eyes moderate; feet very long, formed for walking on water, with the claws minute, inserted laterally into a fissure on the extremity of the terminal joint of the tarsus.

The genera *Hydrometra*, *Gerris*, and *Velia* of Latreille, belong to this family. Those species which have cetaceous antennæ, the head prolonged into a snout and receiving the rostrum beneath, belong to the first of these three genera, of which the *Hydrometra stagnorum* will serve as an illustration.

HYDROMYS. [*MURIDÆ*.]

HYDROPATHY, or more correctly *HYDROTHERAPEIA*, is the art of treating diseases by the application of water in various ways and at varied temperatures. It may truthfully be said that the employment of water as a remedial agent dates from the most ancient times in which we have any authentic records of medical treatment. Hippocrates frequently alludes to the application of both cold and hot baths, as does Celsus, and Galen also, though less frequently: for with him began the purely pharmaceutical treatment of disease which still obtains in the ordinary practice, although with diminished faith in its efficacy by the most enlightened of its practisers. But the special art which under the name of *Hydrotherapeia*, or *Water Cure*, has during the last thirty years become so well known and so extensively practised, dates from the time when a Silesian small farmer, named Priessnitz, first conceived the plan of using water alone for the cure of disease. This date corresponds, as nearly as can be ascertained, with the year 1827. As is so often the case in similar instances, the discovery of the art in question was the result of an accident, improved by the sagacity of a singularly observing man. A little child of Priessnitz had injured the ribs on one side of the chest; the surrounding parts

were hot and throbbing, and the child was restless. After the infriktion of various ointments and liniments to no purpose, save to exasperate the irritation, Priessnitz, feeling the skin to be very hot over the bruised spot, concluded that something cool would be at least pleasant to have. He therefore applied a thick linen cloth wrung out of cold water over the part, and in order to prevent the too speedy drying of it, covered it with a dry cloth. He observed that, pleasant to the sensation as the cold wet cloth was, the really soothing effect was produced when the reaction of the skin upon the cold had taken place, and warmth had been established. He also further remarked, that if this warmth accumulated beyond a certain point, the skin, instead of being soothed, became irritated, and the bruised part, as well as the patient altogether, became more uncomfortable and restless. Thereupon he refreshed the wet cloth with cold water, and noted the rapidity or slowness of its heating, measuring thereby the amount of irritation to be subdued. Under this simple process his child's bruised ribs speedily recovered. Some time afterwards the same child fell under a severe attack of ordinary fever. Feeling the skin all over the body to be in the same hot and uncomfortable state in which the local bruise had been, he reasoned—'If a cold wet cloth covered with a dry one could soothe the hot skin on the ribs, why should not a cold wet cloth all over the body soothe the skin all over the body?' and he proceeded at once to envelop his fevered child's entire frame in a sheet wrung out of cold water. Such is the history of the first step taken in the direction of modern hydrotherapeia; and this envelopment, or 'packing,' as it is technically called, was the most daring, the most original, and as experience has long proved, the most extensively useful of all the processes of the remedial art in question. Having stated that Priessnitz' treatment of his child on this occasion was eminently successful, and that, as a consequence, he was requested by his neighbours to treat all kinds of febrile complaints in their families, it may be readily imagined that the same observation and ingenuity which had enabled him to go thus far, pointed out to him numerous modifications in the mode of applying water, in the course of the multiplied cases which were brought to him from the gradually increasing circle of the country about him; and in this manner he came to devise and apply most of the processes which constitute the means of water cure. From his near and distant neighbours his fame spread year after year to the great towns, and finally to the capitals of Germany; and in the year 1840 the small town of Gräfenberg, on the slope of the Silesian hills, and the large house which he had by this time erected in it for the reception of patients, was crowded by 300 to 500 persons from all parts of Germany, from Russia and Poland, from Italy, and from England, all seeking treatment for some malady or other from the gifted Silesian farmer. Meantime that farmer was totally unacquainted with anatomy, physiology, chemistry, and all the cognate knowledge, the possession of which constitutes the educated physician. He may have known on which side of the trunk the liver is; but if he did, that was as much as he knew about that organ which he was so constantly called upon to treat. And so of all the

other great organs of the body. He never felt the pulse, rarely looked at the tongue, and made no inquiries about the secretions. He judged of the patient's condition almost entirely by an accurate examination of the skin, which he would try with moist and dry friction. He also was much guided by the expression of the face, and by the patient's power of sleeping and of walking. Of the power and quality of digestion he took no measure, and was singularly careless, not to say reckless, regarding the quality of articles of food; and of their quantity also, for he rather desired his patients to eat as much as they could of the coarse and ill-cooked food which he gave them, remarking often that 'people never could get well without strength,' which strength was to be obtained from the food aforesaid. This last remark gives us the cue to the medical theory of this singular man and close observer; and he seems to have formed it at an early period of his healing career. He remarked that his remedies only placed the body in the best position for exercising the power of *recovering itself*; and that this power was based upon the quantity and quality of the blood which nourished the tissues, which were to make the effort at self-restoration. Practitioners of medicine of the largest experience and the most accurate observation have recorded the same conclusion as the result of their experience, although the larger mass of less enlightened practitioners still believe that their drug remedies have a direct, specific, antagonistic agency in the eradication of morbid conditions. Priessnitz came to the sound conclusion; but whilst he considered that quantity of food was the high road to health and strength, through the formation of a large quantity of blood, he failed to appreciate those aberrations in the circulation of the blood which form so large a portion of the list of human maladies. Accordingly, we shall not be surprised to hear, that in congestions of the brain, of the lungs, and of the womb, he frequently committed errors leading, in some recorded instances, to most disastrous results. Yet these were the exceptions to the thronged list of cases which he cured, by calling forth the self-restorative powers of the body through the agency of his own hydrotherapeutic inventions. Many educated medical men visited Gräfenberg for the purpose of witnessing the operation of the strange treatment, so opposed to all received opinions. Priessnitz never could tolerate these interlopers, who cross-questioned him as if he had been brought up in the schools instead of the fields, and who, not content with the facts before them, desired to know *why* means so contrary to their own succeeded; whereas, if their own physiological education had been sound and enlarged, they should have been able themselves to explain the curative phenomena around them. Neither to them nor to his patients did Priessnitz address many words—a pointed sign of his wisdom under the circumstances; and although never unkind or uncivil to any one, his silence and his manners showed his indifference to the pleasing of any one for the sake of retaining them and their purses at his disposal.

The fame of Priessnitz and of his treatment had been common in a large part of Germany and Switzerland for years before it reached England. This it did in the first instance in the shape of a work by

Mr. Claridge, who had been a patient at Gräfenberg, had been cured, and resolved in the enthusiasm of gratitude to make known to his countrymen the wondrous remedies and cures which he had seen administered and made. This was in 1841. In the following year Dr. Wilson published a pamphlet on the subject, but rather of a controversial than descriptive kind. At the same time he commenced to practise hydrotherapeia at Malvern, to be followed after three months by Dr. Gully. In 1846 this last-named gentleman published an elaborate and full work on the subject, entitled 'The Water Cure in Chronic Disease,' which has remained the textbook which is most referred to. In the same year Dr. Edward Johnson gave forth a work on water treatment, in which he endeavours to account, on chemical and other physical grounds, how it is that the water acts in its varied modes of application. Subsequently he published a large work on the 'Domestic Use of Water Treatment,' in which, however, he mixes drug medication with the hydrotherapeutic. The last work which deserves to be mentioned here, is a second one by Dr. Gully, entitled 'The Water Cure in Acute Disease,' being a pendant to his previous work on 'Chronic Disease,' as above named. No other works on the subject have been sent forth which are worthy to be mentioned. All the others are written not so much to elucidate and promulgate the art, as to advertize the abode of the writer, and recommend the sanatorium which he keeps for its practice. In spite, however, of this defect in the practitioners of water treatment, and in spite of the bigoted opposition to it which has for many years been exhibited by those who do not practise it, there is no doubt that it is steadily making its way into ordinary practice as a recognized and powerful mode of treating diseases, both of a chronic and acute character. In some of the London hospitals and at the Edinburgh Royal Infirmary, several of the processes of hydrotherapeia are commonly employed, especially in febrile complaints; and there is every prospect that ere many years are past it will constitute the almost sole treatment in our fever hospitals. There are at the present time in the United Kingdom upwards of twenty establishments for the cure of chiefly chronic diseases by water. In the United States of America, also, large establishments exist, but they are not numerous; nor are any of them, so far as it appears, purely houses for the reception of patients, including as they do the hotel for the sound man as well as the house of health for the ailing man. This arrangement obtains far too frequently in England also, and is, as Dr. Gully has well observed in his last work, a great cause of the slowness with which the ancient practitioners have admitted only part of it into their ordinary practice, and of the obstinacy with which the great majority of them refuse even to investigate it. Meanwhile this obstinacy proves no obstacle to the expression of a very decided opinion against it when an opinion is desired; for it is a rule of the human mind to be most positive in opinion when it is least grounded in the knowledge of the subject.

Such is briefly the history of the hydrotherapeutic art of healing up to the present day; and it exhibits the extreme difficulty with which even the most open and obvious facts are admitted when they differ

widely from other facts which have been long admitted and acted upon.

We pass now to the description of the particular modes of applying water so as to constitute hydrotherapeutic treatment. These modes or processes, as they are often called, are divisible in a general way into those which have a soothing and those which have a tonic or exciting operation on the body. In the former are the packing or envelopment, general or partial, in wet linen sheets or cloths; fomentation, hot or cold; compresses; tepid sitz baths of any duration, or cold sitz baths of long duration; general warm, but not hot, baths. In the latter are the general cold bath; cold pail douches; very hot general baths; partial spongings with cold water; short cold sitz baths of still and of running water; shower baths, vertical and lateral; falling douches of different calibres; spinal washings; cold foot baths; plunge baths; dripping sheets and dripping towels applied with friction. This is not a very long list; nevertheless, by the skilful adaptation of temperature and duration of application, results of the most varied kind may be obtained—far more numerous and varied, so its advocates state, than can be obtained from the two dozen medicinal substances to which all practitioners of the ordinary art of healing at length reduce their practical pharmacopoeia. We will describe the manipulation of each of these applications previous to entering upon their *modus operandi* in diseased conditions of the body.

Packing or envelopment in wet sheets or cloths.—

A linen or cotton sheet is wrung out of cold water more or less strongly, according to the estimated power of the body to react upon and warm it. One or two blankets are spread upon a mattress or feather bed; the wet sheet is spread upon these; the patient is then placed upon the sheet in a recumbent posture; the sheet is then folded over the whole body, sometimes including, at other times excluding, the feet; the blankets are then folded as tightly as may be over the sheet, and as many more blankets or other woollen articles are placed upon the patient as may be deemed necessary to insure the warming of the enveloped person. In summer and in full-blooded persons this warming takes place more speedily than in winter, or in persons whose blood and blood-making powers have been diminished by previous long disease. The amount of water left in the sheet after wringing, and the time during which the patient is left in the packing, will thus be regulated by the previous history and present amount of vital energy of the patient; as also, in acute complaints, by the degree of fever which has to be overcome. Ordinarily, in chronic disorders the packing in a sheet should endure from forty minutes in summer to sixty minutes in winter; but when a raging feverishness is present, whether it accompanies a local inflammation or not, the packing should not endure more than ten minutes after the patient is well warmed in it; and this is often effected in ten minutes, especially in the case of children; so that in these instances the patient will not be longer than twenty minutes in each pack. If he were to remain for a long time after becoming warm, the heat would so accumulate as to prove an irritation to him instead of a most soothing agent when only applied for a brief period. As a consequence of this, it is very often necessary,

in strong febrile conditions, to withdraw the patient from the sheet at the end of fifteen or twenty minutes, and place him in a second cold one; and so on for perhaps three, four, or five changes, until the heat of the surface is so reduced as to allow a sense of quietude and relief to steal over the tumult and the torment of the fevered frame. This quietude is, especially in chronic diseased conditions, so great as to engender sleep of the most refreshing kind; and even in intense febrile states, sleep very often ensues upon the single or repeated application of the wet sheet, if it is not obtained during such application. On the withdrawal of the sheet the skin is found to be cooler than before the packing, and frequently to be somewhat glutinous to the touch; still it is warmer than the surrounding atmosphere; and it is to fortify it against this last, as well as to wash off all impurities brought to the skin during the warm packing, that some sort of ablation after it is necessary. In persons of scant blood and vitality the ablation which conveys the smallest quantity of cold water, or which consists of actually hot water, is the best; rubbing with wet sheets constituting the former, whilst the latter may be represented by a shallow bath at 80° to 90°. Such a shallow bath is likewise applicable in bad cases of lung inflammation, in some womb disorders, and when it is impossible for the patient to walk so as to recover perfect warmth by exercise.

The repetition of the packing in wet sheets or towels reduces the rapidity of the pulse and the heat of the skin in acute febrile conditions; it does the same in chronic conditions of disease. The propriety and the duration of its application should thus be regulated by the amount of acute or chronic irritation which may be present, of which the medical attendant should be able to make a somewhat accurate measurement. For if this process be employed beyond the necessity of the case, a considerable amount of depression of the nervous and muscular power follows. In such instances, cold sweats, fluttering pulse, and tremulous hands announce the injurious prolongation of the process in acute disorders; whilst in chronic diseases the same excessive application is signaled by considerable muscular weakness, shortened breathing, and small, weak, rapid pulse, with diminished power of warming in the packing, as well as after other hydrotherapeutic applications. When such is the case, either the process should be abandoned altogether for a time, or if in acute disease some local inflammation still demands its employment, it should be practised in a restricted manner, by means of local packings with towels, or with ordinary compresses frequently refreshed out of cold water. It should be remarked on this point, that packing of the chest over the ribs is much more reducing, both as regards the pulse and the muscular and nervous systems, than when applied to the abdomen or other parts of the body; so that when the sheet packing proves too depressing, that tendency may be qualified by packing only the body below the chest. Then again, the packing may be reduced by intermittence; using it only on every other or every third day in chronic diseases, instead of daily.

Packing generally augments the secretions of the skin and the kidneys, but not that of the bowels; which last it not unfrequently diminishes. In fact,

the increase of the former implies the diminution of the latter; for the excrementitious portions of the blood being carried off by the skin and the kidneys, there remains less to be eliminated by the bowels. That this is the case is frequently shown by the increased faecal secretion immediately on the cessation of the packing. By means of packing, the skin is not unfrequently made so active an excrementitious agent that an actual faecal odour has occasionally been imparted to the exhalations from the skin in cases where much packing was practised but small faecal discharges effected. By its means also, all kinds of exudations have been produced, conveying from the mass of blood in the body the drugs, mineral and vegetable, which had been circulating for years, and troubled both the sensations and the nutrition of the frame.

From all that has preceded, it will be plain that the wet sheet packing or envelopment is only applicable when the morbid phenomena are those which come under the epithet 'excitement.' Further, it is necessary that the excitement should be more or less of the febrile character: that there should be one organ, or one set of organs, in feverish action, whether that action involves other organs so as to produce general feverishness or not. In acute disease this last condition, that of general fever, is the usual signal for the packing in the wet sheet; but in chronic disease, individual organs are constantly found to be feverishly acting without involving the rest of the body in the same kind of action. Thus we constantly find dry tongue and other signs of fevered stomach, whilst neither the skin nor the pulse respond feverishly. In such cases the partial packing with cold wet towels is successfully applicable. For this reason it frequently becomes necessary to pack only the hips and loins, the belly only, the lower back only, or the chest alone; and this the rather if the body is in a comparatively bloodless state, although affected with irritated womb and kidneys, irritated stomach and bowels, with inflamed piles, or with bronchial irritation, respectively. In this, as in the former case of general fever, it may be necessary to change the packing repeatedly, according to the rapidity of warming in it: that being the measure of the local fever to be subdued. After this local packing, it is necessary to bathe or rub the parts which have been packed with water or towels at varied temperatures, according to the quantity of blood and vitality of the patient; but if these last be in proper quantity, a general ablation or friction follows the local packing. Thus, after packing the hips and loins, a shallow bath or friction all over the body with a dripping sheet may be practised; whereas if those attributes of blood and vitality be deficient, the ablation or wet friction should be restricted to the hips and loins; and the local irritation is in this way subdued without trenching upon the restricted vitality of the general frame. In this manner these local packings come to play an important part in the hydrotherapeutic management of disease, and especially of chronic disease. Frequently, by subduing the local feverish action which was perturbing the whole nervous, digesting, and circulating organs, causing waste of the frame without fever, the local packing has released these last named organs from the interference, and enabled

them to resume healthy sensation, digestion, and circulation. They should, therefore, be by no means passed over in a record of the measures of the hydrotherapeutic method; especially in chronic diseases, in which it is very frequently necessary to commence the treatment by such partial applications, and only subsequently have recourse to stronger and more extended applications.

Cold and Hot Fomentations.—Cold fomentations are effected by applying a towel, more or less strongly wrung out of cold water, over any organ in which there is reason to believe that irritation of a febrile character exists, which excites tumult in other organs. Thus the digestive organs may be keeping in wakeful excitement and sleeplessness the whole of the brain and spinal cord; and cold fomentations applied over the former will bring quietude and sleep to the latter. In this process, as in that of partial packing, the wet towel is covered with a dry woollen tissue; but it differs from the partial packing in the more frequent change of the wet towel. It supposes, in fact, a more intense amount of irritation to be subdued—an irritation verging on the acute, and in which it is necessary to draw off as much heat and feverishness as possible, and in as short a time as possible. In this process, therefore, the towels are changed every fifteen or twenty minutes; and this is continued for one, two, or three hours, until, in short, the towels cease to become warm in the time specified. Nor when they become warm should they be allowed to remain on the skin; another cold towel should immediately be applied. The soothing result is, in this case, left to the subsequent reaction to the surface, and not to the soft warmth, as in partial packing; it is not until some time after the wet towel has been withdrawn, that the soothing action on the nervous system is distinctly experienced. As before mentioned, intense irritation of the belly may be met by this process, especially in general fever, both of the nervous and inflammatory kind; so also may febrile irritation of the uterine organs, either with or without excessive secretion; irritable spinal cord; irritable brain; and even irritable heart, if this is connected with stomach derangement, but not if it has a mental or hysterical source. Over the large joints—the knee, the shoulder, and the elbow—the cold fomentation is useful, when their irritation is *within* the capsule of the joints, and of a sufficiently acute kind. In all these cases the fomentation should be continued until the skin underneath is perfectly cold, and no more heat comes to the surface; the process is then to be discontinued, and dry woollen cloth placed over the skin, which then begins to react strongly towards heat, bringing with it the interior irritation, whether of a visceral cavity or joint. In cases in which the cold sitz is not possible, or is at least inconveniently applicable, the cold fomentation may be profitably employed. In, for instance, uterine hæmorrhage, when the sitting position would be harmful or impossible, cold wet towels applied to the lowest belly and the lowest back, and frequently changed, have the tonic effect of a cold sitz bath of short duration. In hæmorrhage of the lungs, this process is useful over the chest in front, and between the shoulder-blades; and in severe but painless diarrhoea, over the lowest back and belly. As a general rule, cold fomentations

should be applied in the morning or at noon, when the nervous power is least likely to be at a low ebb.

Hot fomentations are effected by placing a four-folded flannel at the bottom of a basin, pouring thereon as much hot water as will saturate it, wringing the flannel well out, applying it over the affected part, covering it with a thick dry flannel or blanket, and changing it for a freshly-wrung flannel every three, four, or five minutes, according to the intensity of the irritation to be thereby subdued. The duration of the application also varies with the same circumstances, and may range from twenty minutes to two or three hours.

Hot fomentations are most useful when the contents of the belly or of joints are in a state of acute and painful irritation. A high degree of heat, say 120° to 130° , applied in this way, is most beneficial in inflammatory mucous disorders of the abdominal viscera; but if the inflammatory action be low, and the nervous irritation predominant, a heat not higher than 110° is more appropriate; in fact, a high degree of heat would, in such case, augment the interior tumult. A joint, for instance, which in a purely neuralgic or neuropathic state, however great may be the pain, would derive no benefit, and might be exasperated by very hot fomentations; and the same applies to hysterical colic, neuralgic womb, and nephralgia or neuralgia of the kidney. So also in fevers of the nervous character they are inapplicable, and cold fomentations are preferable. Dry or loaded tongue, heated throat, thirst and inappetence; tender, distended belly; throbbing, oppressed, or excited brain; and general restlessness—are signs which indicate fomentations at 120° for half to one hour at a time over the belly: and this may be repeated after intervals of two to six hours, as the symptoms are maintained or mitigated. In the prolonged incubating stage of the worst kind of fever, when the abdomen is burning and the extremities freezing; the pulse small, weak, rapid; the brain clear when roused, but ready to sink into apathy (a state in which alcohol is freely administered in the ordinary style of medication)—fomentations at 120° over the belly may be continued for three or four hours, with the effect of driving blood and warmth to the limbs, and deriving it from the head, and so establishing the fever all over the body, but saving the belly contents and the brain from its special ravages; but the general fever once established, it is not so much indicated—not at all, in fact, if the fever be of the purely nervous type. In acute indigestion, hot fomentation is of the greatest benefit; and in that case it may be applied immediately after cold fomentation; and it may, likewise, be used in severe general catarrh occurring in the spring, and caused by east wind. Applied to joints, it may be for the purpose of soothing acute inflammation within them, or of rousing the nervous action when the inflammation, no longer acute, has sunk into the most obstinate chronic apathy; and in the former of these instances it should be at 110° , in the latter at 130° : but in both cases it should be of long duration. It is not applicable to gouty inflammation of the small joints, compresses from cold water frequently changed being more appropriate; but it is applicable to acute rheumatism of these joints, which is the result of cold. It is useful immediately after a severe bruise or contusion, but after

eighteen or twenty-four hours it is less so; and if the contusion be in hard, fibrous tissues, such as the sinews and ligaments, the heat should be great; in soft tissues lower. In the severe pain of the lower back, caused by internal piles, fomentation of that region at 120° , and continued for an hour or more, is useful; as also in inflamed and protruding piles, but the temperature should then not exceed 105° , and should be frequently repeated. Fomentation of the upper spinal column for twenty minutes at bedtime, at a temperature not higher than 110° , frequently induces sleep. As a general rule it is best to use hot fomentations at bedtime, when no further mental or locomotive exertion is called for. The indications of its excessive or inappropriate employment are, general sense of faintness and prostration soon after it, excessive moisture of the skin, profuse flow of urine, palpitations of the heart, and throbbing in the head. These two last signs are mostly experienced during the process of fomentation, and should cause the immediate stoppage of it; nor should it be repeated for a day or more. Any or all of these untoward signs are sure to be exhibited if hot fomentations are applied over the ribs; it is never proper to apply it on the respiratory system of nerves.

Compresses are pieces of folded towelling, mostly four-folded, wrung more or less completely out of cold water, and covered with dry thick towelling, flannel, or some waterproofed tissue. As the compress rather proves an irritant than a sedative when it becomes dry, which it does more readily when covered with flannel than with mackintosh, the latter article is preferable, unless the patient takes care to refresh the cloth out of cold water, and not allow it to remain dry; but with whatsoever cloth it be covered, it is best to refresh it frequently if it becomes very hot, whether the heat be dry or moist. It is for want of this precaution that stomach compresses, for instance, so often produce gnawing at the pit of the stomach, faintness, hysterical pathos, and even nausea. It may be said generally, that if the wet compress becomes speedily and very hot, it cannot be refreshed too often, in order to insure its counteracting and sedative effect. In fact, it is packing on a small scale as regards the extent of surface enveloped, and should follow the same rule; which is, that the more speedy and thorough the warming, the more frequently should it be cooled again—the object in both cases being to exhaust the irritation underneath as completely as possible. Compresses are applied to all parts of the body, either to subdue irritation on the surface, or to bring it to the surface from within. For the latter purpose it is used in both chronic and acute irritations and inflammations of all the great cavities and interior organs of the body; of the belly, in almost all shades of gastric disorder; in constipation; in renal disorder, especially of the lithic kind; in congestions of the ovaries and womb; of the chest, in all shades of lung inflammation; in pleurisy; in rheumatic disease of the heart and its envelopes; in hæmorrhage from the lungs. For the purpose of subduing irritation on the surface, it is used in acute gout and rheumatism in any joint of the body; in the chronic form of those complaints; in all kinds of skin disease; in local neuralgia of the skin. It will thus be seen how almost universal is the applicability of this simple remedy; and it seems

to have been the first to break through the wall of prejudice opposed to hydrotherapeia by the practitioners of ordinary medication; for, without abandoning drugs, numbers of them are employing the cold wet compress, especially over the belly, although its soothing effects are even more strikingly exhibited in maladies of the chest. And here it may be mentioned that compresses applied to the chest are much more subduing in their effects on the nervous system generally, than when applied over the belly; as is the case in packing, which includes the chest. But although so widely useful, compresses require to be managed in strict accordance with the reactionary power and personal peculiarities of the patient. Thus it may be necessary to wring the towelling very slightly in one patient, and very strongly in another; to keep it on only two or three hours instead of all day; to wear it only for two or three hours after a meal, never on the empty stomach; to wet it afresh more or less frequently; to cover it more or less warmly, &c.—conditions which the acuteness of the practitioner, aided by the report of the patient's sensations, must discover and act upon, but which no written statement can more than very inadequately point out. Not unfrequently the skin breaks into a diffused or papular eruption of a burning or itchy character, after the compress has been worn for some time. This is plainly due to the repeated reaction of the skin upon the cold surface of the compress, and is very often useful when it takes place over the interior irritations of the great cavities; but it is of more doubtful benefit when it takes place over joints, when the irritation to be subdued is in the closest proximity to the cutaneous inflammation thus produced; for in such case this inflammation reacts as an irritant upon the original seat of disease, and aggravates it. For this reason, when the skin inflames in consequence of the compress, over a knee joint, for instance, it is better to omit its application for a time, and renew the inflammation of the skin afterwards, than to persevere in maintaining and increasing the latter; whereas, when the compress causes an eruption on the chest or belly, it should be kept up as long as possible, since its action is continuously to subdue interior irritation without the risk of augmenting it. In some persons there is an incapacity for wearing the compress over the stomach by day, because it causes trembling of the limbs and general failure of nervous power. When such is the case, it should be worn at night when the limbs are not called on for exertion. If it become so hot in sleep as to wake the wearer, it should either be thrown off altogether or refreshed. For the rest, a compress over the upper stomach is one of the surest ways of obtaining sleep when the nerves are excited from any cause.

Cold Sitz Bath of long Duration.—This bath acts as a sedative, by withdrawing blood from the brain towards the lower parts of the trunk. This withdrawal of blood is shown in the paler countenance of the patient, and may go to such an extent as to cause faintness. Very frequently it so far subdues the excitement of the brain by withdrawing blood from it, as to induce sleep whilst the patient is sitting in the bath. But whilst it thus causes the withdrawal of blood from the upper organs of the body, by that very process it attracts blood to the

lower organs which are immersed in the water, and induces increased activity in their sensational and secretorial functions. In this manner the long cold sitz bath unloads the brain and liver of blood, and causes improved opening of the bowels, relieving in a double way the congestions and oppressed functions of the upper organs. In like manner it improves the deficient monthly secretions of women, and the quantity and quality of the urine. The duration of this bath varies from fifteen to forty-five minutes, according to the effect which it is desired to produce, and the temperature of the weather and water. When the head or liver is very much congested, especially in apoplectic fulness, the bath can scarcely be too long, and its temperature should be kept down by the frequent addition of cold water, so as to withdraw heat and attract blood as much as possible; but when the congestion of the brain tends towards the atonic kind, without there being real atony of that organ, the duration should be restricted to fifteen minutes, and only augmented after close observation of the symptoms. In cold weather the same effect can be produced by a sitz of fifteen minutes that can be obtained by one of twenty-five or thirty minutes in warmer weather. On this account it is that some hydrotherapeutic practitioners employ in the summer time a sitz bath in which the water is always flowing through whilst the patient is seated in it; the temperature is thus continuously kept at the lowest degree of the season. Reaction after this bath is essential; therefore in chronic complaints brisk exercise should always be taken after it; in fact, the bath is not applicable when the locomotive powers of the patient are small. But the long cold sitz has frequently a wonderful effect in acute febrile complaints, in which there is heat and blood enough to produce attraction and reaction without subsequent exercise. In typhoid fever, when the head is becoming oppressed to the extent of producing stupor, nothing conduces so powerfully to its awakening as a very cold sitz of half or three-quarters of an hour's duration, especially if it is maintained at its low temperature by the addition of ice; natural sleep, with perspiration, frequently follows such application. It is also beneficial in ordinary sthenic fever, when the brain is sleepless, and general restlessness prevails. In acute pneumonia, after sufficient sheet packing, a long cold sitz often reduces cough, and promotes expectoration; a result frequently obtained, notwithstanding its antagonism to long-standing prejudices. In this bath the pulse always falls considerably in rapidity, so that in prescribing it reference must be had to the power of the heart, and the quantity and quality of the blood in the patient; it is not adapted for those with poor and scanty vital fluid.

Tepid Sitz Bath.—The temperature of this bath moves between 80° and 90°; more or less heat than this is apt to stimulate and cause reaction, whereas this bath is employed where reaction would be undesirable or impossible. It is intended, in short, to calm the nerves of the lower regions of the trunk in cases where, from deficient blood, or deficient nervous power to circulate it, the long cold sitz bath is impracticable. If the state of the brain be purely atonic and restless, this bath is good for quieting it; if a patient be far gone in atrophy, and yet cannot procure sleep by night or quietude by day, this bath is

the best for him. Also, when the walking power which is necessary for the purpose of reaction is deficient, the tepid sitz bath accomplishes the derivation of blood from the upper organs of the body, and so calms their irritation without the exercise of that power. It should always be remembered, however, that whenever, from the circumstances of the constitution, the derivative effect of a long cold sitz is possible, its effect is more decided and permanent than the tepid sitz.

General Warm Bath.—The temperature of this bath may range from 80° to 95°. Above these degrees of warmth it becomes a hot and stimulating bath, provocative of quickened circulation of blood, especially in the brain, and of excitement of the nervous system. When it is desired to apply only such an amount of warmth to the external surface of the body as shall not demand reaction from the interior organs, the temperature of the bath should not exceed that of the skin by more than five to ten degrees, and should not exceed that of the blood, which is about ninety-six degrees. According to this rule, a tepid general bath will be applicable in the same kind of cases as the tepid sitz above-mentioned; with this difference, that whereas the tepid sitz soothes by withdrawing blood from the upper to the lower organs of the body, the general tepid bath acts by taking the entire surface of that highly-sensitive organ, the skin, out of the irritating action of the atmosphere, by applying to it a temperature which is grateful without being stimulating; and thus, in the quietude of the cutaneous nerves so produced, the brain will often go to sleep, or at least cease to be irritable. This bath is used after packing in the sheet or towels, and after sweating with the lamp, in all cases where it is either impossible or undesirable to produce much reaction: as in catarrh, which does not allow of muscular exertion; in measles, scarlet fever, and other acute eruptive complaints; and in all cases of deficient blood, or deficient nervous power to move it equably. There are some chronic skin diseases in which it is not well to induce strong reaction after packing or sweating, but in which these two processes are necessary; in such cases (they are chiefly moist tetter and tendency to boils) the tepid general bath should be made to follow the processes alluded to, rather than the cold or the very hot bath, which would only exasperate the outward explosion of skin eruption. The duration of this bath may be from three to ten minutes: the longer time being intended when the object is to procure general calm of the nervous system, and the shorter time when its purpose is to wash off the skin the secretions eliminated by packing or sweating, as in cases of skin disease before-mentioned.

Passing from the list of soothing and subduing hydrotherapeutic processes to those of a stimulating character and aim, these will be mentioned as nearly as possible in the order of their stimulating power.

Friction with Wet Towels and Sheets.—As in packing, so in friction, there must be sometimes local and piecemeal friction with towels, and at other times general friction with sheets. The relation of the nervous centres to the nerves of the skin must, in great degree, determine the use of the partial or general friction with wet cloths. If the skin is very sensitive and somewhat bloodless, whilst the brain and

spinal cord are exceedingly excitable, the skin should be stimulated gradually, so as not to throw too great a shock upon the nervous centres at once. It is then best to rub the trunk and arms with wet towels, the lower limbs being covered warmly meantime; then to dry the trunk and arms, and dress them; and finally to proceed to the friction of the lower extremities. Cold stimulating friction will thus frequently be tolerated, and strong reaction gradually established, when if an entire wet sheet were thrown over the body, the brain and spinal cord would indicate the excessive shock applied to them, by giddiness, faintness, or subsequent headache. After several days of this timid rubbing (after weeks in some tedious instances), it is possible to employ the whole sheet; for by that time both skin and brain have become accustomed to the kind of stimulation, which may then be beneficially extended. Further, it is necessary in not a few cases of chronic disease to commence friction with towels and sheets having had the water very strongly wrung out of them—to be only damp, in fact; and by degrees to contract the amount of wringing, until at length the linen is applied in a dripping state. Dripping towels and sheets applied with friction are used both after packing and sweating, and without those processes. They have the result of fortifying the skin against cold-catching, and they are useful after exposure to heat, provided there be not very great fatigue of the nerves; they tend to disperse external neuralgia of the scalp, and of the face and teeth; external cramps of the trunk and limbs; as well as that condition of the nervous system which accompanies hysterical and melancholic depression—in all which the wet sheet is, of course, more potent than the fractional application of towels. The friction should always be applied vigorously, rumpling the sheet in the act, and it should be continued for from two to four minutes, beyond which time it becomes too warm to be stimulating; although it is sometimes directed to refresh the cloth out of cold water, and renew the rubbing for another four or more minutes. It is of no utility to wring these cloths out of warm water: begin the use of them with ever so little moisture in them, but let it be cold moisture.

General Cold Bath.—This is an advance upon the last process in the direction of stimulation. When in the commencement of the treatment of a chronic malady it has been deemed necessary to initiate stimulation with sheet-rubbing, it is desirable to leave that, and pass on to the present bath so soon as the patient gives signals of power to react upon a stronger agent than the dripping sheet. In acute disease, when it is of a very feverish character, the cold bath may follow upon packing or sweating; the exceptions to this being cases of pleurisy, pneumonia, peritonitis, and rheumatism of the heart, where, from the extreme sensitiveness of the organs implicated, the effort of strong reaction should be avoided. By the general cold bath is to be understood a long bath containing from six to eight inches of water, in which the patient sits and submits to constant splashing and rubbing for a space varying from one to ten minutes. The patient should not be motionless for a moment; rubbing and splashing should be going on incessantly, in order to produce the greatest amount of nervous action, of blood, and of warmth to the sur-

face, which much subsequent dry friction tends to augment. It may be prudent to wet the head, or at least the back of it, before taking the bath, but it is by no means essential in the majority of cases. A few persons are so sensitive in the feet, that they cannot bear them in the bath without pain both in feet and head; in which instances the ablation of the body must be effected in a large sitz bath wherein the feet do not enter. The general cold bath is that which is prescribed for ordinary use on rising every morning, as well as after other processes, such as packing and sweating. It is very commonly ordered as the 'shallow bath,' inasmuch as it is not intended that the water should reach above the hip-bone, nor higher than to cover the thighs. The repeated shocks of splashing and of friction constitute its chief stimulating agency; the constant beating of a small quantity of cold water being more potent in causing reaction to the surface, than absence of motion would be in a deep bath reaching to the throat. Occasionally Priessnitz would cause patients to remain in this bath from half an hour to an hour, rubbing them vigorously all the time, and renewing the water as its temperature rose; and it is alleged that he more than once succeeded in rousing a patient from the stupor of congestive or serous apoplexy by these means, and probably in consequence of the enormous quantity of blood brought to the surface.

Cold Pail Douches.—In this process the patient sits down in a long bath with no water in it; two, three, or four large pails of water are then poured, or rather thrown, at the upper part of the back and on the chest, in the proportion generally of two-thirds on the back and one-third on the chest. The force with which they are thrown must depend upon the nervous and circulating power of the patient, the former especially; for it might produce giddiness or headache by the shock. When the pails have been thrown on the body, the same splashing and rubbing as in the general cold bath ensues; in fact, the pail douche is the shallow bath *plus* the shock of the water thrown on the surface at the commencement. There are persons in whom this additional stimulation is necessary, to insure strong redness and reaction of the surface; these are mostly of pale complexion, soft flesh, and apathetic mentally, who require the lamp and sweat rather than packing—who tend to congestion rather than irritation. The pail douche is administered after packing and sweating; but is, upon the whole, more applicable after the former than the latter, inasmuch as the brain is more quiet, and not so liable to be disturbed by the shock. It would be a very dangerous bath to give where the body is fatigued with exercise, or the brain filled with blood in consequence of mental labours. Sometimes it is desirable to break the shock of the cold pail douches by making the first one which is thrown of a high temperature, from 90° to 100°; this gives an artificial warmth to the skin which breaks the shock of the subsequent cold pails, and, moreover, tempers the water in which the ensuing friction is to be practised. Sometimes, also, the first pail is given at 90° or 100°, and the second and third at 60° or 70°. All this is matter for regulation by the medical attendant, who should be able to measure the patient's capabilities beforehand. Cases of atrophy, of nervous decay from excessive mental

exertion or excessive sensual indulgences, are those which mostly require this graduation of the stimulating shock of the pail douche; but this should always be done with the object of eventually reducing the temperature to the most stimulating degree.

General Bath of High Temperature.—This bath constitutes another mode of stimulating the exterior for the purpose of relieving the interior of the body; and it is especially applicable where the nervous currents of the frame are slow and low, even though there may be a sufficient supply of blood in it. In other words, if there be atonic congestion of the brain and spine to such an extent as to prevent the flow of nervous power thence to the interior organs and to the external surface, the application of great heat all over the latter is a method of releasing the oppressed brain and spine, and of allowing them to send nervous power where it is deficient. It has the same aim, in short, as the lamp sweat, but it is effected with less taxation of the nervous power, and followed by less languor and, perhaps, headache; neither does it consist of two processes, as the lamp sweat followed by the shallow bath does. As may be supposed from what has been repeated in this article, the general hot bath is only palliative or introductory to colder treatment, in chronic disease. For that end it is desirable, very shortly after commencing its use, to have the body rubbed with cold wet towels or sheets on coming out of it, and before the dry friction; and whilst this is being done, the temperature of the bath itself should be gradually and steadily reduced at each time of its application. This may be done sometimes by adding cold water to the bath whilst the patient is in it, as well as by the cold friction just mentioned; but the diminution of temperature each day is upon the whole preferable and more certainly ascertained. In acute disease, the general hot bath is applicable in asthenic catarrhs, such as influenza, in the shivering stage of feverish catarrhs, when it is desirable to curtail it and induce the hot or perhaps the sweating stage, and in sleeplessness unaccompanied with the signs of inflammatory action. It is useful also in spasmodic and neuralgic pains of the kidneys, bowels, bladder, or womb; but it is of no use in actual inflammation of these organs, nor in the same pathological state of the lungs, heart, or brain; in short, it is a stimulating, and not a soothing and subduing process—it stimulates by heat instead of by cold. In furfuraceous and crustaceous skin disease it is often useful, after packing in a wet sheet; but it is not applicable in moist herpetic nor in papular eruptions, in which it stops itching for the moment only to augment the depth to which the inflammation of the skin dips, and thus eventually increase the itching. Upon the whole, being one of the least characteristic processes of hydrotherapeia, it has the smallest range of application.

Shower Bath.—This may be called a general bath, but its chief place of application is, in fact, the head and back. In old practice, warm and tepid shower baths were employed, but in hydrotherapeutic practice these are represented by tepid or mingled pail douches, as more readily obtainable. The shower bath, in the last-named practice, is not employed until it can be applied as a cold stimulant to the nervous system, through the shock which it affords

the nerves of the skin. In this manner it becomes a very powerful agent in dispersing congestion of blood in the nervous centres, both sensific and nutritive; but it must be shown that such congestion is unaccompanied by even the smallest amount of inflammatory action in brain or spine, or in any of the interior organs supplied with nerves from that source. In the cerebral and spinal congestions which induce depression of spirits, depression of muscular activity (paralysis in various degrees), hysterical movements, twitching and convulsive movements, neuralgia, especially of the intermittent and erratic kind, the cold shower bath is eminently serviceable, either as an introduction to the stronger measure of stimulation afforded by the falling douche, or in alternation with it. Of a certain kind of stimulation—that which is evidenced by shiverings—the shower bath is a stronger provoker than the douche just alluded to; the dropping of thousands of small cold points is more irritating to the skin-nerves than the impinging of a heavy mass of water; but the latter, both from its weight and the quantity of cold conveyed in it, stirs more profoundly the nervous centres themselves. This is the reason why in the list of general stimulating processes the shower bath precedes the douche, towards the employment of which it tends. The question of the application of the shower bath to the head hinges upon the tonic or atonic fulness of the brain. If there be abundant blood in the whole body, and the head suffers, it suffers because there is relative excess of blood in the brain, and it is passing forcibly through it; in such case the cold shower may fall on the head for a brief time—not during the whole continuance of the bath. But if the body be wanting in blood, the vessels of the brain are most certainly filled in the atonic way; and in that case it will not be right to stimulate strongly the head by the shower, because it would be followed by reaction toward the brain, whose vessels are too weak to rid themselves of the blood thus driven towards them; in atony of the brain-vessels, therefore, the shower should not be allowed to fall upon the head. But in baths properly fitted up for hydrotherapeutic treatment there are to be found *lateral shower baths*, the play of which is directed towards the back and front of the trunk at the same time, or against one part only at a time, and this kind of bath is frequently bearable when the falling shower bath would excite the nervous centres excessively. These lateral shower baths are of much benefit in abdominal congestion, in flatulent indigestion, in bad secretory action of the kidneys, in uterine congestion and neuralgia, in chronic lumbago, and all ailments marked by sluggish circulation in the abdominal and pelvic organs. The duration of the falling shower bath should not exceed two minutes; whereas the lateral shower bath may be taken as long as five minutes, and is occasionally followed by the heavy-falling douche on the hips and legs, for a minute or two.

Falling Douche.—The stream of water which constitutes this bath varies from one to three inches in diameter; and the height from which it falls varies from twelve to eighteen feet from the back of the recipient. It will be readily conceived that the body of water so falling acts as a very powerful stimulant to the nervous centres, and requires pre-

paration and care in its administration. In fact, it is the most potent of all the stimulating processes, and, as it were, the crowning of the excitant treatment, when such is demanded. Beginning with frictions with towels and sheets, the nervous system, however weak and excitable, may be made at length to tolerate the heaviest douche, by gradually passing the body through the graduated stimulation of tepid general bath, then of cold general bath, of mingled pail douche, then of totally cold pail douche, of spinal washing, and of shower bath, by which time the nerves of the skin and their origins in the spinal cord are well able to bear the weight and cold of water falling from a height of eighteen feet, at the rate of seventy gallons in a minute. This has been abundantly proved during the last thirty years, although it is denied by those practitioners of the old school who have never seen hydrotherapeutic treatment. This tolerance of so much stimulation has, for the most part, to be arrived at by the graduation just mentioned; but it is equally certain that in not a few cases the patient, having abundant blood, but having it accidentally congested in one or more points, is able from the commencement to react upon, without failing under, the stimulation administered by the falling douche. The process by which this bath operates is plain enough, and has just been alluded to. The violence and the cold of the water shock the thickly supplied nerves of the skin, and rouse them; the shock is propagated along those nerves to their origins in the spinal cord, and thus this latter organ eventually receives the stimulation of the application. Receiving it, the spinal cord propagates it toward the brain, on the one hand, and along the nerves which it (the cord) sends to the interior organs—the heart, lungs, stomach, &c.; and in this manner is explained its effect in producing appetite and digestion, in reducing flatulency, in promoting the secretions of the kidneys, bowels, and womb; but in this manner also is explained its occasional action, when imprudently administered, of causing giddiness, throbbing and sleeplessness of brain, spitting of blood, palpitation of heart, nausea and vomiting, and excessive flow of urine. But besides these reflected actions on the interior viscera, the spinal cord sends the effects of its stimulation along the nerves which it sends for locomotive purposes to the limbs and voluntary muscles generally, and thus energy is given to those muscles; but should the stimulation of the cord have gone beyond the point of tone and reached that of tumult, we have, instead of alacrity of locomotion, disinclination to it, with a sense of fatigue and languor. This rationale of the operation of falling douche points at once to its potency as a therapeutic agent, and to the care necessary in employing it. With this in view, it is well for the first few days to limit its application to the extremities of the nerves of the spinal cord, in other words, to the upper and lower limbs and the buttocks, and only by degrees apply it to the back and spinal cord, where it would impinge on the roots of those nerves, and of course be more liable to produce excessive tumults therein. When it is judged to be prudent to apply the douche upon the spinal column, it should be passed rapidly across the back by an appropriate movement of the trunk, and not be allowed to pause upon any point of it.

The most usual proportion of its application is one-third of the time to the back and two-thirds to the limbs, or one minute to two minutes; but in many cases of paralysis and neuralgia the time may be extended to six or eight minutes. Rarely is it administered twice in the day; and mostly, when it is so, in old standing rheumatism, neuralgia, and palsy. In persons of sensitive temperament, a sufficiently stimulating result is often obtained by receiving the douche on the limbs alone. But in all cases it is desirable that its operation should be watched; the patient should never be permitted to continue the employment of it without frequent inspection. It is well known that disastrous results at Gräfenberg followed on Priessnitz prescribing the douche and never seeing the patient for two or three weeks. The signals of the irritating, as distinguished from the tonic effects of the douche, have already been mentioned, and more or fewer of these suffice to indicate the necessity for intermission, suspension, or diminished time and space of application. If, for instance, the bath is causing fatigue instead of exhilaration, it should be taken from the spine, administered only on the limbs, and perhaps curtailed in time of application. If broken sleep attends its use, it should be taken two or three times a week, instead of every day. But if to this is added palpitation of the heart and irascible or lachrymose irritation of mind, the process should be suspended altogether, for a time at least, until these symptoms subside, and if the bath be considered necessary for other existent morbid symptoms. In order to avoid these irritating results, the bath should never be taken at too near a distance from the head; from a line drawn across the middle of the shoulder-blades downwards is the most eligible space for it to fall upon. Comparatively few persons can bear its application on the nape of the neck. Occasionally, in cases of torpid liver, the douche may be allowed to fall over the region of that organ; otherwise, it is not prudent to allow it to play upon the belly. It remains to state that the douche is beneficially applicable for local complaints; for torpid swellings of joints or glands, for local palsy of hands or legs (as in painter's palsy), for sprains, after the inflammatory stage is past, for very torpid lepra, &c. Applied to the feet, especially to the soles of them, it is an efficient mode of warming them. The douche should never be taken when fatigued by walking or other exertion; the exertion should follow, not precede it, and even then not for so long a time as after the sitz bath.

Plunge Bath.—This is taken alone, or after packing, lamp sweat, or vapour sweat. It is only an increase of the general cold bath and the pail douche, and is prescribed when the object of treatment is in all ways to induce a tumult in the system, with the view of rousing a critical, or, at least, an altered action in the body generally, or in some of its principal organs. Such tumult is more especially desirable in long standing rheumatism, characterized more by stiffness than by pain; in obstinate congestion and torpor of the liver and of the abdominal organs generally; and in paralytic conditions which are unattended by cerebral or spinal-irritation. In some inveterate forms of skin disease, also, of the crustaceous or furfuraceous kind, the additional stimu-

lation of a plunge bath after the sweating process will often be found useful. On the other hand, it should not be employed where there is active or even atonic fullness of the brain; where there is pulmonary obstruction from any cause; where there is weak or abnormal action of the heart; where there is general bloodlessness; or where there is suspicion of fatty accumulation about any of the internal organs. The duration of this bath should in no case exceed five minutes, and constant movement and friction should be used during it.

Partial Sponging with Cold Water.—This is the first to be mentioned of the partial applications of water to the body. As in the instance of the towel rubbings, this is a process to be practised when, from the defective nervous and circulating powers of the frame, a general bath would not be applicable. When with this general defect a dry, harsh, lifeless skin presents itself, a piecemeal sponging is all that can be applied in the onset of treatment, or subsequently to friction with wet towels. The patient sits down, having the lower extremities alone covered with blankets; the trunk and arms are rubbed well with wet towels for two or three minutes, and then are sponged freely with cold water for a minute or two, dry friction following upon that. The previous preparation of the skin by broad and wet friction renders it more susceptible to, and therefore more ready to react upon, the punctuate stimulation of a cold splash, and activity of the skin is thus better insured. After free sponging and abundant friction of the trunk and arms, the same double process is gone through with the legs; the trunk having been warmly enveloped meantime. The repetition of this leads gradually, as before explained, to the more general baths of stimulation and tone. If, without being dry and harsh, the skin is only bloodless, but tolerably warm, the sponging may be used at once, without any previous friction with towels. Sometimes also dry friction with a hair-glove, or with a rough towel, for two or three minutes renders the subsequent sponging more agreeable and more certain of reaction.

In congestive irritation of the brain, in which heat of head and sleeplessness are prominent symptoms, sponging of the hands and arms up to the elbows with cold water often proves beneficial, by inducing sleep when the limbs have become warm. Such sponging should continue for three or four minutes. The same is useful in nervous headache, in face-ache, and in toothache of a purely neuralgic kind.

Another partial sponging is that applied to the nape of the neck and back of the head. It is useful in those numerous cases of neuropathia which take their principal source in the congestion of the cerebellum, the medulla oblongata, and the base of the brain. The repeated and prolonged stimulation—for it should continue for two or three minutes—tends to disgorge the congested bloodvessels of the parts within, whilst by the process of reaction a quantity of blood is brought outwardly to the tissues of the neck. The sponging should be practised two or three times a day, holding the head over a large bath or basin. Administered near to bedtime it is somewhat uncertain in its action on sleep—sometimes inducing, at other times preventing it. As a general rule, it causes sleep when the patient has a fair

quantity of blood in the body, and it precludes sleep when the blood is very deficient in the body, although excessively congested in the posterior regions of the brain; in other words, it is calming when there is more or less of apoplectic fulness, and exciting when there is a purely atonic state of the cerebellum. Partial sponging has been carried to a most ridiculous extent by certain pretended practitioners of the water treatment, who amuse the weak-minded by sponging the nose, one hand and not the other, &c., whereby the minds in question are amused, and their bodies, though not cured, not injured.

Short Cold Sitz Baths of still and of running water.—The stimulation of this kind of bath is more particularly required in conditions of the pelvic viscera which indicate relaxation of the bloodvessels from defective innervation, with excessive secretions from them. Thus it is applicable in painless or even in painful diarrhoea, if the discharges are large and liquid, and the more if the malady is of long standing. For the same reason it is applicable when the womb gives evidence of its atonic and relaxed condition, by falling down in the pelvis, by emitting leucorrhœal discharges in the intervals between the monthly illnesses, and by profuse or prolonged discharges at the period of those illnesses. When there is general puffiness, relaxation, and heat of the feminine organs of generation, this kind of bath is most appropriate. In disorders of the male organs of generation, such as seminal weakness and impotency, spermatorrhœa and nocturnal pollutions, the bath is appropriate for the same reason. And in the minor degree of relaxation, shown in heat, weariness, and aching of the hips and loins after excessive muscular exertion, the short cold sitz bath will be found to be very useful. After sedentary and intellectual labour, it has a wonderful effect in clearing the brain, renewing the nervous alacrity, and producing appetite for food and easy digestion thereof; in this way it is a most desirable termination of a hard-worked professional or commercial man's day, and antecedent of his dinner; he can do no more profitable thing for his health, than to take a cold sitz bath of five to ten minutes, with a cold wet towel on the head during it, as soon as he returns home for the evening. A person sleepless, restless, and hot at night, will be calmed and cooled if he rises and takes one of these baths. In sudden and transitory headache, arising possibly from a surprise or from nervous shock from any cause, the short cold sitz with cold to the head should be tried; and it is well to follow it immediately with a foot bath of cold water and mustard. Very frequently, in cases where this bath is applicable, the body is in a state of nervous or feverish excitement, which precludes the necessity for walking after it; in fact, in the case of excessive pelvic discharges, walking is not desirable.

As the whole virtue of the short cold sitz depends upon the low temperature of the water, it becomes necessary to devise a method of retaining the coldest degree throughout the process. In the very cold time of winter this may be found in the ordinary spring water, which is usually at 35° to 50°; but in summer this point is gained by constantly changing the water by sending it running through the bath, so as to prevent a rise of temperature by the withdrawal and accumulation of animal

heat from the patient's body. Hence the running sitz bath becomes a necessary apparatus of all water-cure practitioners. In domestic treatment this may be substituted by the addition of ice, or failing that, of nitre and bay salt, to the water.

Spinal Washing.—This form of local stimulation was first introduced by Dr. Gully. When there is reason to believe that the spinal marrow is much congested with blood, and, in consequence of that, is sending irritation along its nerves to the skin and other organs, or when the congestion therein is so great as to diminish the power which should flow to those organs, it is desirable to stimulate the bloodvessels of the spinal marrow itself, because the extremities of its nerves on the skin are either too irritable or too torpid for healthy reaction. On these conditions is based the necessity for some such process as the spinal wash. Add to this, that when the spinal marrow is in either of the states just indicated, there is always some deficiency in the quantity of blood in the body, or some defect in its quality, which renders *strong* cold stimulation of the entire skin inappropriate. This double state of congested spine, and very defective vitality of skin, therefore, is that which requires the spinal wash. Spinal exhaustion and congestion from any cause thus becomes the indicative sign for its employment; from uterine disorders, from excessive childbearing and nursing, from venereal excesses, from excessive muscular or mental exertion, from hæmorrhages and sweatings, &c. An instructed medical eye will at once see that endless phases of such congestion and exhaustion may obtain; and upon accurate measurement of these must depend the temperature of the water to be used in this bath, and the duration of it. In ordinary cases the water may be cold, and the application may continue for from two to six minutes. In some cases of greater delicacy, the water should be at 60°, and the period of its application about three minutes. In still more sensitive and dilapidated persons it may be necessary to apply water at 80° to 100°, for one, two, or three minutes, previous to employing a colder temperature immediately afterwards; the shock of stimulation is in this way broken, and the patient is very gradually inured to the coldest and most tonic temperatures. With precautions of this kind, the spinal wash becomes one of the most useful detailed applications of hydrotherapeia, so great and so numerous are the sympathies of the spinal marrow with the other organs of the body, both internal and external, and so much, therefore, does it become a point upon which those organs converge their irritations, and from which irritations are in return vividly radiated. Hence there is scarcely a state of multiform indigestion, of constipation of bowels or of kidneys, of internal spasm and flatulence, of spasmodic breathing, of nervous palpitation of the heart, of hysterical depression or excitement, of confusion and inaptitude of brain, or of tremor of limbs, to which it is not beneficially applicable. It is a kind of miniature of the falling douche; and when that potent stimulant cannot be obtained, a long spinal wash forms the best substitute for it. Sometimes the spinal washing is confined to the lower half of the spinal column, when the pelvic organs are those upon which it is desired specially to operate, or when the upper half of the spine is so exquisitely sensitive

as to cause spasmodic action of the respiratory or vocal muscles, giddiness, throbbing of head or heart, &c., when strongly stimulated. In such instances the lower half of the spine may be first sponged with cold water, and then the upper half with water from 15° to 30° of higher temperature.

The manner of applying the spinal wash is this:—The patient sits on the edge of a sitz bath or large tub in which is the water to be used; an attendant then pours a half gallon or a gallon jug of the water down the spine, emptying it as it descends, continuing this incessantly during the prescribed time. Sometimes a large sponge is used instead of the jug, but it is not, on the whole, so appropriate as the jug.

Cold Foot Baths.—This simple process has been an especial object of dread or derision to the practitioners of the ordinary medication; of dread to those who are learned but not experienced, of derision to those who are neither one nor the other. Yet its medical effect is most decided when it is tried and observed. The foot is supplied with nervous tissues to an extent and with a complexity only to be equalled, among the external organs, by the hand; and its nerves are derived directly from the lower portion of the spinal cord, which also supplies all the pelvic viscera with nerves. In administering a foot bath, there is first the shock of the water's temperature applied, and this shock is promulgated along the nerves of the legs to the spine, and thence to the contents of the pelvis and belly; next there is the repetition of this shock and stimulation of the nerves by the prolonged friction; and finally, there is the reaction of blood from above towards the foot so rubbed. But besides this, the termination of the spinal cord in the brain gives this process the faculty of acting upon the circulation of the latter through the former. With this anatomical and physiological arrangement clearly before the mind, it will not be difficult to understand how it is that foot baths act in congested and nervous conditions of the womb, the bladder, the flatulent bowels and stomach, in indigestion, in nervous palpitation of the heart, in sanguineous as well as in nervous headaches, giddiness, cold in the head, &c.—in all which conditions of disorder, experience has largely proved this remedy to be most efficient. They who *dread* it have in their view only the effects of cold wet feet, without friction or exercise to produce reaction of blood and warmth. They who *deride* it must be totally ignorant of the nervo-sympathetic connections which that highly sensitive limb, the foot, has with the nervous centres; yet some of them must have limped from the acuteness of a corn or a tight shoe. Not unfrequently a cold foot bath, given within two hours after a full meal, has produced vomiting, and it constantly causes wind in the stomach or the bowels to be immediately and forcibly ejected. It will cause a partially paralyzed bladder to act, a spasmodic womb to be calm, or a constipated womb to secrete, a nervous cough to cease, a stuffed catarrhal nose to open, and a fierce headache to dissipate; nay more, gloom and hypochondriacal depression of mind to be exchanged for lightness and contentment. The temperature of the foot bath must depend upon the sensitiveness and reactive power of the patient, and on his ability for brisk exercise after it. It is often necessary to commence with friction with damp

towels only, or with water at 70° or 80°, which should be gradually lowered. It should always be recollected that reaction of blood and nervous current towards the feet is the final object of the process, and both the temperature of the water and the duration of the friction in it must be accommodated to this end. In this way it is that water at 80° produces as complete reaction in a bloodless and nerveless patient, as water at 50° does in a full-blooded person; but as the blood and nerve increase, so should the temperature of the water decrease, even to the ice temperature, which produces the fiercest reaction of all. It is often desirable, although not essential, to aid the reaction in question by irritating the skin with mustard, flour, or salt, in the water.

The process of the foot bath is to place the feet in about four inches of water, and to rub them vigorously with the hand under the water for a space of time varying from three to fifteen minutes, and subsequently drying them with considerable friction for three or four minutes.

The Sweating Process.—All the cold processes hitherto described and dwelt upon have the effect of rousing the interior organs to reactive energy by the shock of a temperature much lower than that of the skin. But it constantly happens that the internal organs are so enfeebled by reason of the oppression of their functions by long-continued and very great stagnation of blood in their tissues, that it is impossible for the practitioner to rely upon the power of the oppressed organ to react upon the cold shock from without; and if such reaction does not take place, the organ only becomes more congested, in consequence of the additional quantity of blood thus driven upon its tissue; or, which is very frequent also in prolonged chronic disease, the diminution and impoverishment of the blood and of the nervous power is such as to deprive the internal organs of all reactive power: for however small may be the quantity of blood in the entire body, there is the greater tendency for it to accumulate out of all proportion in the interior organs, in order that life may at least be sustained *there* by the vital fluid. Now, in either of these cases the sweating process becomes necessary; that is to say, the blood which cannot be sent to the surface by the process of reaction, must be *drawn*, as it were, by the action of great heat applied to the surface. In doing this the excitation of the circulation is very great—the pulse usually rises from 70 or 80 beats in the minute to 100 or 115, evidencing the rousing of the organism under this hot stimulation. The brain circulation of course partakes of this, and for a short time before the outbreak of sweat there is tightness and throbbing in the head with, occasionally, giddiness; all which dissipates so soon as the skin bursts into perspiration, and to obviate which it is well to apply a cold wet towel over the head, and to keep it cool during the whole process. The time necessary for effecting perspiration varies from ten to forty minutes, and it is by no means the most full-blooded persons who are the swiftest to perspire; on the contrary, if there has been excessive alcoholic stimulation, with congested liver and bloated external tissues, the sweat is mostly slow to come; whilst a person emaciated by anxiety, watching, or any other source of nervous irritation, usually bursts into sweat in five or ten

minutes. Much depends upon constitutional peculiarity of circulation—the slow and phlegmatic responding less speedily than the vivid and active. In order to aid the elimination of sweat, it is often desirable to immerse the feet in six or eight inches of hot water, and to sip a good quantity of cold water during the process. The air of the room should be kept pure by the opening of a window more or less; faintness is then less likely to accompany it, against which contingency, as well as for the administration of water for beverage, it is better that an attendant should remain in the room. The duration of the actual sweating varies from five to fifteen minutes, according to the facility with which the patient bears the process, and the special aim with which it has been ordered. If the object is simply to bring a large quantity of blood to the surface, and so to relieve the interior organs, the appearance of the sweat will be sufficient evidence of this having been effected; and five minutes, or even less, of the actual secreting act will suffice. But if, in addition to this, it be intended to purge the blood vitiated by medicinal poisons, by gout and rheumatic degenerations, the quantity of sweat elicited becomes important, and it should be allowed to flow ten, twelve, or fifteen minutes, or even longer, if the head gives no sign of weariness; and the same applies when the process is given for chronic and dry skin disease. The time from which to date the sweating is when the skin is perfectly moist or running down, not when it has only a glutinous feel; and it is not necessary to await the appearance of sweat upon the face. It is necessary to remark this, since the patient alone can state the condition of the skin under the blankets by which he is covered.

But the sweating process does not consist of the extraction of secretion from the skin only. The blood drawn in large quantities to the surface not only relieves the interior organs from sanguineous oppression, but also presents in the skin an amount of nervous energy and of heat which enables it to react upon the ablation which constitutes the second part of the process; and in this manner the skin gradually acquires the power of reacting even upon very low temperatures. Time after time, oftentimes day after day, the cutaneous bloodvessels are distended with blood, and so become more and more easily able to resist external temperature by reacting on it. Accordingly, after the sweating has continued for the prescribed time, either a wet-sheet rubbing, or a general bath at a temperature varying from 70° to cold, is essential to the completion of the sweating process. Here the same rule obtains as has been already announced in treating of these last-named processes: the temperature of the bath must be accommodated to the organic power of the patient, measured by the pulse, the nutritive and nervous energy, the past and present history of the case. Were the patient merely to be wiped dry after the sweating, the skin would be more sensitive than before, and would, moreover, be covered with, perhaps, morbid secretion. Now, the bath which follows upon the sweating should be always at a lower temperature than the skin in that state, else there will be the same sensitiveness as if only drying had been practised. Beginning, in very difficult cases, at 80°, the water should be steadily decreased

in temperature every few days, and the colour, warmth, and absence of shivering of the skin subsequently be narrowly watched, so as to lose no time in arriving safely at the lowest temperature; for then begins the forcible and undoubted curative action of the sweating process. That process is unquestionably a *disturbing* process; it stirs up the whole interior, and introduces tumultuous effort in the organs thereof to throw off either blood which is oppressing them or blood which is poisoning them, or both. The repetition of this tumult at length begins to worry, as it were, the brain, the nerves of the heart, or the nerves of the stomach, and sleeplessness and headache, or palpitation of the heart, or nausea or vomiting, announce this. The plan then is to intermit the process for one or more days, according to the intensity of the above symptoms, and to take the long sitz bath, foot bath, cold fomentation, or other soothing process, recommencing the lamp sweat so soon as the excessive tumult has subsided. But a close observer and experienced medical eye may detect the signs of such tumult long before it has reached the distressing point alluded to, and will suspend the sweating in order to avoid it. By these means, a patient with obstinate internal congestion, or whose blood has been poisoned with mercury, iodine, and all kinds of aperient drugs, or is infected with gouty materials, may be brought into a state of critical relief without hazarding the integrity of functions of the nervous or circulating centres.

In order to facilitate the action of the lamp sweat, it is for the most part better to precede it, for more or less period of time, by packing, fomentations, warm baths, and all methods the end of which is to reduce the irritability of the brain, nerves, heart, and all the internal organs, so that when the lamp comes to excite the latter to the effort to throw off their congestion, they may make such effort with the smallest amount of irritation to themselves, and to the body generally. And, in fact, the great majority of chronic diseases require that nervous and circulating irritation should be subdued previous to the application of the disturbing and curative measures. Furthermore, the packing and cognate means tend to prepare the skin for the sweating process. It rarely happens that the treatment of a case can be judiciously commenced with the lamp sweat.

From the above it will be plain that the sweating process is not applicable to febrile conditions of the body. A very common but a very decided error of those who do not understand water treatment is, that at the commencement of an acute catarrh it is only necessary to produce sweating by the lamp in order to disperse the cold; whereas that process would unquestionably increase the headache, throbbing, feverishness, and languor of that malady. But suppose that, in consequence of bad management and repeated relapses, the acute has passed into the chronic stage of catarrh, wherein all the mucous membranes have lost their febrile activity, and have become atonic and congested, then the sweating process is strongly indicated, and will be found useful. The same applies to the chronic congestion of any other organ, and notably of the brain, liver, and womb; the lamp sweat will be

found useful when the febrile symptoms have all disappeared, but not sooner. Headache, giddiness, nausea, faintness, and universal throbbings will indicate the inappropriateness of the sweating arising from this cause. When the sweating is employed for long-standing rheumatism and thickening of the joints, and for various skin diseases, the head symptoms should be watched; for in these maladies the lamp may be employed for a much longer time than in other diseases without rousing the secretory activity of the mucous membranes in any of their extent, but the long-continued action of the process occasionally and suddenly tells unfavourably on the brain circulation, and irritation of the brain, or of the spinal cord, or of both, is all at once exhibited. This caution is addressed to those who believe that because the remedy is only being applied for an external malady, it can in no way interfere with internal organs, forgetting that almost all the nerves of the skin take their origin in the spinal cord, itself a prolongation of the brain, and are vehemently stimulated by the alternate heat and cold of the process in question.

It has been already stated that the lamp sweat is a necessary mode of relieving congested interior organs when the bloodlessness and exhausted nervous power of the body is such as to prevent the stimulation of cold which requires reactive energy—in cases of atrophy, for instance. But so soon as by aid of the lamp sweat the skin is acquiring a fulness of blood circulation and an energy of nerve current, the stimulation of the cold processes should be added to and intermingled with the stimulation of heat; for an active circulation obtained by reaction is always more permanent than that produced by attraction. The same combination of stimulating applications should also be practised when, with sufficient blood, it is desired to induce *critical* action, to purge the blood generally in some particular organ. For this reason it is that so many obstinate chronic diseases require that the treatment which began with slight and subduing processes, should terminate with powerful and perturbing measures, such as the falling douche and lamp sweat in combination.

Cold Water Compress.—This is a local and continuous packing, effected by placing a four or five-fold towelling, wrung out of cold water, on the skin, and covering it with flannel alone, or with flannel having oiled silk or mackintosh web underneath, immediately over the wet towel. The region to which this is most universally applied is the belly, especially the upper half of it, over the stomach proper, the liver, and the large plexus of nerves underneath them. But it is used in all local irritations and inflammations, particularly over joints and cutaneous eruptions. The effect of the compress is directly soothing; but if it remains in the hot condition for a long time over a region, it is apt to induce irritation rather than soothing. This is eminently shown when the compress over the upper stomach is allowed to remain for many hours after becoming hot: it causes gnawing and sinking in the stomach, and thence may produce headache, palpitation, &c., all which dissipate so soon as the towelling is wrung afresh out of cold water. It is plain from this that the soothing effect

of compresses is due to the reaction upon the cold on the surface, and that when no further reaction is possible by virtue of the equalization of heat, the latter begins to prove a stimulant, and in time arouses irritation in the very parts which it was intended to soothe. The compress over the chest or belly, therefore, should be refreshed every three hours or so, if it becomes hot in one hour. Those to joints and the skin may remain longer, as they do not involve such important parts; but they too should be refreshed frequently. The quality of the dry covering has to do with this question. If flannel only be used, the wet towelling heats, and soon begins to dry by evaporation; but if impervious tissue, such as mackintosh, be used, the heat, having no exit by evaporation, is much greater in degree and more irritating in action. The best arrangement is to have flannel only, and to wet the compress every three hours; but the majority of chronic patients take to the more convenient plan of wearing mackintosh and changing the compress less frequently. In acute diseases, however, no mackintosh should be used; the compress should be covered with flannel, and changed every hour or two, sometimes more frequently still.

The above processes include all that can scientifically be called the hydrotherapeutic treatment. Their application, to greater or lesser extent, with more or less frequency or intermission, must be regulated by the medical tact of the practitioner. The ignorance of the invalid world, which delights in fussy activity, and has the desire to be ever doing *something*, especially if that something fits with their fears or love of comfort, has caused the introduction, by some pretenders to medical skill, though having no pretence to medical status, of a number of minute and absurd processes, which can have no effect save to amuse and abuse the patient. After this fashion one hand is rubbed in warm water, the other in cold; one foot is gravely rubbed in a tepid bath for four minutes, whilst the other is rubbed for only three minutes; a pint of water is poured slowly over the crown of the head from the forehead backwards, &c., &c. A book is published which is filled with absurdities and dishonesties of this kind, the processes being numbered from one to two hundred and sixty. It is needless to say that the favour given to such a burlesque of medical treatment is given by the same persons, and for the same reason that faith is given to unknown drugs, to which lying effects are audaciously attributed by their promulgators.

Water Drinking.—The processes above enumerated exhibit hydrotherapeia in its application to the exterior membrane of the body. But an important part in that treatment is played by the application of water to the interior membrane of the body, in other words, by the drinking of cold water. Priessnitz laid great stress upon this, and instructed his patients, almost without discrimination of cases, to swallow as much water as they could; and instances are numerous in the history of his practice in which patients drank from twenty to thirty tumblers per diem. A better appreciation of the philosophy of water treatment has led to a considerable modification of this practice, and to a classification of conditions in which much or little water drinking is desirable. As a general rule (and it is impossible

here to enter into details), one or two tumblers of water after each external process suffices in all cases where the morbid phenomena are dependent upon irregular nervous and circulating function alone, and where there is reason, from the previous history, to suppose that no vitiation of the blood has taken place. But in the numerous cases in which internal chronic derangement has existed so long as to have inevitably led to vitiation of the quality of the blood—in those equally numerous cases where the blood has been deteriorated by the actual absorption, during years, of all kinds of drugs, and especially of mercury, iodine, and other mineral poisons, and in the obstinate congestion of certain solid organs, the liver, the spleen, and the mesenteric glands—large doses of water are indicated, varying from six to fifteen or sixteen tumblers per diem. The reasons for this different treatment by water drinking are obvious enough. Whenever a temperature much colder than that of the skin is applied to that surface, the blood is first of all driven upon the internal mucous membrane, and some degree of dryness thereof is the result, as all persons experience in the throat and mouth immediately after a cold bath. To obviate this interior feverishness thus engendered a tumbler of water is taken, and when it is followed by exercise, it promotes the reaction from the interior, which is looked for as a desideratum. When interior organs are obstinately congested, the aim of water drinking is vehemently to stimulate the nerves of the abdominal organs, so that they may arouse the gorged and torpid bloodvessels of those organs, and enable them to throw off their oppressive blood: the quantity of water for this purpose is necessarily large, and its temperature should be very cold. When the same large doses of cold water are taken in cases of poisoned and vitiated blood, an additional aim involved in them is so to alter the animal chemistry going on within the body, and to augment the excretions, that by reason of excessive micturition and sweating the old blood may be gradually excreted, whilst the better appetite and digestion, which is the result of the cold water applied to the stomach, are forming a better elaborated blood to supply it. There is little doubt that water, when absorbed into the circulating blood, acts within the body as it is well known to act out of it, namely, to increase the rapidity of chemical changes; and thus it is that it aids those alterations in the character of the blood, which eventually purify and renovate it, and render it fit for the nutrition of the tissues; the old vitiated blood is abolished by the same measure which augments the formation of the new blood. With these indications the practitioner will be enabled to direct the patient as to the quantity of water which is to be drunk. But there is one point upon which his watch must be kept. The stimulation of the nerves of the stomach afforded by large quantities of cold water, and the absorption of the water into the circulating blood have, from both causes, the effect of sooner or later exciting the circulation and the sensitiveness of the brain and spine; and headache, giddiness, sleeplessness, and, more than all, great irritability of temper, show that, however necessary the continuance of the water for the purposes of the blood may be, its large

absorption must be for a time diminished or suspended, until the nervous excitement subsides. It is related that not a few of the patients at Gräfenberg became apoplectic or insane from this reckless imbibition of cold water.

Rationale of Hydrotherapeutic Treatment.—

Throughout the portion of this article which gives details of the various processes, it will have been observed that constant stress is laid upon the reactive power of the body, as it is exercised upon the application of these processes. Upon this power is based the whole rationale of the treatment in question. It was mentioned under the 'History of Hydrotherapeia,' that Priessnitz had intuitively concluded that when disease was abolished it was by the efforts of the body itself, and not directly by the remedy employed, and that therefore 'strength' was requisite. So long as the organism exists in life, there is always more or less of this organic strength upon which Priessnitz built; and one of the most necessary, and at the same time the most nice calculations which medical art has to make, is the quantity of the power referred to which still remains in the body after all the ravages of acute or chronic disease; for upon this calculation must be based the quality and amount of the treatment to be employed. What is called diseased action is itself a reaction of the organic strength upon some offending cause, such as cold, heat, bad food, poisons, fatigue, violence, &c. The first reactive exhibition thus made is, in the majority of cases, a vehement one, involving excessive action of the nervous and circulatory functions. This immediate and violent reaction, which is for the purpose of throwing off and remedying the results of the morbid cause, is the phase of disease commonly called 'acute.' Excessive rapidity of the nervous and circulatory functions is its attribute; all is tumult and disorder. If by any means this rapidity and tumult can be subdued, and the body thereupon relieves itself by eruption or excretion of some kind or other, there is an end of the disease. But if, whilst the dangerous tumult of the functions is subdued, the body does not relieve itself by eruption or excretion, more or fewer organs fall from the excessive activity which they exhibited into a state of exhaustion of organic power—an exhaustion having a proportion with the amount of the previous excitement in which they were. This condition and phase of disease is what is called 'chronic.' Both states may be thus illustrated: in consequence of a chill, acute inflammation of the lungs ensues, characterized, as every one knows, by very rapid pulse, very rapid breathing, very hot skin, difficult expectoration, &c. Remedies subdue the pulse, breathing, and heat of skin, but are not followed by either a collection of matter in the tissue of the lung, nor by copious secretion from the inflamed parts into the air tubes; the immediately dangerous part of the inflammation is past, but the tissue of the lung remains surcharged, oppressed with an undue quantity of blood, the continued presence of which constitutes the 'chronic' disease of the organ. The intensity and duration of the acute stage varies in individuals. In persons whose original congenital supply of organic power is small—in other words, in persons of feeble constitution—the acute stage is feeble and brief, and speedily passes into the chronic stage, or else extinguishes the individual. In the

former case the acute stage often passes unobserved, and the statement is that 'the disease came gradually on;' in the latter case the organism sinks under the effort to relieve itself from an offending cause. To take up the illustration of the diseased lung again: the chronic stagnation of blood in the tissue of the lung being established, it becomes a source of sensitiveness and irritation to other organs and to its own tissue; the heart is readily excited; the windpipe and organ of voice are rendered exquisitely sensitive to cold air; the nerves of respiration are played upon, and cough induced; the very skin is rendered more delicate; whilst the mass of blood congregated in the tissue of the lung is irritating the organic sense of that tissue, and constantly tending to set up a new, chronic, disintegrating inflammation therein—an inflammation in which the organic power is so diminished that it is altogether unable to make efforts to relieve the distressed function of the organ.

Now, in both the instances of acute and of chronic disease, the thing to be dealt with is the organic power of the organ involved. In the acute state of disease this may be more readily measured; it is in violent reaction against a peccant cause, and the aim of the practitioner is, plainly enough, to restrain the excess of activity, so that life shall not be extinguished by its subsequent complete exhaustion, and to direct such activity from the important organ involved to some less important organ. Accordingly, the hydrotherapeutic applications to this form of disease are all of the soothing and subduing kind, such as diminish the pulse, soothe the cerebral and nervous tumult, and cool the fevered skin. All this moderates the vehement efforts of nature, and directs the irritation of which she is striving to rid herself towards the skin, upon which the remedies are applied; and, as has been said in speaking of the packing, this may be done so perseveringly as to exhaust the internal fever and irritation entirely by the skin; so that, in the case of inflamed lung before alluded to, the inflammation shall cease without either the prolonged and copious expectoration which so often attends its solution, or the lapse into the chronic form. The limit to this subduing and soothing process must be looked for by the practitioner in the collapse of the pulse and of the nervous power; for the organic power of individuals varies infinitely. If, after employing subduing measures against an acute internal disease for a certain time, the diseased condition still continues, but the action of the heart has been so lowered, and the excitement of the nerves so subdued, as to cause fluttering of the heart, with tremor and faintness of the nerves, then there is reason to fear that the patient is about to succumb to the internal malady, persisting as that does in spite of the remedies in question: his organic strength can no longer react upon them, and therefore is unable to throw off the diseased state which first roused all the tumult. If, on the other hand, the internal acute malady diminishes *pari passu* with the diminution of the nervous and circulatory tumult induced by it, the organic power of the patient must still be carefully measured by the practitioner, and must not be permitted to sink so low in its reactive energy as to be unable eventually to rid the body of the primary malady; for in the contrary case, that

malady would become a chronic one, liable to take on acute activity on provocation, and causing the formation of all kinds of morbid sympathies of the diseased organ with other organs, and perhaps the destruction of its own tissue.

In acute disease, therefore, it will be seen that the success of treatment by hydrotherapeutic means depends upon the skilful measurement of the organic power which the patient possesses, both to react upon those means and to recover the body from the original malady. It should ever be remembered that hydrotherapeia depends for its success upon the curative reaction of the disordered body itself, and makes no pretension to the possession of antidotes which are presumed to drive out disease, either because they are of a contrary nature to that disease, as is the case with allopathy; or because they are of the like nature in their pathogenesis, as is the case with homeopathy. Upon this fact is fairly based the assertion that treatment by hydrotherapeutic means involves more accurate appreciation of the physiological state of the body, and more minute skill in the choice of remedies which shall arouse its curative reaction without exhausting it, than are required or than could be possibly applied in the ordinary systems of antidotal medication.

But if the measurement of the powers of the body be a matter of nicety in the midst of the excessive activity of acute disease, it requires still more appreciation of these powers when that form has lapsed into the chronic state. For in chronic disease there are two opposite phases of vitality to be dealt with. The bloodvessels of the chronically diseased organ, after having their vital contractile power strongly excited during the acute stage, fall into the opposite condition of exhaustion and relaxation. In this condition they occupy more space and contain more blood than they should healthily do, and on both these accounts are a source of irritation to the nervous tissue both of their own substance and to that of immediate and distant organs. Here, then, are two opposing conditions, demanding opposite treatments: relaxed and enfeebled bloodvessels, and irritable nerves caused by them. This is the double condition which meets every close observer of chronic disease. It may be illustrated by the case of an acutely inflamed liver which has fallen into a state of chronic congestion; its bloodvessels, weak and gorged, irritate the nerves which run in the tissue of the liver itself, and, not only so, are a source of irritation to distant organs, as is evidenced by the headache, throbbing and heaviness of the brain, by the obscuration of the sight, by the irritable state of the throat, the foulness of the tongue, the disordered urine, the constipation, the dry, harsh skin, &c. Now, in treating such a case hydrotherapeutically, the soothing portion of the remedial applications would tend to increase the congestive feelbleness of the bloodvessels of the liver, whilst the stimulating measures, which would rouse these vessels to efforts to rid themselves of the oppressive blood with which they are charged, would tend to maintain and augment the nervous irritation of the liver itself and of the various organs with which it morbidly sympathizes. The longer the chronic state of disease has existed, the more decided are both these conditions; the feelbleness and congestion of the diseased organ

becomes more decided, and its nervous sensitiveness and sympathies more intense and more extended.

In treating chronic disease by the hydrotherapeutic method, therefore, one of these two opposite conditions must first be dealt with. The nervous irritation of the organ itself, and of its sympathizing organs, is obviously the first that demands attention, because it is that which gives the greatest amount of suffering to the patient, and because it is the most recently established condition. Accordingly, the practitioner, having accurately measured the extent and intensity of that condition, will proceed to apply soothing and subduing processes with fitting caution. For the most part there is, besides the inherent irritation of the original malady, an immense accumulation of nervous irritation all over the body, produced by the long-continued employment of futile tonics, sedatives, aperients, &c., all administered in the vain attempt to remove a causal disease by palliating its morbid sensational and secretorial effects. And besides these positive irritants, there is the negative result of neglect of the most sensitive of all the bodily surfaces, the skin; rarely, if ever, has any attempt been made, in the long course of the ordinary medications, to bring into play the vast and acute sympathies of that surface for the purposes of acting upon interior organs or carrying off irritation from them. Like all organs, therefore, whose functions have been neglected and whose vitality has been called away to be concentrated on other organs, the skin is mostly found, when chronic cases are first submitted to hydrotherapeutic treatment, to be in a state of exquisite sensitiveness and of obscured reactivity; it has been ignorant of the touch of water, and is therefore intolerant of the touch of air, from which it has been for years excluded under masses of flannel and other supposed armours from evil. With the brain and spinal cord rendered irritable by the internal chronic malady; with the heart, kidneys, and womb rendered irritable by their direct nervous connections with the primary diseased organ, and indirectly so connected through the brain and spinal cord; with the skin painfully alive to external impressions, but nearly dead as to the power of reaction on these impressions—it is no wonder that, when the first soothing hydrotherapeutic measures are applied to the body through the skin, the result should be that of great relief to morbid sensation and suffering, and a resilient feeling of health to which the patient had been a stranger for months or years. And such is the fact, in a very short time, in the great majority of cases: it is a common thing for patients, after treatment for a week or two, to declare themselves better than they had been for many months, and even to declare themselves well. But these sensations are only the result of the reduction of the sympathetic nervous irritations already referred to; through the exquisitely sensitive skin, the nerves of which take their origin in the spinal cord, a soothing effect is produced upon the interior nerves proceeding from the same source, and between the renewed secreting activity of the skin and the diminished excitement of the internal nerves, the sense of improved well-being is readily explained.

But this more or less extended nervous irritation is not the disease to be cured; it is only, as it were,

the unhealthy atmosphere thrown out by the focus of disease in the specially diseased organ. In that organ is found that prostration of circulating power which constitutes the chronic state, and which must be overcome before it can cease to be a source of mischievous function to other organs. To the attack upon this centre of diminished organic power must now be brought all the agencies of hydrotherapeia whose office it is to rouse dormant bloodvessels—the stimulating processes of that mode of treatment. If the patient from long disease has become bloodless as well as nerveless, it will be necessary to employ the hot processes of the lamp sweat, vapour bath, general hot bath, &c., so as to draw blood to the exterior without the necessity for reactive exertion on the part of the body. And whilst the skin is thus artificially filled with blood and excited in its nervous power by applied heat, that power should be called into play by subsequent frictions or ablutions more or less low in temperature, and always lower than that of the skin. By the frequent repetition of this method, the bloodvessels of the skin gradually become the receptacles of more and more blood, and gradually acquire the power of reacting more and more upon the external temperature, which temperature should be steadily lowered with the increasing ability of the skin to bear it, and to react upon it. After a time the power increases so much as to permit the application of measures which call forth the reactive energy alone without the attractive power of heat; and pail douches, rose douches, falling douches, and other cold stimulants, are introduced for the purpose of arousing the tumult of the interior organs which is to rid them of their oppressed and torpid state of circulation. When the body is able to bear these, the sweating process is applied only from time to time to aid, by varying means, the advent of the revolution which it is desirable to cause in the vital actions. It is well to bear this in mind: variety of mode of stimulation adds much to the amount of stimulation. In many cases this variation requires to be regulated by the weather; when cold dry winds prevail, the lamp sweat should be most used; in warm, moist weather, the cold stimulants. In many other cases the disease regulates the employment of either kind; generally speaking, chronic disorders of the abdominal organs require only a small admixture of hot stimulation; whilst in affections of the chest and of the exterior organs, as in gout, rheumatism, and skin diseases, the lamp and vapour baths should be largely applied, but still with cold stimulation added. The stimulation is thus affected, and the resulting tumult is further augmented by the drinking of large quantities of cold water and a good amount of bodily exercise, especially in affections of the liver and kidneys, in gout and rheumatism, in states consequent on courses of mercury, iodine, and other poisonous minerals where, as in gout and rheumatism, the blood requires to be purged and changed as well as regulated in its circulation.

It has happened that the patient generally expresses a sense of rapid improvement whilst under the preliminary soothing treatment. On the other hand, it constantly happens that when the stimulating treatment has been in progress for a while, the patient begins to complain that he does not feel

so well, that the treatment appears to be disagreeing, &c. This is the expression of the tumult which the treatment is causing in the chronically affected organs, a tumult which is spreading sympathetically to the great nervous centres, causing therein malaise, sleeplessness, nervousness, faintness, &c., and radiating thence to cause palpitations of the heart, short breathing, nausea, &c. When more or fewer of these symptoms prevail, it is well to intermit some of the stimulating processes and to substitute some of the soothing, packing in towels or sheet, for instance, alternately with the lamp or douche; or ceasing the latter altogether for a while, if the above-named symptoms of disturbance continue notwithstanding the intervention of the soothing measures.

In this manner the hydrotherapeutic treatment is applied perseveringly to undermine and subvert the long-standing morbid action of more or fewer organs. The object is to revolutionize, to subvert altogether. It may be necessary to delay this conclusion from time to time in order to spare the nervous power, and prevent grave nervous effects; but that object must be kept steadily in view: the disease is not cured until a total change in the affected organs, and frequently also in the character of the blood of the whole body, is made. Sometimes the gradual alteration of the sensations, secretions, and mental and locomotive powers gives evidence of this, without the sudden and violent explosion of some secreting organ, such as the liver, stomach, bowels, kidneys, or skin, or the throwing out of some eruption of a diffused, or itching, or burning, or furuncular kind. But at other times some of these exhibitions of tumultuous effort on the part of the body take place, and vomiting, diarrhoea, copious and loaded urine, sweatings, various eruptions of the skin or large boils upon it, then afford evidence of a *crisis*, as it has been called. This critical action may come again and again; the intervals being the periods during which the nervous system is resting from its past, and accumulating power for its future efforts in the same direction. Whilst such efforts are actually going on and the *crisis* is present, it is not well to interfere with it by continuing the stimulating treatment; it is best, in fact, to intermit all treatment save such as will keep the skin in active function; for the effort is a natural one, and nature is doing all that it is desired should be done, namely, throwing chronic irritation which had long possessed important organs upon other organs wherein it cannot involve life, and whence it is evolved by secretion. But it is expedient to renew the perturbing treatment immediately on the cessation of the critical action; and if it fails to cause renewal of such action, and if, on the other hand, it only irritates the nervous centres, as will be shown by sleeplessness, excitement of mind, diminished locomotive power, &c., then it may be concluded that no further irritation remains to be expelled, and the treatment may be speedily terminated.

The tumult through which the patient passes in the process of cure causes in him an incapability of appreciating the benefit which the treatment is effecting on him. At first, as has been said, the subduing of sympathetic irritations induces sensations of relief and health; then comes the perturbing treatment which stirs up the old morbid arrange-

ments, and during which the patient often suffers much uneasiness; and it is not until all the tumult produced by the treatment has subsided that he really feels how much he has gained by the ordeal through which he has passed. In some instances this sensation of totally restored health is not experienced until the end of two, three, or even four months, so deeply were the roots of disease planted in the organs, so violent and prolonged the tumultuous effort which was necessary for their eradication.

From all that has preceded it will be seen that the water treatment differs from other methods in this, that it calls upon the powers of the body to effect the restoration of the organs, which is not the pretence of either the allopathic or the homœopathic modes of treatment. Further, it will be seen that it aims at *cure* and not at *palliation*, as is the fact with regard to allopathy. For both these reasons, it is apparently more tedious in its career and less brilliant in its immediate operations. But even in this particular, an exception must be taken in the instance of acute disease, in which the speedy results are frequently marvellous. In high states of fever, for instance, a single pack in a sheet will often reduce the pulse by fifteen or twenty beats in the minute, and induce sleep quite as directly as the most approved narcotic drug. And in cases of profuse diarrhoea or menstruation, the application of a very cold sitz bath for five or eight minutes will constantly have the speedy effect of arresting the discharge. The same rapid action applies to the effect of a long sitz upon a headache, or of a foot bath upon a toothache.

It must not be supposed, however, that the advocates of hydrotherapeia repudiate altogether the employment of medicinal agents. Several of the most distinguished practitioners of that treatment in Britain mingle homœopathic treatment with their own, more especially Dr. Gully. And among the allopathic remedies they do not utterly discard narcotics and diffusible stimulants, when either overwhelming pain or alarming faintness threatens to extinguish vitality. On the other hand, it is now certain that hydrotherapeia is gradually finding its way into the ordinary style of healing and becoming part of it. In the Edinburgh Infirmary, at St. Thomas', and other hospitals of London, the treatment of febrile complaints by packing in towels and sheets is becoming general, whilst in private practice the employment of compresses and of sitz baths is extending almost every month. It is to be hoped that this candid examination and utilization of all that may aid the patient to obtain palliation of suffering or recover health will continue to increase, and the narrowness of sectarian views, which tells against the patient and only in favour of sectarian passions, to expand, so that medical art, so short-coming in the combat with the multifarious assaults of disease, may receive into her armoury of remedies the extensive and powerful agencies of hydrotherapeia.

HYDROPHILIDÆ, a family of coleopterous insects established by Leach. The insects of this family are included by Latreille in his section *Palpicornes*. They have generally nine joints to the antennæ, but sometimes only six; the terminal joints always form a perfoliated knob; the maxillary

palpi are very long and slender; the body is usually oval or rounded, convex above and flat beneath, or nearly so: the tarsi are five-jointed, and the mandibles bidentate.

The principal genera are *Hydrois*, *Hydrophilus*, *Spercheus*, *Berosus*, and *Hydrobios*.

HYDROPHOBIA (from *ὕδωρ*, 'water,' and *φόβος*, 'fear') is the disease occasioned by inoculation with the saliva of a rabid animal, and is so called from the violent and suffocating spasms of the throat which occur when the patient attempts to drink, or when, in the latter stages, the mere idea of drinking arises in his mind. The exciting cause of this disease is the poison of rabies, which is generated in the dog and various animals of the canine species, such as the wolf, fox, and jackal; and which may by them be communicated to other animals, such as cats, horses, pigs, and also to man.

The disease may be communicated to man either by the saliva being carried into a wound made by the tooth of a rabid animal, or by its being placed on the surface of a previous wound, as where dogs have licked the hand or face of a person in which there was any raw surface. If a mad animal bite through the clothes, there is great probability that all the saliva will be wiped off from its teeth as they pass; and hence wounds of the hands and face are generally the most dangerous. The poison is of a fixed and not of a volatile character, and capable of being propagated as long as the corpse has not become perfectly rigid.

The period after the inoculation at which the symptoms of hydrophobia may exhibit themselves varies greatly. In general the disease appears between the thirtieth and fortieth day from the injury; but cases are known where it has been delayed for several months. The bite of a rabid animal generally heals up like that of a healthy one, and the patient is attacked when he had forgotten that he was ever bitten. In some cases, however, before hydrophobic symptoms appear, the scar of the wound becomes painful, red, and swollen, and pain is felt shooting from it along the course of the nerves of the part, as if it were going to ulcerate. The first decided indication of the disease is that the patient has headache and general uneasiness; he loses his appetite, and when he is about to drink he suddenly feels an aversion to any liquid, and finds a difficulty in any attempt to swallow it. The symptoms rapidly increase in severity: any attempt to drink, and even anything that can suggest the idea of drinking, is sufficient to bring on the most frightful spasms of the throat, threatening instant suffocation, and producing the most severe pain. The convulsions, which were at first limited to the muscles of the throat and of deglutition, after a short time extend to other parts of the body. As the disease proceeds, the convulsions of the throat become more frequent and severe: the slightest noise or vibration of the room is sufficient to excite them; there are severe headache, a rapid pulse, a foul tongue, and other symptoms of a generally disordered condition of the system. A copious secretion of thick tenacious mucus clogs up the air passages, and it is in his attempts to free himself from this that the patient coughs and makes a loud harsh noise, which has been supposed to resemble the barking of a dog. Sometimes there is furious

delirium, but often for the last few hours of life the patient becomes quiet; he then rouses from his tranquillity, and, after one or two comparatively slight convulsions, expires. The duration of the disease is very rarely more than six days, and it often terminates fatally in twenty-four hours.

No method of cure has yet been devised for this terrible disease, and the only question that can be satisfactorily considered is that of prevention, which can only be accomplished by the removal of the morbid saliva from the wound before it has had time to produce its fatal influence on the body. The surface of the wound should be well washed, and then the whole area of it excised, and caustic applied to every part of the cut surface. Water dressing should then be used. It may happen, however, that the wound is so lacerated, or penetrates into such structures, that the complete separation of it by the knife is impossible. If it occurs in a finger, for example, it may be amputated; but if a more important member is implicated, the circumstances should be submitted to the patient. If he prefer running the risk and retaining his limb, the wound should be thoroughly washed and cupping-glasses applied over it, or a potent caustic may be used.

HYDROPHYLLACEÆ, a natural order of exogenous plants. It is near *Boraginaceæ*, but differs in the structure of its seeds and fruit. Many of the species, especially those of the genera *Nemophila* and *Eutoca*, are beautiful objects: they are all natives of North America.

HYDROPS PERICARDII, or *Hydropericardium* (from *ὕδωρ*, 'water,' and *περικαρδιον*, the 'pericardium'), is a collection of an unnatural quantity of fluid in the sac containing the heart.

HYDROSTATIC BED. [BEDSTEAD.]

HYDROSTATICS is the science which relates to the pressure and equilibrium of the fluids commonly called non-elastic, or incompressible; as water, mercury, &c., and to the equilibrium of bodies immersed in them. The elastic fluids, as air, steam, &c., are the subjects of Pneumatics.

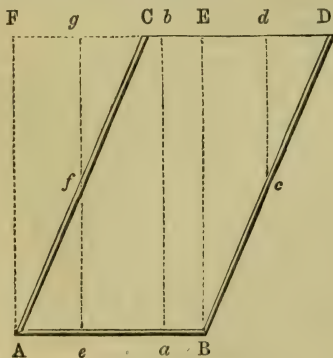
The cause of fluidity in bodies has been the subject of much discussion; it has been supposed to depend on the globular form of the particles, on the caloric contained between them, or on both these circumstances combined. But whatever may be the primary cause, it is admitted by all that the property must arise immediately from the perfect mobility of the particles among one another. Differences, however, exist in the fluidity of different bodies, such as mercury, water, &c., which in their ordinary state possess this property in a high degree; while the particles of many fluids, as the oils, have a sensible adhesion to one another. Except pure alcohol, all the non-elastic fluids at certain temperatures congeal, and lose their fluidity.

Since the particles of all bodies, fluid as well as solid, are separated by intermolecular spaces, it may readily be conceived that no fluids can be absolutely incompressible; and experiments have proved that spirit of wine, oil, water, and even mercury, can, by pressure, be reduced in volume in certain degrees; the fluids which have the greatest specific gravity suffering the least compression. But as this diminution is very small when compared with the volume of the fluid (being for water, only $46\frac{1}{10}$ millionths

of its bulk with a pressure of 15 lbs. on the square inch), for all practical hydrostatic purposes such fluids may safely be considered as experiencing no change of volume by the compressions to which they may be subjected.

Experiment has also shown that *all the non-elastic fluids possess the property of transmitting equally in every direction the pressure exerted against any point on their surface*. This property is the fundamental principle of hydrostatics, and most of its other propositions are only different forms or direct consequences of this truth. If, for example, a piston were forced into an orifice made in any part of the side of a vessel containing such a fluid, the effect of the pressure would be experienced equally at every point on the whole surface of the vessel; but the pressure thus exerted must be distinguished from that which is caused by the gravity of the fluid, the former being the same in every part of the fluid mass, while the latter, at every point in the sides, depends on the depth of the point below the upper surface of the fluid.

If a fluid at rest in a vessel be supposed to consist of an infinite number of filaments, or infinitely slender columns in vertical positions, the pressure, which, in consequence of the weight of the particles vertically above, is exerted in every direction by any particle of one filament, will be counteracted by the equal pressure of all the surrounding particles, so that the filament will remain at rest, and act by its gravity on the particle vertically under it. Also, the pressure exerted by the fluid against every part of the surface at the sides or bottom of the vessel containing it, will, while the fluid is at rest, be perpendicular to the surface; since otherwise the reaction of the surface could not entirely destroy that pressure, and a part of it would disturb that equilibrium which, by hypothesis, is the condition of the fluid in the vessel. The amount of that reaction is, of course, equal to



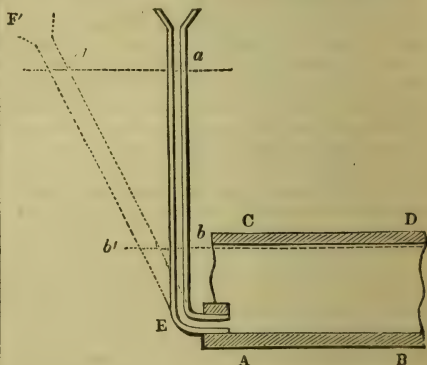
the weight of any one of the vertical filaments comprehended between the upper surface of the fluid and a horizontal plane passing through the elementary surface pressed. The pressure of all the particles in the upper surface of the fluid is evidently null.

It may hence also be proved, that the pressure on the base of any vessel containing a fluid will be the same, whatever be the form or position of the sides of the vessel, provided the fluid always reaches the

same height above the base. For, let $ABCD$ be a vertical section through a prismatical vessel; the pressure on any point, a , of the base is evidently equal to the weight of the vertical filament, ba ; that on any point, c , of the inclined side, BD , is the weight of the filament, cd ; and this last produces no effect on the base, because the lateral pressures of all the particles in every vertical filament are counteracted by those of the particles in the neighbouring filaments. The same thing must be understood of all the water in the portion EBD . The pressure on any point, e , under the inclined side, AC , is equal to the weight of the filament, ef , together with the pressure arising from the reaction of the side, AC , at f , in the vertical direction, fe ; and this reaction is, from what has been said, equal to the weight of a filament which may be supposed to exist above f , with a height equal to fg . Consequently, the pressure on AB , when the sides of the vessel are inclined to the horizon, will be equal to that upon the same base when the sides are in vertical positions. This is the foundation of a popular experiment, when columns of water of equal height, in cylindrical and conical vessels, having equal bases, but, of course, containing very different quantities of the fluid, are shown to be in equilibrio with one and the same weight applied to prevent the movable bases from descending.

It may readily be inferred from these statements that the pressure on the base will be equal to the weight of a vertical prism or cylinder of the fluid, whose base is that of the vessel, and whose altitude is that of the fluid which it contains, whatever be the form or inclination of the sides.

On the same principle may be explained the hydro-



statical paradox. In this experiment is employed a cylindrical machine formed of two circular plates of wood, as AB and CD , with sides of leather like those of a pair of bellows. A tube, FE , is inserted in an orifice near the bottom, and through this tube water is poured into the cylinder, till the boards, AB and CD , are at any distance asunder within the limits allowed by the leathern sides. Then if any weight be placed on the board, CD , it will cause the water to rise in the tube, EF , to a certain height, suppose a ; and the weight of the small column, ab , of water may be considered as holding in equilibrio the weight imposed on CD ; which will, in fact, be found to equal that

of a cylinder of water whose base is the area of the board CD, and whose height is equal to ab .

If the tube, EF, were made to decline from the vertical so as to take any oblique position, EF', it would follow, since the pressure of a fluid by gravity depends on the vertical height only of the column, that the fluid in the tube, from the same pressure on CD, would rise till its upper surface is in a horizontal plane, aa' , passing through a : and the weight of the column of fluid must be estimated by the area of the horizontal section at b' , multiplied by the vertical height of a' above b' .

The pressure exerted by a fluid against the side of a vessel containing it, or against a surface immersed in it, whether that side or surface be plane or curved, is, by the theory of parallel forces, equal to the weight of a column of the fluid having the surface pressed for a base, and to the distance of the upper surface of the fluid from the centre of gravity of the former surface for its altitude. By this theorem the pressure of water against the walls of reservoirs, lock-gates, &c., may be determined, and the relation ascertained between the weights of the fluid in vessels of various forms and the pressures against the sides.

The centre of pressure in any surface subject, like the side of a vessel containing a fluid, to the hydrostatical pressure of the fluid, is that point at which, a force being applied in a direction contrary to that of the pressure, the surface will be kept in equilibrio; and in all cases, when the surface pressed is symmetrical on each side of a line joining the centres of gravity and pressure, the latter coincides with the centre of percussion in mechanics.

When a triangle in a vertical position is pressed by a fluid, its vertex coinciding with the upper surface of the latter, and its base being horizontal, the distance of the centre of pressure from the vertex is equal to three-fourths of the perpendicular of the triangle. And when a circle in a vertical position is so pressed, its upper part just touching the surface, the distance of the centre of pressure from that part is equal to five-eighths of the diameter.

The equality of the pressures in every direction at any point in a fluid mass, is the cause why, if a solid body be immersed in a fluid, the pressure of the fluid immediately under it will tend to raise the body upwards with a force equal to the weight of the fluid it displaces. But the weight of the body is a force acting vertically from above downwards, and, consequently, in an opposite direction to that of the reaction of the fluid. Since, therefore, the volumes of the body and of the displaced fluid are equal to one another, if their weights or densities should be equal, the body would remain in equilibrio in whatever situation it were placed in the fluid. But should these weights or densities be unequal, the body would make an effort to ascend or descend, according as its density is less or greater than that of the fluid; and in order to counteract these tendencies, it would be necessary to use a force equal to the difference between the weight of the body and of the displaced fluid. Hence, if a solid body be weighed in a fluid, it will be found that its weight, compared with that of the same body in vacuo, will be less than in the latter case by the weight of an equal volume of the fluid; and, consequently, when

a body is weighed in a fluid, as water or air, the true weight, or that which would be obtained in vacuo, will be found by adding to the observed weight that of an equal volume of the fluid.

When a body floats in a fluid, in order to bring its upper surface to coincide with that of the fluid, it must evidently be loaded with a weight equal to the difference between the weight of the body, or of the displaced fluid, and the weight of a volume of the fluid equal to that of the whole body. The weight which a floating body will thus bear is denominated the buoyancy of the body; and on the principle here stated depend the common rules for finding the buoyancy of rafts, vessels, &c.

If a solid body float in equilibrio in a fluid, the centres of gravity of the body and of the displaced fluid must evidently be in one vertical line; otherwise the upward action of the fluid below, which necessarily has its resultant in a vertical line passing through the centre of gravity of the place occupied by the body, would produce in the latter a rotatory motion contrary to the hypothesis. This circumstance has given rise to three distinctions in reference to the equilibrium of floating bodies. If the centre of gravity of the body should be below that of the displaced fluid, the body is said to possess a stable or firm equilibrium; if above, the body is said to float with a tottering equilibrium; and if the said centres should exactly coincide, the body would float in any position whatever, and is denominated an equilibrium of indifference.

The absolute weight of a given volume of any solid or fluid body is called its specific gravity. In this country, for convenience, it is customary to consider one cubic foot as the given volume, and to express the weight in avoirdupois ounces: thus the weight of a cubic foot of rain-water being 1000 ounces, and that of a cubic foot of cast iron being 7207 ounces, those numbers are used to denote the specific gravities of the bodies. From this definition it follows that, when the volumes of two bodies are equal, their specific gravities will be proportional to their weights: when the weights are equal, the specific gravities are inversely proportional to the volumes; and, in general, the weights of bodies vary in a ratio compounded of their volumes and specific gravities. [SPECIFIC GRAVITY.]

HYDROTHORAX (from *hydor*, 'water,' and *thorax*, 'the chest'), dropsy of the chest, is a term applied to express the existence of serum in the pleural sac. This morbid collection may take place in consequence of inflammation of the pleura, which, like inflammation of other serous membranes, may terminate in effusion; or it may result from the causes of general dropsy. [DROPSY; PLEURITIS.]

HYDRUS (constellation), the Water-snake, commonly called the Southern Snake, a constellation of Lacaille. It is situated between the south pole and the bright star in Eridanus (Achernar).

HYDRUS, a genus of serpents which have the posterior part of the body and the tail very much compressed and elevated vertically, so as to give them a facility of swimming adapted to their aquatic habits.

Cuvier places them with *Bongarus*, or *Bungarus*; Daudin distinguished them as a tribe of serpents whose jaws are organized and armed nearly as in the

non-venomous serpents, but which have the first of their maxillary teeth larger than the others, and pierced for conducting the poison, as in the venomous serpents with isolated fangs. He subdivides these water-serpents, which are said to be very common in the intertropical regions of Asia, and the neighbouring islands, into the two genera *Hydrophis* and *Pelamides*. Cuvier adds the sub-genus *Chersydrus*.

HYERES, a town in the French department of Var, situated 10 miles E. from Toulon, on the southern slope of a hill that looks over a beautiful plain covered with plantations of the orange, citron, vine, olive, pomegranate, mulberry, and palm, and terminating in the Mediterranean, stands in $43^{\circ} 7' N.$ lat., $6^{\circ} 7' E.$ long., and has 5430 inhabitants. It is considered one of the healthiest winter residences in the south of France, being protected by hills from the north-west winds, and also from the direct influence of the south-west, which sometimes blows with great violence in this part of the Mediterranean. It is much resorted to by persons suffering from chest and nervous complaints. The group called the Iles d'Hyères lie near the coast.

HYGIENE or HYGIENE. That department of medicine which treats of the preservation of health. From Hygeia, the fabled Goddess of health.

HYGINUS, CAIUS JULIUS, a freedman of Augustus Cæsar, and a grammarian, was, according to some, a native of Spain, but according to others, a native of Alexandria. He was placed by Augustus in charge of the library on the Palatine Hill, and also gave instruction to numerous pupils. His numerous works are quoted by the ancients; but they are all lost.

HYGROMETER (*hygros*, 'moist,' and *metron*, 'measure') is an instrument serving to determine the quantity of aqueous vapour in the atmosphere, or other gas under examination. M. De Luc employed for this purpose a thin slip of whalebone, whose contractions indicated the variations of moisture; and De Saussure had recourse to a human hair, by means of which he constructed a far more delicate instrument; which was, however, exceedingly liable to derangement, and, unless prepared with extraordinary care, was uncertain. A very ingenious instrument was also invented by Leslie, but all previous inventions have been superseded by the hygrometer which the late Professor Daniell introduced. It consists of two thin glass balls; one inch and a quarter in diameter, connected by a glass tube about seven inches in length. The tube is bent in two places at right angles, so as to form three arms of unequal length, the longest of which contains a small thermometer, whose bulb descends into the lower of the two glass balls. This ball, after being about two-thirds filled with ether, is placed over a spirit-lamp until the vapour of the ether has expelled the contained air through a capillary tube, which is left open for the purpose, and afterwards hermetically sealed. The other ball is then covered with a piece of muslin, and the instrument thus adjusted is placed upon a stand, to which is attached a small thermometer indicating the temperature of the external air. When about to be used, a small portion of ether is poured upon the muslin, which, by evaporating, lowers the temperature of the glass ball, and thereby

occasions a rapid condensation of the ethereal vapour contained within the instrument. The condensation of the vapour within the tube produces a continuous evaporation from the surface of the ether in the lower ball, whereby the temperature of the included ether is continually reduced, until a deposit of moisture from the surrounding atmosphere is observed to take place upon the exterior of the glass. At this instant the inner thermometer, which always indicates the temperature of the ether, is observed, and thus the dew point, or that at which the precipitation of atmospheric moisture takes place, is determined with considerable accuracy. Having ascertained the dew point, and likewise the temperature of the external air, the actual quantity of moisture contained in the cubic foot of air will readily be found from the formula,

$$\text{Weight in grains} = \frac{5656 \cdot 2}{448 + t} \times p,$$

where t denotes the temperature of the external air, and p the elasticity of aqueous vapour at the temperature indicated by the interior thermometer. The value of p for every degree of the thermometer is given in Mr. Dalton's tables of the expansive force of steam. This instrument, so excellent in theory, is very costly, on account of its great consumption of ether, and can scarcely be used in hot climates, owing to the difficulty experienced in preserving that fluid. It is also objected to because an experiment has necessarily to be made to obtain an observation. It was employed for the determination of the dew point at the Royal Observatory, Greenwich, from 1840 to 1847, but since that period it has been superseded by the more convenient instruments—the wet and dry bulb thermometers. This instrument consists of two thermometers—an ordinary one, to give the temperature of the air; and another, whose bulb is covered with a piece of muslin, or other similar material, to which is attached an absorbent wick, communicating with a vessel of rain-water—an arrangement by which the muslin is kept constantly wet. The evaporation from the muslin, and consequent cooling of the bulb, being in proportion to the dryness of the air, the difference between the readings of the two thermometers will be greatest when the air is driest, and zero when it is completely saturated with moisture. The reduction of the observations to derive the elastic force of vapour at the dew point is effected by the formula of Dr. Apjohn:—

$$(1) F = f - \frac{d}{88} \cdot \frac{h}{30}; \quad (2) F = f - \frac{d}{96} \cdot \frac{h}{30},$$

(1) to be used when the reading of the wet thermometer is above 32° , and (2) when below. In these formulæ, F is the elastic force of vapour at the dew point; d the hygroscopic depression, or depression of the dew point; h the height of the barometer; and f the elastic force of vapour for the temperature shown by the wet thermometer. In these calculations, Mr. Glaisher's 'Hygrometrical Tables' will be found of very great value, as they include all the requisite data and corrections.

HYGROMETRY is that part of natural philosophy which relates to the determinations of the humidity of bodies, particularly of the atmosphere:

it comprehends also the theory of the instruments which have been invented for the purpose of ascertaining the quantity of water contained in a given volume of air.

The experiments of Dr. Dalton proved that the water received from the earth is not dissolved in the atmosphere, and that it exists there in the form of vapour. That philosopher discovered also that the quantity of vapour contained in a portion of the atmosphere depends greatly upon the temperature of the latter, and that it is very variable even when the temperature is constant. He ascertained, moreover, that when a quantity of aqueous vapour at a given temperature is diffused through any space, it will support the same external pressure, whether that space had previously been void or occupied by air. On these principles are founded the methods which have been used for determining the absolute quantity of moisture in a given volume of air by means of the hygrometer, the requisite data being the elasticity of aqueous vapour at different temperatures, and the corresponding indications of the instrument.

In order to find on the scale of an hygrometer, constructed like those of De Luc and Saussure [HYGROMETER], a number of points corresponding to any given elasticities of the vapour, Gay-Lussac put water into a vessel of glass; and having determined the elasticity of the vapour arising from it, he suspended from the upper part of the vessel a delicate hygrometer. The vessel was then closely covered, so that there might be no communication between the vapour within and the external air; when, after a short time, the index of the hygrometer became stationary at a certain point on the circumference of the graduated ring which served as a scale; this point thus became an indication of the elasticity of the vapour. Experiments of the like kind being made with vapour of equal temperature, but in different states of elasticity, between those which correspond to extreme dryness and complete saturation, there were obtained so many points on the scale of the instrument as indications of the elasticities of the vapour.

The extreme points on the scale of such an hygrometer may be found in the following manner: the instrument is to be placed under a receiver in which is a certain quantity of dry caustic alkali, when, after a time, the material will contract in length as much as its nature will permit; the point on the scale at which the index stands is that of extreme dryness, and constitutes the zero point. The instrument may then be placed in water, or in a receiver filled with vapour completely saturated with moisture, when the material will expand to the greatest extent possible: the place of the index is then to be considered as the point of extreme humidity, and is usually indicated by 100.

In Great Britain the mean evaporation per minute from each square inch of the surface of water is 0.01155 grains.

The method at present adopted at the Greenwich Observatory in all hygrometrical observations, by means of the wet and dry bulb thermometers, is described in the preceding article; but in a recent work on the subject by Sir John F. W. Herschel, he states that, 'it cannot be denied that great difficulty

still exists in determining, by any mere reading of instruments, the exact hygrometric state of the air.' For the last ten years (since August 24, 1856) hourly hygrometrical observations have been made at the Observatory once in every week during twenty-four hours, the deductions from which, stated for each hour, include also that of the vapour required to saturate a cubic foot of air. They are also given, with the other meteorological elements, in the form of monthly returns.

HYLACTES, a genus of birds established by Captain Philip Parker King, R.N., for a form allied to *Megapodius*. Example, *Hylactes Tarnii*. Locality, the Island of Chiloe and Port Otway, in the Bay of Penas.

HYLEOSAURUS, Dr. Mantell's denomination for the extinct Saurian discovered by him in the forest of Tilgate, in Sussex, and thence termed the Forest Lizard. The remains upon which this genus was established were found imbedded in a block of stone $4\frac{1}{2}$ feet by $2\frac{1}{2}$ feet, and consisted principally of bones of the trunk.

HYLOBATES (from *hylobates*, 'wood-walker,' or one that goes through woods), Illiger's name for the long-armed Apes, or Gibbons. [APE.]

HYMEN or HYMENÆUS, in Grecian mythology, the god of marriage, was the son of Apollo and a muse. In very early legends he was described as a mortal of extreme beauty, who delivered from captivity some Attic virgins who had been carried to Eleusis by Pelasgian pirates. For this service he was rewarded with a maiden of whom he was deeply enamoured; and on account of his conduct, and the happiness of his marriage, he was invoked in bridal songs, thence called hymeneal songs. In ancient art he is represented as a tall and elegant, but somewhat effeminate youth—a larger and more serious Eros. He usually carries in his hand the bridal torch, and sometimes wears on his head, or around his neck, a wreath of flowers.

HYMENÆA, the name of certain festivals celebrated at Athens in honour of Hymen, the god of marriage, who is usually represented as crowned with flowers, and holding a burning torch in his hand.

HYMENÆA, a genus of plants belonging to the natural order *Leguminosæ*. *H. courbaril*, Locust Tree, or Gum-anime Tree, is a fine lofty spreading tree, and grows in the tropical parts of America and in Jamaica. The seeds are enveloped in a cellular mealy substance, which is sweet like honey, and is eaten by the Indians with great avidity. When fresh it is slightly purgative, but by keeping it loses this property. A decoction of this substance, when allowed to ferment, forms an intoxicating drink resembling beer. From the principal roots of this tree there exudes a fine transparent resin of a reddish colour, which is collected in large lumps, and sold under the name of Gum Anime. It resembles amber, is very hard, and sometimes contains leaves, insects, or other objects imbedded in it, which remain in a perfect state of preservation. It burns steadily, emitting a very fragrant smell. Dissolved in rectified spirits of wine, it makes one of the finest kinds of varnish. In countries where this tree grows the resin is used medicinally, and has also been employed in that way in Europe. The timber of the old trees is very hard and tough, and

is in great request for wheelwork, particularly for cogs. The wood is very heavy, and takes a fine polish.

HYMENOMYCETES, the first sub-order of the *Fungi*, a natural order of plants. They are characterized by their reproductive organs, called the Hymenium, being naked. This sub-order is divided by Fries into four tribes; by Berkeley into six tribes. Those of the latter are, *Pileati*, *Clavati*, *Mitrati*, *Cupulati*, *Tremellini*, and *Sclerotiacei*.

The tribe *Pileati* contains the genus *Agaricus*, many of the species of which are eatable, and are mentioned in the article AGARICUS.

In the same genus are included the various species of *Amanita*, which are among the largest and most remarkable forms of the fungi. *A. Cæsarea* is remarkable for its beauty, as well as for the traditional belief that it was in a dish of these mushrooms, which were regarded by the Romans as one of the greatest luxuries of the table, that Agrippina administered poison to her husband, Claudius Cæsar, in order to hasten her son Nero's accession to the imperial power. *A. muscaria* possesses an intoxicating or narcotic property. It is used by the inhabitants of the north-eastern parts of Asia in the same manner as wine, brandy, arrack, spruce, &c., by other nations. One large or two small fungi is a common dose to produce a pleasing intoxication, which lasts for a considerable time.

Upwards of 700 species of the genus *Agaricus* have been described; of these, 333 are natives of the British Islands.

In the tribe *Pileati* are also included eight species of the genus *Cantharellus*, which inhabit Great Britain. The *C. aurantiacus* is said to be a poisonous plant. It is common in fir-woods and pastures. It has a beautiful orange colour and a strong smell. *C. cibarius*, the common Chanterelle, is common in the summer and autumn. The pileus is of a pale yellow colour, and the whole plant has an agreeable smell, like that of apricots. On the continent of Europe this fungus is eaten, but is not often used in Great Britain. It is dangerous when eaten raw, and should always be cooked. Berkeley describes five species of this genus as natives of Great Britain. Of *Schizophyllum* but one species has been found in Great Britain, the *S. commune*. The genus *Dædalea* has been so named from the remarkable sinuosities and sculpture-like pores of its hymenium. *D. quercina* is found commonly on oak-trees, or stumps and roots of that wood. It is an astringent, and has been applied to wounds to arrest hæmorrhage. There are several other species of this genus which are indigenous in Great Britain. *D. suaveolens* is a northern plant. It yields an agreeable perfume. Upwards of forty species of the genus *Polyporus* are found in Great Britain, and many more European species have been described. Many of the species are used in the arts and in medicine. *P. destructor* is one of the fungi found on decaying timber when it is attacked with what is called dry-rot. The genus *Fistulina* has one representative in Great Britain, *F. hepatica*, the Pipe-stool. It grows upon the trunks of old oaks and other trees. It is eaten in France. The genera *Sistotrema*, *Irpex*, *Radulum*, and *Phlebia* are small. *Thelephora* is an extensive genus, and forty-two

species are indigenous in Great Britain. They are common on decaying branches of trees, &c.

The tribe *Clavati*, in their branched and club-shaped forms, resemble the corals, and were actually placed by the older naturalists in the same class. Some of the species of the *Clavati* are edible. All the *Clavaria* are esteemed as food.

In the tribe *Mitrati* the genus *Morchella* yields the esculent fungus Morel. Three species are found in Great Britain. There are also three British species of *Helvella*, as that genus is at present defined. The species of *Helvella* are edible. *H. crispa* is considered the best species for eating, and none of the species are poisonous.

The tribe *Cupulati* contains eleven British genera. Some of these plants are very remarkable, from the regular cup-like form and the deep colours they present. Of the genus *Peziza*, the species *P. coccinea* is perhaps the most elegant plant belonging to the fungi. The outer surface of the cup which it forms is white and downy, whilst the inside is of the richest carmine. It frequently grows on sticks covered with moss, the green colour of which forms a beautiful contrast with the white and crimson of the *Peziza*.

The fifth and sixth tribes of the Hymenomycetes are the *Tremellini* and *Sclerotiacei*. The *Tremellini* embrace six British genera. The British genera included under *Sclerotiacei* are amongst the lowest forms of the hymenomycetous fungi, and include species which are found attacking the various cerealia, producing the disease called *Ergot*.

HYMENOPHYL/LEE (Gr. *hymen*, 'a membrane,' and *phyllon*, 'a leaf'), a family of ferns of the natural order *Gleicheniaceæ*. The various species of the genus *Hymenophyllum* may be classed among the most elegant of the ferns, and flourish most when grown in small pots, in a mixture of peat and loam.

HYMENOPTERA, one of the orders into which insects are divided. Hymenopterous insects possess four membranous wings, of which the anterior pair are the larger; they have all the usual parts of the mouth well developed, that is to say, they possess labrum, labium, mandibles, maxillæ, and two pairs of palpi; besides the ordinary compound eyes, they are furnished with three ocelli, or simple eyes, which are usually situated on the vertex of the head. Their tarsi are five-jointed. The females are provided with an ovipositor, consisting chiefly of three elongated slender processes, of which two serve as a sheath to the third. This ovipositor, in many species, is so organized that it can not only perform its ordinary function, but serve as a weapon of defence, and is the part which in bees and wasps is called the sting: in these insects it is barbed at the apex. The antennæ are generally filiform or setaceous. The mesothorax and metathorax are well developed; the prothorax is narrow.

Insects of the order Hymenoptera undergo what is termed complete metamorphosis, i.e., the larva is unlike the perfect insect, and the pupa does not possess the power of locomotion. The larvæ of some of these insects very much resemble those of the order Lepidoptera (Butterflies and Moths), but differ in the number of their legs, &c.: these feed upon plants. The larvæ, however, generally speak-

ing, are destitute of legs, and do not possess a distinct head, and these are for the most part fed by the parent insect, or, as in the case of Bees and Wasps, by the neuters. In the pupæ, all the parts of the perfect insect are visible, since they are inclosed only in a delicate semi-transparent membrane.

In the imago, or perfect state, most hymenopterous insects live upon flowers, or at least often frequent them, some for the purpose of gathering honey, and others find them a convenient resort wherein they may prey upon the less powerful species of their own class. Illustrative forms are given on Plate 'Hymenoptera,' which see.

HYMENOPTERA, FOSSORIAL. This group, to which Latreille applies the name *Fossores*, is divided into eight families:—1, *Scoliada*; 2, *Sapygida*; 3, *Pompilida*; 4, *Sphecida*; 5, *Bembicida*; 6, *Larrida*; 7, *Nyssonida*; and 8, *Crabronida*.

HYMETTUS. [ATTICA.]

HYMN (*hymnos*), a song of praise and adoration, in honour of a Deity, and by the Hebrews, as well as the Greeks, accompanied on some musical instrument. The 'Te Deum' and 'Benedictus' are, in our liturgy, both called hymns. The hymn is a song of joy, not of lamentation. The term is now applied to any short religious poem sung in places of public worship, not being a version of a psalm, or taken directly from any of the canonical books of Scripture. Dr. Busby, in his 'Musical Dictionary,' says that 'the Hymns, or divine odes, of the ancient Greeks generally consisted of three couplets—the *strophe*, the *antistrophe*, and the *epode*. But Menander, the rhetorician, enumerates no less than eight different species of hymns. The Hymn appears to be among the most ancient of all poetical compositions; and was originally thought to be dictated by the gods themselves, or at least by men truly inspired. St. Hilary is said to have first composed hymns for the service of the church, in which he was followed by St. Ambrose and Prudentius; the latter of whom is the supposed author of those contained in the Romish breviary.' Among the ancients, however, this style of poetico-musical composition was not confined to mere religious ceremonies, but often used as a song of supplication previous to an engagement, and called the 'Hymn of Battle.' Thus Xenophon, in his account of the first battle fought by the Greeks against the Persian monarch Artaxerxes, tells us that the two armies were not more than four or five hundred paces apart when the Greeks, to the great surprise of Cyrus, began to sing the 'Hymn of Battle,' according to the custom of their countrymen.

HYODON (Gr. 'swine-toothed'), in Ichthyology, a genus of fishes of the family *Salmonida*, belonging to the *Chupina*, or herrings.

HYOSCYAMUS, a genus of plants belonging to the natural order *Solanaceæ*. One of the species of this genus, *Hyoscyamus niger* (Henbane), is an indigenous herbaceous annual or biennial plant, of which the leaves and seeds are officinal. The leaves should be collected when the plant is flowering, dried quickly, and preserved in well-closed vessels, in a cool dry place. The virtue of the leaves is dependent on the presence of *Hyoscyamia*, which, however, is more easily obtained from the seeds. When bruised they evolve an odour of henbane.

Taste oily, bitter; by expression they yield a fat oil, and also furnish a very powerful extract, as well as hyoscyamia. This alkaloid crystallizes in stellated acicular crystals, with a silky lustre; but it more generally occurs in a colourless transparent soft viscid mass. When properly dried it is devoid of odour; but when moist, and particularly when in an impure and coloured condition, the odour is highly disagreeable, stupifying, and tobacco-like. Its action, even in a small quantity, is extremely narcotic and fatal, like nicotine. It kills more slowly than conia, and scarcely causes convulsions. Applied externally to the eye, even in a very minute quantity, it causes great and enduring dilatation of the pupil.

Hyoscyamus, when taken by a person in health, produces disorder of the nervous system, inducing symptoms greatly resembling hysteria, if the dose be moderate; but if large, it causes all the phenomena of narcotic poisoning. Administered in medicinal doses to persons with disturbance of the nervous system, it lessens the irritability, quiets the circulation, and, when morbid wakefulness exists, disposes to sleep. It possesses a superiority over opium in many instances, as it does not constipate the bowels, but rather acts as a mild laxative.

In case of accidental poisoning, the stomach-pump should be used, or an emetic of sulphate of zinc be given. If the brain should appear much oppressed, venesection may also be resorted to.

HYPATIA, the famous daughter of Theon, the mathematician, was born at Alexandria, probably about the year 370. She was instructed by her father in the sciences of mathematics and astronomy, to which he was himself devoted. She succeeded her father in the chair of philosophy at Alexandria, and became the head of the Neo-platonic school there. Beautiful as she was gifted, Hypatia soon attracted to her lectures a numerous auditory. The citizens of Alexandria were proud of her, and the magistrates used frequently to consult her on important cases. St. Cyril, the bishop, came frequently into collision with the authority of Orestes, the prefect of the city, whose increasing hostility to the bishop and his clergy was by them slanderously attributed to the influence of Hypatia. At the commencement of the year 415, the monks seized her in the street, dragged her to a spot opposite to the chief church of the city, stripped her naked, and stoned her to death, after which her flesh was scraped from her bones with oyster shells, and her limbs carried to Cinaron, and there burned to ashes. Cyril has not been held guiltless of her blood, but to what extent he was implicated in the atrocious deed of his partisans cannot be accurately determined. The name of Hypatia has been made familiar to English readers in one of the best of Professor Kingsley's historical romances. For original authorities, consult the *Lexicon* of Suidas, and Fabricius, *Bibliotheca*, tom. viii.

HYPERBOLA. In connection with this article see ELLIPSE and PARABOLA. The hyperbola is one of the curves known by the name of Conic Sections. It is in the application of mathematics the least useful of the three; indeed so very rarely does the necessity of using it occur, that it may be a question whether the study of it should form a part of a course of practical mathematics. But there are, in

pure analysis, so many analogies which are illustrated by distinctions existing between the properties of the ellipse and hyperbola, that the student who aspires to more than elementary knowledge cannot dispense with the comparison of the two curves.

HYPERBOLE (*hyperbole*) means literally 'an over-casting'; in its common sense, a going beyond the truth in describing an object, not by the introduction of qualities which do not belong to it, but by the exaggeration of those which do. For example, it may be hyperbolic to say that the complexion of a fair woman is whiter than snow; but to say so of a brown woman is either irony or simple falsehood. It is often employed by orators with great effect, and Demosthenes frequently resorted to it.

HYPERICA'CEÆ, a natural order of polypetalous exogenous plants. The species inhabit various parts of the world, both within and without the tropics; they are especially common in the southern states of the North American Union. Many are objects of ornament, but they are little cultivated, because they have frequently a disagreeable hircine odour. They are generally astringent, and in some cases, as in the genus *Vismia*, yield a substance so much resembling gamboge as to have acquired in commerce the name of American Gamboge.

HYPERICUM, a genus of plants belonging to the natural order *Hypericineæ*. St. John's Wort is the common name of all the species. *H. maculatum* is the *H. quadrangulum* of Fries, and is found in moist places by ditches and rivers. *H. perforatum* is found in large quantities in Britain and throughout Europe; also in the north of Asia and Africa. The flowers are of a bright yellow colour, dotted and streaked with purple. When rubbed they emit a powerful lemon-like scent, and stain the fingers with dark purple. *H. laxiusculum* is a native of Brazil, in the provinces of St. Paul and Minas Geraes, where a decoction of the leaves is used as a remedy against the bites of serpents. *H. crispum* is a native in the regions of the Mediterranean. At the present day it grows near the sea in Attica. Most of the species of *Hypericum* are showy, and deserve cultivation.

HYPERION, a Titan, the son of Uranus and Ge, and father of Selene, Eos, and Helios.

HYPERO'DON (Gr. *hyper*, 'above,' and *odontes*, 'teeth'), a genus of *Cetacea*, or whales, of which there is only one species known. It is sometimes caught in the British Channel, and is usually from twenty to thirty feet in length.

HYPERSTHENE (Labrador hornblende) occurs crystalline and massive. Primary form a rhombic prism; colour varying from reddish to greenish-black, with a greenish-gray streak: opaque; specific gravity 3.389. It consists mainly of silica, oxide of iron, and magnesia.

HYPERSTHENE ROCK is a sort of trap, of which there are three varieties, viz., Hypersthene with compact felspar; Hypersthene with common felspar; Hypersthene with glassy felspar. In largeness of grain it varies from large-grained granite to ordinary greenstone, or is even as fine as basalt. The felspar is of various colours.

HYPERTRPHY (from *hyper*, 'above,' and *trophe* 'nutrition,') a term in medicine signifying the enlargement of a part of the body from excess-

sive nutrition. The hypertrophied organ contains no new solid or fluid substance, but one or more of its proper component tissues is in greater quantity than in the healthy state. The opposite condition of a part, namely, diminished bulk from defective nutrition, is termed **ATROPHY**.

When hypertrophy attains such a degree as to interfere with the action of the organ in which it is seated, it constitutes an important and highly dangerous disease. Such is frequently hypertrophy of the heart.

The treatment consists in the removal of the exciting cause, if this can be effected. The part should be kept at rest as much as possible, all irritation prevented, and the supply of blood diminished.

HYPO'CAUST (Gr. *hypo*, and *kaustos*, 'burnt under'), among the ancient Romans a sort of subterranean stove for heating the baths, remains of which are frequently found in Italy and different parts of England even at the present day.

HYPO'CHARIS, a genus of plants belonging to the natural order *Compositæ*. There are two British species of this genus, *H. glabra*, and *H. radicata*. They are found on waste places which are dry and gravelly.

HYPOCHONDRIASIS is a state of extreme sensibility of the nervous system, which leads patients to believe themselves worse than they really are, to detail their sufferings with exaggeration, to individualize all the painful sensations which they experience, and to consider them the symptoms of so many different diseases. Allied to this extreme sensibility there is a mental excitation, which causes the patient to pay the most minute attention to what passes within himself. He recounts all the details of his animal and organic life; relates the manner in which his digestion is effected; and describes his sensations, his passions, and the succession of his ideas.

The sufferings of hypochondriacs have been called imaginary; but such a term is not correct, if it means that they are not really felt. Of all patients, those whose diseases are the result of an excited imagination probably suffer the most. In many cases, however, these persons are affected with a real disease, and the term hypochondriasis is applicable to them only in consequence of their having their attention constantly fixed on their complaint, and of their experiencing a degree of fear and sadness which their condition does not warrant.

Hypochondriasis is frequently witnessed in young men of studious habits, and is the result of intellectual application too much prolonged. Another very fertile source of hypochondriasis is luxury, and the want of occupation and exercise. Hypochondriasis occasionally results from other causes, such as misfortunes, the excesses to which young men are sometimes addicted, and the prolonged and injudicious use of medicines.

The treatment of hypochondriasis must of course vary in some degree with its cause; but in all cases a remedy must be sought for in the banishment of their groundless fears, in a change in their mode of life, and in scenes that withdraw them from the continual contemplation of themselves.

HYPODERMIC METHOD is the name given by Dr. Charles Hunter (1865) to an expedient for the cure of acute disease, by the introduction of

various *anæsthetics* under the skin at the part affected. The plan is substantially that introduced in 1845 by Dr. Alexander Wood under the name of *Acupuncture*. As a practising physician in London, Dr. Hunter has recently carried the treatment into phases not perhaps anticipated by Dr. Wood. The mode of introducing the remedial agents has also been considerably improved. By this system, even such dreadfully acute diseases as mania, puerperal convulsions, and *delirium tremens* are said to be immediately combated and overcome, while in less active diseases, as insomnia (want of sleep), neuralgia, and other nervous and cognate affections, the most soothing anodynes can be instantaneously administered. The operation is easy, and without pain to the patient. [ACUPUNCTURE.]

HYPOGÆA (Gr. *hypo*, and *gaia*, 'under the ground'), among the Greeks and Romans, a kind of subterranean vaults for the interment of the dead, which came into use when the custom of burning the bodies had been discontinued. Sometimes these hypogæa had many apartments, with niches for the urns, &c.

HYPOGENE, a term in geology implying 'nether-formed,' proposed by Lyell as a substitute for the word *primary*, but not yet generally admitted by geologists.

HYPONITROUS ACID. This liquid at common temperatures is green, but at 0° it is colourless; it is very volatile, so that when exposed to the air it is rapidly converted into an orange vapour, the density of which is stated to be 1.72, air being 1. It consists of O3 N1. Hyponitrites may be formed by moderately heating certain nitrates, the acid of which losing two equivalents of oxygen, hyponitrous acid remains, and in combination with the base.

HYPOSEPETES (Gr. *hypo*, 'under,' and Lat. *sepes*, 'a hedge'), a genus of birds, of the family *Merulide*, and belonging to the short-footed thrushes. They are distinguished from the other genera by their forked tails.

HYOSULPHURIC ACID, in Chemistry, an acid intermediate between sulphuric and sulphurous acids, usually containing two atoms of sulphur, and five of oxygen; its equivalent being 72.

HYPOTHEC (from the Greek *hypothēke*, 'a security,' literally the subjection of a thing to the power of another person) is a term derived from the Roman law, still in use in the law of Scotland, and in that of France under the name of *hypothèque*. In the law of England it is not a received technical expression, but it is occasionally used in the same sense in which it is used in the Roman law. Hypotheca, in its proper acceptation, is that security which a man has for an obligation, when the thing which is his security is not placed in his possession, in contradistinction to pignus, which applied to what is now termed a pledge. Thus a landlord has a hypothec over the crops and furniture of his tenant; a law agent or attorney over the title-deeds of his client, in respect of his account or bill of costs; and seamen over a vessel, in respect of their wages. The second illustration we have given is always called a hypothec in Scotland, but it is clearly a lien. Further information on the Scotch law of hypothec will be found in Bell's 'Commentaries,' vol. i., and the difference between it and that of England is noticed

in Paterson's 'Comparison of the English and Scotch Law,' section 594.

HYPOTHEUSE, or HYPOTENUSE (*hypoteinousa*, 'subtending'), is a term which has always been applied since the time of Euclid to the side of a right-angled triangle which subtends, or is opposite to, the right angle.

The property of the hypotenuse of a right-angled triangle is one of the most important elementary propositions in the whole of mathematics. The property in question, in a limited form, is this: that the square on the hypotenuse is equal to the sum of the squares on the sides. The introduction of the square, however, in preference to any other figure, arises from the fact of the property of the hypotenuse with respect to the square being demonstrated before that with respect to any other figure. The general proposition is this:—If three similar figures (that is, figures of the same shape, but differing only in size) be described upon the three sides of a right-angled triangle, the content of that which is described upon the hypotenuse will be equal to the sum of the contents of the figures described upon the sides.

HYPOTHESIS (*hypothesis*, 'supposition'), literally, the act of placing one thing under another, that the latter may stand upon and be supported by the former; metaphorically, the assignment of any cause or reason why an observed event or phenomenon should have happened, or must result from a certain pre-existing condition of things. Assumed causes, or hypotheses, often have to be employed to explain natural phenomena, and ascertain real causes. Thus, when Newton became convinced of the existence of a principle of gravitation, though he had no positive proof of it, he assumed such to be the case, and in working on that hypothesis at last proved its correctness and established it as a fact. Great differences of opinion exist as to what constitutes a legitimate scientific hypothesis. Mr J. S. Mill, M. Comte, and others, consider that a sound hypothesis can only be established when the cause assigned to any phenomena is a real cause, or capable of being ascertained to be a real cause by experiment and calculation, as in the case of the law of gravitation. Dr Whewell and others, on the contrary, are of opinion that in such a case as the undulatory theory of light—which not only explains many complicated phenomena relating to that subject, but has actually led to the discovery of new facts by the inference of the truth of the hypothesis, although, as yet, the ethereal substances whose undulations are supposed to constitute light in its passage from the sun to the earth are not known to have a real existence—a sound hypothesis has been established, at least until such time as some discordant facts arise, when it must, of course, be modified or abandoned.

HYPOXIDACEÆ (Gr. *hypo*, 'under,' and *oxy*, 'sharp-pointed'), an order of herbaceous endogenous plants, with hexapetalous flowers and tuberous roots. They chiefly inhabit the warmer latitudes of India, Australia, and America.

HYRAX, the generic name for a form of quadrupeds of small size, but of great interest, in consequence of the peculiarity of their organization, which has led Cuvier and other zoologists to assign them a place among the Pachydermata, though their external appearance, when cursorily examined, would

seem to point out their relationship to the Rodentia, among which they have been erroneously classed.

Incisors, $\frac{2}{4}$; canines, 0; molars, $\frac{7-7}{7-7} = 34$.

Cuvier observes that there is no quadruped which proves more completely than the Hyrax the necessity of having recourse to anatomy for the determination of the true relations of animals. To that great zoologist we are indebted for the fact that the quadruped under consideration is a true Pachyderm, and, notwithstanding the smallness of its proportions, must be regarded as intermediate between the Rhinoceros and the Tapir. The resemblances which the Hyrax bears to the former of these may be traced, according to Cuvier, so far as the osseous structure is concerned, in the general form of the trunk. The Hyrax has 21 ribs on each side, a number superior to that possessed by any other quadruped, the Unau excepted, which has 23; and those which, after the Hyrax, have the most, belong precisely to the order of Pachydermata in which Cuvier would arrange it. Thus, the Elephant and the Tapir have each 20; the Rhinoceros has 19; the Solipeda have 18. The greater part of the Rodentia, on the contrary, have only 12 or 13; and the Beaver, which has the most, only 15.

The upper incisors of Hyrax are not formed, like those of the Rodentia, in the shape of a quadrangular prism, or in that of a cylinder curved and terminated by a truncation or a corner-edge. They are triangular, and terminate in a point, recalling to the observer the canines of the Hippopotamus. The lower incisors are laid forward, like those of the Hog; they are flat and dentilated in youth, but soon become worn by attrition against the upper incisors. The molars represent those of the Rhinoceros, both in number and form, so that, were it not for the size, they might be mistaken for each other.

The fore feet are divided each into four toes tipped with hoof-like nails; the hind feet into three, of which the innermost is furnished with a long claw-like nail. The toes are all buried in the skin as far as the little hoofs, precisely as in the rhinoceros.

Several species belong to the present genus; of these we may notice the Syrian Hyrax (*Hyrax Syriacus*), the Daman or Coney of Scripture; the Cape Hyrax (*Hyrax Capensis*); and the Tree Hyrax (*Hyrax arboreus*), which inhabits the hollows of decayed trees in the forests of South Africa.



Hyrax (*Hyrax Capensis*).

With respect to the Syrian Hyrax, Bruce states that, 'in place of holes, the animal seems to delight in less close or more airy places, in the mouths of

caves or clefts in the rock, or where one projecting, and being open before, affords a long retreat under it, without fear that this can ever be removed by the strength or operations of man.' He describes it as gregarious, and says that frequently several dozens of them sit upon the great stones at the mouth of caves warming themselves in the sun, and coming out to enjoy the freshness of a summer evening. 'They do not,' he continues, 'stand upright upon their feet, but seem to steal along as in fear, their belly being nearly close to the ground, advancing a few steps at a time and then pausing. They have something very mild, feeble-like, and timid in their deportment; are gentle, and easily tamed, though when roughly handled at first they bite very severely.' The same author says that these quadrupeds are found plentifully on Mount Libanus, and that he has also seen them among the rocks at the Pharan Promontorium, or Cape Mahomet, which divides the Ælaniticus from the Heroopoliticus Sinus, or Gulf of Suez. They seemed to him to be the same in all places; but if there was any difference, those of the Mountain of the Sun were superior in size and fatness. He kept one some time, and gives an interesting account of its habits in confinement.

HYRCANIA, a province of the ancient Persian empire, lay at the S.E. corner of the Caspian Sea. Hyrcania was a plain sloping from the mountains towards the Caspian Sea, and was very fertile, producing grapes, figs, and corn in abundance, though the land was not much cultivated. Previous to the Persian conquest Hyrcania appears to have been subject to the Chorasmii. After the dissolution of the Persian empire it became subject to the Macedonians. It appears afterwards to have become independent. Strabo informs us that there were several towns in Hyrcania, of which the most important were Talabroce, Samariane, Carta, and Zadracarta, which Arrian mentions as the capital ('Anabasis,' iii. 28).

HYRCANUS, JOHN, one of the Asmonæan rulers of Judæa. He succeeded his father Simon in the high priesthood, B.C. 135. During the first year of his reign (B.C. 134) Jerusalem was besieged by Antiochus Sidetes, and after a long siege Hyrcanus was obliged to submit; but he eventually established his independence. The latter part of his reign was troubled by disputes between the Pharisees and Sadducees. Hyrcanus originally belonged to the Pharisees, but quitted their party, and became in consequence very unpopular with the common people. He died B.C. 106, and was succeeded by his son Aristobulus, who was the first of the Asmonæan princes who assumed the royal title.

HYRCANUS II. was the eldest son of Alexander Jannæus, king and high priest of the Jews. At the death of Alexander the regal authority was assumed by his widow, Alexandra, a princess of much wisdom and virtue, and the pontificate was conferred on Hyrcanus. When his mother died (B.C. 69) he was declared king, but was soon after deprived of power by his brother Aristobulus, who was of a daring and ambitious disposition. Hyrcanus, who was a man of easy and peaceful temper, would probably have remained content with the private position to which he had been reduced, but he was persuaded by Antipater to seek the aid of Aretas, king of Arabia

Petræa, to whose court he went in the year 65 B.C. In compliance with the entreaties of Hyrcanus, Aretas marched against Jerusalem, defeated Aristobulus, who, with his partisans, took refuge in the temple, and delivered the city into the hands of Hyrcanus. Both Aretas and Hyrcanus, however, were compelled to withdraw from Jerusalem, by order of Emilius Scaurus, Pompey's lieutenant, who had been gained over by bribes and promises to espouse the cause of Aristobulus. Shortly after, the matters in dispute were submitted to Pompey by the brothers, who appeared in person before him; but the evident desire of the Roman to show favour to Hyrcanus roused the fiery temper of Aristobulus, and prevented an amicable arrangement. Aristobulus attempted for a while to resist, and the city of Jerusalem was subjected again to the privations of a siege, at the close of which Hyrcanus was restored to the office of high priest, with the title of prince. He lived several years under the protection of the Romans; but in the year 40 B.C. Syria was invaded by Pacorus, the son of the king of Parthia, and Antigonus, the son of Aristobulus, having through the influence of Pacorus gained possession of the person of Hyrcanus, cut off his ears, in order to incapacitate him for the priesthood, and sent him as a prisoner to Seleucia on the Tigris. Several years afterwards he was induced by Herod to go to Jerusalem, where, under pretence of being concerned in treasonable designs, he was put to death in his eightieth year.

HYSON, a species of green tea imported from China.

HYSSOP (*Hyssopus officinalis*), the name of a species of plant of the natural order *Labiata*. Though common in our gardens, it is not a native, but has been introduced from Siberia, or from some of the mountainous parts of Central Asia. Hyssop was wont to be a favourite with the herbalist as a tonic, and, differently prepared, as an expectorant. This plant is not the hyssop of Scripture. The shrub referred to by the biblical writers belongs to a different natural order, namely, the *Capparidaceæ*, or Caper family. 'The chief points,' says Dr. Duns ('Biblical Natural Science,' vol. ii., 272), 'to be noticed in order to identification are—1. That the hyssop spoken of as scientifically described by Solomon was relatively small. We are not entitled to assume that the cedar was the largest of trees, and the hyssop the smallest of plants, but only that, compared with the cedar, the hyssop was very small. 2. That the plant supplied stalks which, when put together, formed a bunch that could be used in sprinkling blood. 3. That some of the stalks grow to the size and strength of short rods. 4. Subordinate to these, that a plant

having such characteristics was associated, in the minds of the people, with matters of cleanliness and the public health. Between twenty and thirty different species of plants have been proposed, but no one of them comes so near the above requirements as the caper plant (*Capparis spinosa*), the *lasaf* of Lepsius and Stanley, the *aszef* of Burckhardt, and the *lussuf* of Bonar.'

HYSTASPES. [DARIUS I.]

HYSTERIA (From *hystera*, 'the womb') is, in general language, understood to signify those paroxysms to which females are subject, and which are attended with convulsions, a sense of choking, and involuntary laughing or crying. But the term is used in medicine as a general expression to include a vast number of other symptoms known as 'nervous disorders,' all dependent on a peculiarly susceptible state of the nervous system, and not confined to women, nor dependent on diseased states of the womb.

What is called the hysteric fit generally commences with the sensation of a ball in some part of the abdomen or in the left side, which rises with a twisting vermicular feeling to the throat, where it induces a sense of suffocation. A temporary state of loss of sense and voluntary power succeeds, in which the patient either lies motionless, or is agitated with violent struggles of the limbs. In the absence of convulsions there is often immoderate laughter, crying, or singing, and the paroxysm is frequently terminated suddenly by a burst of tears. More usually the patient lies quietly for some time after the convulsions cease, and when recovered complains of headache.

During a fit of hysteria, care should be taken to prevent the patient receiving injury from the head or hands striking against the floor or hard bodies, and to guard against the propensity to bite, by placing a folded cloth between the teeth. If the fit be slight, it may frequently be arrested by dashing cold water over the face, or by filling the mouth with something which has an unpleasant taste, as salt; or a stimulating scent may be held to the nostrils. If the paroxysm be more prolonged and violent, it will be proper, should the face be flushed and head hot, to apply wet cloths to the forehead, and to loosen all the dress about the neck and chest. When there is less fulness about the head, small doses of stimulants, such as sal volatile in water, will be useful.

The general nervous symptoms will frequently resist every mode of treatment. Giving tone to the system and relieving the mind are frequently the most important objects to be had in view.

HYSTRIX. [PORCUPINE.]

HYTHE. [CINQUE PORTS; KENT.]

I is a vowel which represents two very different sounds in different languages. In England it denotes a rapid pronunciation of the diphthong *ai*. In French, Italian, and many other tongues, its sound is that of the English *e*. In the series of the vowels established by the experiments of Mr. Willis, *i*, as denoting the latter sound, lies at one of the two extremes. It is pronounced with the lips retracted so as to shorten the vocal tube, whereas the same organs are protruded to produce the sound represented at the other extremity by *u*. As to the various forms of this letter see the Plates of the ALPHABET.

The letter is interchangeable as follows:—

1. With the diphthongs *ai*, *oi*, *ei*, as in the Latin language, where *alais*, *requairo*, *pueroi*, *puerois*, *nulloius*, *deico*, &c., were corrupted into *alis*, *requiro*, *pueri*, *pueris*, *nullius*, *dico*. In the same language, when one *i* was followed by another *i*, it was not uncommon to denote them by a single long *i*, as *tibicen*, *Chius*, *alius* (gen.), for *tibicen*, *Chius*, *alius*. In such cases it was common to give greater length to the letter, thus, *chiivs*.

2. The short *i* was interchangeable with nearly all the short vowels, more particularly in the penult syllables of polysyllabic words, which are very indistinctly pronounced. Thus the Greek *mēchānē* is in Latin *māchina*. In the same manner the Nomad races of North Africa are called by the Greeks *Nomades*, by the Romans *Numidæ*. *Bonitas* must have been originally *bonotas*, and would have been written in Greek with a termination *-ons*. Lastly, in a large number of words a short *u* degenerated into an *i*: as *maximus*, *decimus*, *recipero*, *scribimus* (compare *simus*), into *maximus*, *decimus*, *recipero*, *scribimus*.

3. A short *i* before *n* or *m* is not unfrequently in French changed into *ai* or *a*. *Vincere* is in French *vaincre*, &c. [A.]

4. In the same language the vowel *i* is changed into *oi* very commonly, as *sitis*, *soif*; *mi*, *moi*; *fides*, *foi*; *Ligeris*, *Loire*, &c., and this though the *i* in Latin be short.

5. *I* is often inserted in French or Spanish words before the vowel *e*. [E.]

6. The vowel *i* is often inserted after the vowels *a*, *o*, and *u*, in the French language, particularly when a contraction has taken place, as *aimer*, *connoître*, *réduire*, from *amare*, *cognoscere*, *reducere*. [A.]

7. When the vowel *i* in the Latin language has a vowel after it, and is preceded by one of the consonants *p*, *b*; *t*, *d*; *c*, *g*; the derived languages have often a sibilant in the place of the former consonant. Thus *sapiam* is in French *sache*; *rabies*, *rage*; *ratio*, *raison*; *medius*, in Italian, *mezzo* (compare the

Greek *μεσος*). The double sound of *c* and *g* in our own language may have originated in this way.

A similar change occurs in other cases, as *simia*, French, *singe*; *vindemia*, *vendange*; *lineus*, *linge*.

IAMBICS, a species of verse composed of a succession of iambi (˘ ˉ), or equivalent feet, was used both by Greek and Latin poets. The iambic is the most common metre in the Greek tragic poets.

The following feet may be admitted in the iambic metre in the Greek tragic poets, which is usually called the tragic trimeter acatalectic, because it consists of three entire metres, or six feet.

1.	2.	3.	4.	5.	6.
˘ ˘ ˘	˘ ˘ ˘	˘ ˘ ˘	˘ ˘ ˘	˘ ˘	˘ ˘
˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘
˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘
˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘	˘ ˘

The anapæst in proper names is admissible in every place except the last, with this restriction, that the anapæst must be contained in one word. The comic trimeter admits the same feet as the tragic, and also a dactyl in the fifth place, and an anapæst in common words in every place but the last. Much of the beauty of the iambic trimeter depends upon the cæsure [CÆSURA], which usually occurs in the middle of the third or the middle of the fourth foot.

For an account of the other iambic metres employed by the Greek and Latin poets, see Hermann, 'Elementa Doctrinæ Metricæ.' In English poetry, where, however, the rhythm is determined by the accented syllables, the iambic metre is very common, as, for example:—

'On Lin'den, whe'n the su'n was lo'w,
All bloo'dless la'y th' untro'dden sno'w,
And dar'k as win'ter wa's the flo'w,' &c.

IAMBlichus, a Neo-platonist of the fourth century, was born at Chalcis in Cœlosyria. His reputation among his contemporaries cast into the shade the fame of his teacher Porphyry, whom he was far from equaling either in learning or in powers of mind. The literary career of Iamblichus extends from the reign of Constantine the Great to that of Julian the Apostate, whose favour he obtained, not only on account of his general adherence to and defence of the old national religion, but particularly for his 'Life of Pythagoras,' in which he ascribed to the Greek philosopher miraculous powers and acts, rivalling the signs and wonders on which the Christians not only founded the divine authority of their creed, but to which they still laid claim. Iamblichus made the perfection of man's moral nature to consist in a state of contemplative innocence. He also asserted the existence of several classes of spiritual essences, or dæmons, and attempted to determine the mode and occasions of their manifestation and opera-

tions, and the means by which man may subject them to himself, and employ their agency in the execution of his own designs.

IBERIA was the name given by the Greek writers to Spain. The Iberi are said to have occupied also Southern Gaul as far east as the Rhone. (Strabo, Casaubon, 166.) They were a distinct race from the Celtæ, who at a remote period crossed the Pyrenees, and occupied the central parts of the Peninsula, and from whose admixture with the Iberi the Celtiberi sprang. [CELTIBERI.] William Humboldt asserts that the Basque language is the remains of the old language of the Iberian race which at one time spread over Spain, Southern Gaul, part of Italy, and the islands of Corsica, Sicily, and Sardinia; and he attempts to prove this by the affinity between the proper names in those countries. Strabo observes that the Romans used the names Iberia and Hispania indifferently to denote the whole peninsula.

Iberia was also the name given by the Greeks and Romans to a country south of the Caucasus, having Albania to the east, Colchis to the west, and Armenia to the south, and corresponding to the central or principal part of modern Georgia.

IBERIS is a genus of cruciferous or brassicaceous plants, class 15, *Tetradynamia*, order 1, *Siliquosa*, consisting of annual, perennial, and slightly shrubby species, chiefly inhabiting Europe, and particularly the northern shores of the Mediterranean Sea. Two are found in the north of Europe, one of which, *I. amara*, is British. The plants have a very graceful appearance, and are cultivated in gardens as objects of ornament, under the name of Candytuft, in allusion to their having been first procured from Candia.

IBEX. [GOAT.]

IBIS. [ABOU-HANNES; TANTALIDÆ.]

IBRAHIM PACHA, viceroy designate of Egypt, was born in Roumelia in 1789. He was the son, or adopted son, of Mehemet Ali, and was intrusted by him with the command of a force to preserve tranquillity in Upper Egypt when only sixteen years of age. In 1816 he gave great proofs of gallantry and generalship in subduing the Wahabes, an Arabian sect of military fanatics, who aimed at purifying Mohammedanism, and denied the claims of the sultan to be considered the chief of Islam. For several years afterwards he afforded great assistance to his father in organizing an Egyptian army, after the European fashion, and in 1825 he invaded the Morea with the view of quelling the Greek insurrection. He captured several strongholds, but the intervention of the allied powers cut short his successes, and after the battle of Navarino he was obliged to evacuate the country. During the next four years he still further improved the Egyptian army, by creating a regular cavalry force, and in 1831 he was the instrument used to carry out Mehemet Ali's long-cherished plan of the conquest of Syria. In this enterprise he was entirely successful. Having taken Acre by storm after a siege of six months, he soon made himself master of the whole country. He was appointed governor of the Syrian pachaliks, and discharged the duties of his post for several years with rigour and ability. In 1838 hostilities were resumed between Mehemet Ali and the sultan, and Ibrahim was again successful in the field. He totally routed the Turks in the great battle of Nezib, June 25,

1839; the Turkish fleet had deserted to Mehemet Ali, and he was also supported by France. It was then that the late Lord Palmerston, with great ability, negotiated a treaty to which England, Russia, Austria, and Prussia were parties, but from which France was excluded, to enforce the submission of Mehemet Ali. When that event took place Ibrahim evacuated Syria, and was designated successor to Mehemet Ali, as hereditary governor of Egypt. He devoted the following years to agriculture and travel, and in 1848 went to Constantinople and formally received the Egyptian viceroyalty—for Mehemet Ali had become so old and childish as to be quite unfit to govern; but he did not enjoy the honour many weeks, dying at Cairo, November 9, 1848. He was a brave and skilful general, and a sagacious and stern administrator.

IBRAILA or IBRAHIL (Turkish), also called *Brailov* or *Brailoff*, is the principal port of Wallachia, 103 miles N.E. of Bucharest, on the left bank of the Danube, above Galatz. The place is fortified, and an island shelters its harbour. It contains extensive warehouses, and most of the exported produce of Wallachia, especially corn, is shipped here. The population is estimated at 20,000. The town has suffered much in the various wars between Russia and Turkey—having been thrice captured by the former power.

ICE (German, 'eis'), is water or other liquid frozen into a solid form. Water, in ordinary cases, freezes at 32° Fahrenheit, or 0° on the Centigrade and Reaumur's thermometer. The formation of ice most generally takes place on the surface first, and if the cold be sufficiently intense, it progresses downwards till the whole body of water is converted into a solid mass. Sometimes, however, ice forms at the bottom of rivers, and is called ground-ice. It is one of the universal laws of nature, that as all bodies are expanded by heat, so they are contracted by cold; and although water, when congealed by excessive cold, appears to increase in bulk and become specifically lighter, the cause is readily explained on the principles of crystallization—the word crystal originally signifying ice. Thus water in freezing crystallizes in filaments, which uniformly cross each other at angles of 60° and 120°; and by this means a piece of ice, on minute examination, will be found full of air-bubbles, or small interstices, which of course contribute to the bulk, and decrease the specific gravity. It is this angle of crystallization which causes the ice to occupy a greater volume than if the filaments were parallel. To prove that ice contains a large portion of air, we have only to drop some small pieces of ice into a glass filled with hot water; and we shall perceive that as the ice melts, the air contained therein becomes disengaged, and air-bubbles will be seen to rise to the surface of the water, and then burst. That ice is lighter than water, is known from its swimming on its surface; and also from the fact that the bulk which water occupies, when turned into ice, is as nine to eight. Thus this apparent deviation from the laws of nature does not in the least alter the general proposition, that all bodies are contracted by cold and expanded by heat. But as to the general density of ice, it is harder and much more compact in the northern latitudes than in the more temperate ones. The ice of Spitzbergen and the Greenland seas is so hard that it is difficult to break with a hammer.

It is related by M. de Bomare, that during the severe winter of 1740 there was constructed at St. Petersburg, according to the rules of architectural art, a palace of ice, fifty-two feet long, sixteen feet wide, and twenty feet high. The blocks of ice were quarried from the river Neva; and when built up, the different parts were coloured by sprinkling them over with water of different tints. To increase the effect, six cannons, made of ice, with wheels, &c., of the same material, were placed before the palace; and a hempen ball was fired by one of these cannons through a board two inches thick, at a distance of nearly sixty yards, without bursting the ice cannon. From the excessive cold which universally prevails at the poles, the water is converted into solid masses of ice, similar to the hardest rocks; and it may be formed by the chisel of the statuary, like stone or marble. This great solidity of ice at the poles is caused by the very low temperature of the atmosphere during the absence of the sun's rays; and there can be no doubt that the eternal masses of ice at the north pole are the principal source of the coldness of our winters, and that this low temperature is conveyed to our more temperate latitudes by the vast strata of cold air blowing from the north. The ice at each pole of the earth forms an immense cupola, the thickness of which, beyond the 60th degree of latitude, is several hundred feet. Captain Cook could never approach nearer the south pole, where there is no land, than the 70th degree of latitude, or about 1500 miles, although he had coasted round it for a whole summer; but later navigators have penetrated nearer the pole, though only to meet with an eternal barrier of snow and ice. In the northern part of the Russian territory the temperature of the atmosphere is sometimes sufficiently low to freeze mercury, or 71° below the freezing point of water. In the northern latitude the thermometer frequently falls to zero, or 32° below freezing point.

There are many curious phenomena connected with the formation and solution of ice. Thus water congeals in a glass which is set in salted snow, on account of the intense cold communicated to it. If only the lower part of the glass stands in snow, the congelation will commence at the bottom instead of the surface, and proceed upwards. During this process the glass will not readily spring or crack; but if it be entirely covered with salted snow, with the view of promoting congelation all over, the glass is liable to break, because the regular discharge of air is thus prevented. It is by the assistance of snow that various liquids are cooled and frozen. In India, where it scarcely ever freezes naturally, they have a very ingenious method of obtaining ice. The natives dig pits in the ground about two or three feet deep, which are lined with Indian corn, or dried sugar-canes. They then place over the excavation shallow dishes made of very porous earthenware filled with soft water. The dishes are deposited in the evening, and in consequence of the evaporation from the outside of the dishes, a considerable portion of the water is found frozen next morning. Before sunrise, the natives collect the ice, and deposit it in an underground cellar, lined with straw, where, in consequence of its own accumulated cold, it freezes into a solid mass. As to the solution of ice, it melts sooner in water than when exposed to air of a similar tempera-

ture; and sooner in water a little warm than near the fire, where there may be more heat. It melts quicker on some substances than on others, for which a philosophical reason cannot always be assigned. For instance, it melts sooner on a silver plate than on the palm of the hand; and also on a plate of copper than on any other metal. When placed in a vacuum, it sooner melts than when exposed to the atmosphere. In the former it will only occupy four minutes, while it takes twenty minutes to dissolve it in the atmosphere. [FREEZING.] *Regelation* is a remarkable property of ice. If two pieces of melting ice be placed together in a warm room, the stratum of water between them soon freezes and cements them together. A similar effect occurs beneath the surface of warm water.

ICE-HOUSE, a building constructed for the purpose of keeping ice through the summer, by excluding, as perfectly as possible, the influence of changes in the temperature or humidity of the external atmosphere. Such structures are not only useful for preserving ice which is to be applied to the cooling of liquors, or to the preparation of articles of confectionary, but also as affording the most effectual means known for keeping meat, fish, game, vegetables, and fruit sweet and fresh in hot weather.

One of the simplest modes of preserving ice consists in enveloping the ice in a great quantity of straw, above the surface of the ground, in such a position that moisture, which is even more injurious than heat, may drain off freely.

An underground ice-house may be simply a large cellar, with hollow or double walls, floor, roof, and doors, and furnished with a trapped drain to allow the escape of such water as may be produced by a partial thaw, without admitting any air. Mr. Loudon ('Encyclopædia of Cottage, &c., Architecture') gives a ground-plan and section of a complete ice-house of approved construction, of the inverted conical shape, with an arched roof, which it is proposed to cover with two or three feet of earth, or more in hot climates, over which he suggests the propriety of training ivy, for the sake of excluding solar heat. In this design a small pump is shown communicating with a well in the drain of the ice-house, for the purpose of raising the thaw-water for drinking or other use. Dr. Ure, in his 'Dictionary of Arts,' &c., article 'Ice-house,' gives a section of a similar structure, but with solid walls and a conical roof of timber, which may be simply thatched, or covered with brickwork and thatched, and which should have a gutter round it to collect and conduct to a distance all rain that falls upon it, that the circumjacent ground may be kept dry. Many other forms of ice-house have been proposed by different writers. The importation of American ice from Wenham Lake has lessened the necessity for collecting ice in England.

ICE PLANT (*Mesembryanthemum crystallinum*), a garden plant which derives its name from the numerous crystalline spots, like specks of ice, that cover its leaves.

ICE-SPAR, a mineral of a light-gray colour, found near Naples. It is sometimes crystallized in thin and long six-sided tables. Its specific gravity is 4.32; and its component parts are, silica, 63.56; alumina, 24.06; potash, 10.03; lime, 0.94; peroxide of iron, 0.92; water, 0.37.

ICE TRADE AND MANUFACTURE. The trade of collecting ice in this country is comparatively small, being confined chiefly to the neighbourhood of large towns. When the winter is favourable, the ice is collected daily from the rivers, brooks, ponds, and canals, and carefully stored in ice-houses. In the newly built and best-constructed of these houses, the outer walls are of massive brick-work; within these are walls of strong timber, and between the two casings is a compact stratum of saw-dust, a substance remarkably efficacious in checking the transmission of heat. The inclosed area is divided into four compartments, and the only door, extending from floor to roof, is narrow, and closed by a sliding-shutter, over which, on the outside of the building, is fixed a crane. When the laden carts come into the courtyard, the ice is quickly put into baskets, and emptied into one or other of the compartments, where it is strewn about equally, layer after layer, until the whole place is full. Most of the older ice-houses in this country are built underground, on the theory that the atmosphere is colder there than above, but it is now known that the exclusion of damp is a great desideratum, and that this can be better insured above ground than below. The rays of the sun do more good than harm, if the building be well constructed, because they tend to dry the air in and around the building. The French, in 1859, built an extensive range of ice-houses in the Bois de Boulogne. During the hard frost of December in that year, 250 carts were employed for ten days in conveying ice to these store-houses.

A remarkable foreign trade in ice has sprung up during the present century. About forty years ago a London fishmonger made a voyage to Norway, purchased a large quantity, brought it home, and sold it at a good profit. Since then we have regularly obtained annual supplies from Norway and Sweden. But North America is the great ice-producing country. The credit of originating the export trade to tropical countries is due to Mr. Tudor, a Boston merchant, who established an ice-trade with the West Indies in the year 1805. After much perseverance he landed a cargo of Massachusetts ice at Calcutta in 1833. He sent 180 tons, of which 80 melted on the voyage. The 100 tons were eagerly bought by the natives, and a trade thereupon commenced which has gradually extended itself to Bombay, Madras, Hong Kong, China, and Batavia. The enterprise was so successful that several ice-companies were formed in the New England states for the shipment of ice to Great Britain. It is chiefly collected in the neighbourhood of Boston, Philadelphia, Baltimore, Washington, and New York, and the lakes which supply it are very valuable property. One of the best sources is Rockland Lake, in Orange County, which yields more than a hundred thousand tons every winter. Wenham Lake, eighteen miles from Boston, is very deep, and the ice forms upon it beautifully clear. An acre yields a thousand tons on an average. When the ice is of the requisite thickness—from ten to twenty inches—it is cleared from snow, and an ice-plough, drawn by horses, is made to cut parallel grooves a few inches in depth in it, and these are again crossed by other grooves at right angles, so that the whole of the surface is deeply

marked out into small squares, measuring a little more than three feet. A saw, worked by hand, cuts out one row of blocks, and then the rest are easily severed by crowbars, and floated away to the ice store-houses, which are always very large buildings, built near the edge of the lake, pond, or stream. Two of these houses at Rockland Lake will hold 40,000 tons each, and one at Athens, on the Hudson, will hold 60,000 tons. In the interior towns of America the ice is sold at 10s. to 16s. per ton; at Boston it is sold wholesale for shipment at about 8s., and the freightage makes it worth 18s. per ton at the English ports.

The importation of ice into the United Kingdom in 1864 amounted to 24,802 tons; value, 22,823*l*.

Many experiments have been made to produce ice by artificial means, but it is only recently that they have become practically useful. Two ice-making machines were exhibited in the International Exhibition of 1862; one of which, known as Siebe's Ether Ice-machine, is capable of producing ten tons of ice per day. It is worked by steam-power, and its action consists in evaporating ether, which rises into vapour at a very low temperature, and again condensing the vapour to liquid, so as to be used afresh. By this machine 52° of cold have been obtained, and it is now successfully used under the equator, in Peru, and in India and the Cape of Good Hope by the government, for the use of the troops and hospitals. The other machine exhibited was that of Carré and Co., of Paris, in which ammonia is used instead of ether. A strong iron vessel filled with a solution of ammonia is so placed that heat can be applied to it; and a smaller iron vessel, containing ammoniacal gas, so that it can be immersed in water. When a tube connects the two vessels curious alternations take place in the ammonia, first liquid, then gaseous, then liquid again, and so on; and each process of vaporizing freezes some of the water in which one of the vessels is immersed. From its low price, and extreme simplicity, this machine is likely to come into extensive use. [REFRIGERATION.]

ICEBERGS (German, *berg*, 'a mountain') are immense masses of ice rising to a great height above the level of the sea, presenting a singular variety in form and appearance. They are masses broken off from glaciers, or from barrier lines of ice-cliff, and seem to owe their origin to the circumstance of glaciers being in a continual state of progress. The glaciers of Greenland, which are situated on the margin of the sea, protrude their exterior parts over the ocean, and in the summer when the ice becomes brittle, the force of cohesion is overcome by the weight of the prodigious masses that overhang the water, and they are detached from the glacier with a dreadful crash. Thus an iceberg is formed. It is chiefly by the north polar current, which passes through the narrow sea that separates Greenland and Iceland, and descends upon the shores of Labrador, and thence to the south-east of the great Atlantic, that the ice-formed mountains of the northern regions are borne to the south, where they are seen floating in towering masses, until dissolved by the warmer temperature of the atmosphere and water. The mountains of ice, by which the ocean is thus traversed, appear in a great variety of shapes; sometimes as *Bergs*, or mountainous masses; at others as vast sheets of ice,

called *Ice-fields*, or smaller aggregations, known as *Ice-floes*. These icebergs have the appearance of chalk or marble cliffs floating on the deep, and have been seen with an elevation of above 200 feet, and a circumference of two or three miles. We may best judge of their magnitude, when it is estimated that the portion which appears above the surface of the water is not more than one-seventh of the entire mass. Lieutenant Parry, during the first Arctic expedition under Captain Ross, measured an iceberg which was grounded in Baffin's Bay, at about twenty miles from the land, and in sixty-one fathoms of water. It was found to be 4169 yards long, 3869 broad, and 51 high. The weight of the whole was calculated to be 1,292,397,673 tons. They are so numerous that Dr. Scoresby counted 500 drifting along in lat. 69° and 70° N. The great distinction of icebergs from ice-fields, independently of their shape, is, that the former are fresh-water formations, which have their origin upon the land, and are identical with the glaciers of the Alps and other mountain ranges, but having their birthplaces in the frozen regions of the North Pole. These floating masses of ice are very dangerous to navigation. (See Scoresby's *Arctic Regions*, and Noble's work, *A Painter in Search of Icebergs*.)

ICELAND, a large island in the North Atlantic, belonging to Denmark, extends from $63^{\circ} 24'$ to $66^{\circ} 33'$ N. lat., and from $13^{\circ} 30'$ to $24^{\circ} 30'$ W. long. Its area is about 40,000 square miles. The population, which was formerly 100,000, has been reduced by epidemic disease till, at the last census, the number of inhabitants was only 64,603. The coasts are deeply indented with fiords, which are the estuaries of the rivers that flow from the interior. The island is crossed from east to west by rugged mountains, which run nearer to the south than to the north coast, the longer rivers flowing towards the north. From these ridges numerous offsets branch out, to terminate in high and steep promontories. Between these offsets, in the vicinity of the fiords, are fine valleys, in which the inhabitants have erected their dwellings; and many of the low mountains are covered with a coarse grass, which affords summer pasture to their cattle. The best inhabited spots are on or near the banks of the fiords, where factories are built for the purpose of trade and shipping. But the majority of the inhabitants live in detached cottages or farms, a certain number of which constitute a parish, having a church and an incumbent of the episcopal Lutheran communion. The interior of the island is a dreary desert. It consists partly of snow mountains, called Yökuls, many of which are also volcanoes, and partly of vast tracts covered with lava, scoriæ, and volcanic sand. There are also several lakes, the largest of which, called Myvatn, is about 40 miles in circumference. The most extensive mass of icy mountains is that called Klofa Jökul, in the south-east part of the island.

There are numerous boiling springs, such as the Geysers, which throw up, at periodical intervals, columns of boiling water to the height of 200 feet; the Reykiuim and the sulphur springs of Krisuvik are near the south-west coast; those of Reykiadal in the west district; and those of Reykiahverf and Krabla in the north. There are also bogs of boiling mud, craters of volcanoes now quiescent, and columns

of dense smoke and steam issuing from many spots. The whole island appears to be of volcanic formation, and there are still numerous volcanoes in full activity; among which are Hecla (5210 feet high), Öräfa Jökul (6426 feet), and Snaefells (5965 feet).

Owing to the insurmountable obstacles presented by conglomerations of ice, and by lava fields once red-hot but suddenly cooled, and thus rent, torn, and twisted in every conceivable manner, a portion of the country towards the south-east coast has hitherto defied all investigation, and will probably for ever remain untrodden.

There are thirty known volcanoes in Iceland, eight of which have been active within a century. The most destructive eruptions on record were those of 1294, 1341, 1636, 1693, 1783, and the eruption of Mount Hecla, 2nd September, 1845, to 6th April, 1846, on which occasion the ashes reached the Orkney Islands. The climate is very variable—storms of extreme violence being frequent; in summer it is moist, and in winter the sky is dark and gloomy, but lighted up by brilliant displays of the Aurora Borealis. The south-west coasts, washed by a prolongation of the Gulf Stream, are much milder than the north, and generally free from ice. The temperature is more elevated than in any other country in the same latitude.

Forests formerly abounded, but the island is now destitute of trees, except a few stunted service-trees and birches. The want of fuel is severely felt, although the Gulf Stream and the Polar currents occasionally float drift-wood to the northern shores, and a fine white turf is used. Sulphur is exceedingly abundant. Iron ore is also found. Garden vegetables are cultivated, but no grain of any kind can be raised. The most important domestic animal is the sheep, which, with the horse, ox, pig, and dog, was introduced from Norway during the last century. It is estimated that there are about 700,000 sheep, 25,000 head of cattle, and 32,000 horses on the island. Reindeer, introduced in 1770, now roam in large herds, but are not domesticated; and the polar bear is sometimes cast on the shores from the northern ice-fields. Birds are numerous; and several kinds of fish are abundant on all the coasts. The wool of Iceland is much sought by English manufacturers, and the commerce consists of the exchange of that article, butter, skins, fish, and oil, for European manufactures.

The only means of transport is by pack-horses, and in winter on sledges. The Icelanders are attached to their country, and hospitable to strangers. There is only one school, the college at Reikiavik, with a president, eight professors, and eighty to a hundred students; but domestic education is general, and the people are intelligent, being universally educated to the extent of reading and writing. Reikiavik is the only town, but there are upwards of twenty trading villages, mostly on the coasts. From thirty to forty vessels sail annually from Denmark to Iceland. Formerly the trade was a government monopoly, but it was thrown open by a decree of the Althing in 1853.

The inhabitants are the genuine descendants of the old Scandinavians or Norsemen; they are tall, but not generally corpulent, with a florid complexion, flaxen hair, and an open frank countenance. The

women are shorter and more inclined to corpulence than the men. Scurvy and elephantiasis are common, owing to the sameness and poor description of the food, and the crowded and ill-ventilated dwellings, which are generally of the very humblest description, built of turf or pieces of lava, the crevices stuffed with moss and the roof formed of turf. The knitting of stockings and gloves is almost the only industrial occupation.

The Icelandic language is the standard of the northern or Scandinavian dialect of the Gothic language. Since the language has been no longer spoken in Scandinavia (Norway, Sweden, Denmark), it has been styled exclusively Icelandic. The first colonists of Iceland were Norwegians, who fled in the ninth century from the dominion of Harold Harfager, tyrant of Norway. They established a republican government, appointed magistrates, and had their annual Althing, or national assembly, which was held at Thingvall, in the south part of the island. Icelandic literature began to be cultivated immediately after the introduction of writing, in 1057. Iceland fell under the yoke of Norway in 1264, and when that country became subject to Denmark in 1380, it shared its fate. It was not, however, transferred with it to Sweden in 1814, but continued under Denmark. The Icelanders are generally good sailors, and it is now indisputably proved that they not only discovered Greenland, but also America, which they called Vineland, early in the tenth century. Christianity was not established in the island till 1000. The Protestant form of worship became general about 1550. In the seventeenth century the island suffered much from the ravages of the Algerine pirates, who carried away many of the inhabitants to slavery, and its population has on several occasions been decimated by famine and disease.

Within the last century literature has been much cultivated by the Icelanders; and the language and literature of Iceland have begun to attract attention among the scholars of Denmark, Germany, and England. Three newspapers are published at Reikiavik, and Icelandic books are also printed.

Iceland is divided for administrative purposes into three fiordnungs, or districts. These districts are divided into syssels, or sheriffdoms, a sysselman being a magistrate and receiver of the king's taxes residing in each of them. The governor-general is called *stiftamtman*, appointed by the king of Denmark for five years, and resides at Reikiavik. He has under him two *amtmanns*, or deputy-governors—one for the western, and the other for the northern and eastern districts. The affairs of the island are regulated by the Althing, a council composed of twenty members—one for the town of Reikiavik, and one for each of the nineteen syssels.

Reikiavik (reek-town), the capital, contains about 1200 resident inhabitants, and is built on the south side of an inlet of the Faxefjord, on the south-west coast of the island. It consists of two streets, and contains the chief buildings of the island. The houses, with a few exceptions, are simply small wooden dwellings, one story high, and coated with tar, with which white painted sash windows contrast strongly. The town has an observatory and library, is the seat of the Icelandic Society, and a bishop's see. To the south-west of Reikiavik is the peninsula

of Alftaness, adorned with a church and a number of pretty cottages. Gardé, in the same neighbourhood, is the residence of the archdeacon of Iceland; and at Hafnarfiord there is a dry dock.

In the northern district there is a kind of town or village, called Eyafjordur, and a factory, called Husavik, on the Skialfiandafjord, from which sulphur from the neighbouring mines is shipped. Other factories are scattered about the coast, especially in the west.

The best works of reference on Iceland are Sir George Mackenzie's *Travels*, a cheap edition of which was published in 1851; *Tracings of Iceland and the Farøe Islands*, by R. Chambers, 1856; *Iceland: its Volcanoes, Geysers, and Glaciers*, by C. S. Forbes, 1860; *Iceland and its Sagas*, by Baring-Gould; Dr. Henderson's *Iceland*; Lord Dufferin, *Letters from Northern Latitudes*; Symington, *Pen and Pencil Sketches of Iceland and the Farøe Isles, &c.*

ICELAND-MOSS. [CETRARIA.]

ICELAND SPAR, [CALCAREOUS SPAR.]

ICH DIEN (literally, 'I serve'), the motto of the Prince of Wales, which was originally adopted by Edward the Black Prince, after the battle of Crecy, in proof of his obedience to his father, Edward III., and has been continued down to the present time. (See an exhaustive paper on this subject in the *Archæologia*, vol. 31, by Sir Harris Nicolas.)

ICHNEUMON, the name applied by Lacépède, Geoffroy, and others, to a genus of digitigrade carnivorous quadrupeds, allied to the Gennets (*Genetta*, Cuvier) and Paradoxures (*Paradoxurus*, F. Cuvier). It is the *Mangusta* of Oliver and others, *Herpestes* of Illiger, *Mangouste* of the French.

Feet short, with five demipalmated toes armed with slightly retractile claws; tongue furnished with horny papillæ; ears small; anal pouch voluminous, simple; body elongated; tail long, strong at the base; hairs of the fur annulated. Teeth, forty, consisting of—

Incisors, $\frac{6-6}{6-6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{6-6}{6-6}$.

Locality, India and Africa.

Examples, *Herpestes Pharaonis*; *H. griseus*;



Ichneumon Pharaonis.

H. badius; *H. vitticollis*; *H. fasciatus*; *H. gambianus*, &c.

The Egyptian Ichneumon (*H. Pharaonis*) was celebrated by the ancients for its destructiveness

among snakes and other reptiles; and many exaggerated accounts relative to its darting into the crocodile's mouth and tearing the monster's entrails were received as truth. It was one of the sacred animals of the Egyptians, and was occasionally kept tame. It is a bold and familiar animal, preying upon snakes, crocodile's eggs, rats and mice, poultry and other birds, much resembling, in fact, a polecat in its manners. In size it exceeds a common cat. The general colour is freckled gray; the long tail is terminated by a black tuft. Locality, Northern Africa.

ICHNEUMON, a genus of insects belonging to the order *Hymenoptera*, section *Terebrantia*, and family *Pupivora*, in the arrangement of Latreille. The genus, as defined by Linnæus, included such pupivorous hymenoptera as are furnished with veined wings (the anterior pair presenting in their disc several complete or closed cells), filiform or setaceous vibratile antennæ composed of a great number of articulations, and an ovipositor of various lengths and complicated structure. The Linnæan genus now constitutes a group including a great many well-marked genera, and an immense assemblage of species. All these are remarkable for the habits of their larvae, which are parasitic in the bodies of other insects. These bodies the perfect Ichneumons perforate by means of their ovipositors, and there lay their eggs. This destructive habit gave rise to the name by which they are known; a comparison being drawn between them and the Egyptian ichneumon, the quadruped celebrated as the destroyer of serpents and crocodiles.

ICHNITES (Gr. *ichnos*, 'a foot-step'), in geology, those traces of foot-prints peculiar to the new red sandstone formation, which appear to have been impressed generally by reptiles and birds. The subject has been classed under two general divisions, viz., *Ichnolites*, or foot-prints on stone, and *Ornithichnites*, or stony bird-tracks. Of the former, some interesting discoveries were made in 1828 by Dr. Duncan, on the new red sandstone, in the quarry of Corn Cockle Muir, in Dumfriesshire. The tracks were discovered in many successive layers of stone, to the depth of forty feet. In 1834 some remarkable footsteps were also discovered at Hesseburg, in Saxony, the hind foot of one of the largest animals being eight inches in length. [*CHEIROTHERIUM*] Of the *Ornithichnites*, some very distinct traces were discovered, in 1836, in the red sandstone of the Connecticut Valley, and in other parts of Massachusetts, several specimens of which are now in the British Museum. These footmarks are referred to that class of birds called Waders, and the impressions were very similar to those made on the muddy banks of the river by the living aquatic birds common to the localities where these traces were found. Thus, by these faint traces, we are enabled to gain some notions, however indistinct, of the great history of Nature and of the first dawnings of animal existence in the history of the earth's crust.

ICHNOCARPUS, a genus of plants belonging to the natural order *Apocynaceæ*. *I. frutescens* is a native of Ceylon and Nepal. The flowers are small and purple; the leaves deep green above and pale beneath. *I. Afzelii* is a native of Sierra Leone,

and about the river Bascha, in woods and among bushes.

ICHOLOGY (Gr. *ichnos*, a 'footprint'; *logos*, 'a discourse'), literally, the science of fossil footprints. The word has almost wholly superseded two other words which were much in use early in this century, namely, *ornithichnites*, or bird footprints, and *saur-oidichnites*, or saurian footprints. Ichology is now studied as a subordinate branch of palæontology, to which the late Dr. Hitchcock has given the name *Lith-ichnozoa*, or animals made known by their tracks in stone. Having arranged the whole animal kingdom in ten groups, Dr. Hitchcock gives sixty genera and 120 species of animals which are known only from their footprints, and which are found in the State of Massachusetts alone. This fact will show how wide the field is which is here opened up to the student of natural science. Such progress has been made in the science of comparative anatomy, that, having ascertained the form of any one part of the bony skeleton, the form of all the rest can be determined. Thus, if an animal has left the print of its toes, or of the whole foot, on any, even of the oldest, rocks, from these tracks the figure of the whole animal may be known with some degree of certainty. Science is specially indebted to the late Dr. Hitchcock for the application of the principle of correlation implied here, in determining the kind of animal to which the footprints belonged.

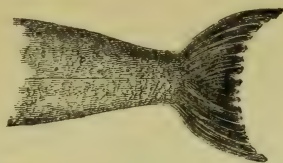
ICHTHYOCOLLA (Gr. *ichthys*, 'a fish,' and *kolle*, 'glue'), a preparation from the fish known by the name of Huso; a kind of isinglass.

ICHTHYOLITES (Gr. *ichthys*, 'a fish,' and *lithos*, 'a stone'), in geology, a name given to those numerous fossils of the vertebrated order, some of which exhibit the most perfect animal structure, while others appear to be but a little removed from the humbler crustaceans. Agassiz divides these ichthyolitic remains into four orders of fishes, each characterized by the form and structure of their scales; thus a single scale often becomes a clue to the order and habit of the animal to which it belonged; and it is remarkable that the scales are precisely those of the finny tribes which are most abundant in a fossil state. The leading classification of scales is into enamelled and unenamelled. The former are divided into the *Placoidians* (broad-plated), and *Ganoidians* (shining); while those not enamelled are subdivided into *Ctenoidians* (comb-like), and *Cycloidians* (discus-shaped); but those only of the Placoidian and Ganoidian races are found in the ancient strata anterior to the chalk formation. The Ctenoidian and Cycloidian orders, to which the existing species of fish principally belong, make their appearance in the earth's crust after all the preceding fossil genera had become extinct.

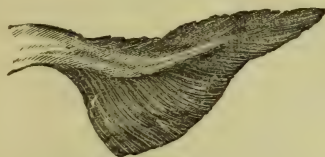
Agassiz distinguished the different kinds of fossil fishes by another feature, dividing them into three classes—the *Round* tail, as in the wrasse;—



the *Crescent* tail, as in the trout;—



and the *Unequal* tail, as in the shark.



It is remarkable that nearly all the fossil fishes found in the ancient strata, beneath the magnesian limestone, are distinguished by these unequal tails; while in the superior or oolite systems, this form is seldom discovered.

Cuvier, in his great work on 'Fossil Organization,' had effected much towards the classification of fishes; but it was reserved for his distinguished successor, Agassiz, to complete the arrangement. He has raised the number of species to about 2000. His discoveries in the old red sandstone formation have been of the most extraordinary character; and their strange conformations, as he observes, would puzzle the naturalist to assign them even their class. 'Boat-like animals,' says he, 'furnished with oars and a rudder; fish plated over like the tortoise, above and below, with a strong armour of bone, and furnished with but one solitary rudder like a fin, covered with scales; creatures bristling over with thorns; others glistening in an enamelled coat, as if beautifully jappanned; the tail, in every instance among the less equivocal shapes, formed not equally, as in existing fish, on each side of the central vertebral bone, but chiefly on the lower side, the bone sending out its diminished vertebrae to the extreme termination of the fin. All the forms testify of a remote antiquity, of a period whose fashions have passed away. The figures on a Chinese vase or an Egyptian obelisk are scarcely more unlike what now exists in nature than the fossils of the old red sandstone.'

ICHTHYOLOGY (from *ichthys* 'a fish,' and *logos* 'a discourse'), a department of zoology embracing the structure and natural history of fishes. [FISH; FISHES, FOSSIL.] To the views and labours of Agassiz allusion has already been made under the foregoing articles. The geographical distribution of fishes some years ago attracted much attention; and several valuable local monographs were published, which on this point added greatly to our knowledge. Among these may be enumerated Bennett's 'Fishes of Ceylon,' with exquisitely coloured plates, and Yarrell's 'British Fishes,' with admirable woodcuts. Nor are other labourers wanting. In the north of Europe, besides the writings of Nilsson and Eckstrom, the fishes of Denmark have been illustrated by Henrik Kroyer. Those of Belgium have

been carefully examined by M. de Selys Longchamps. In that naturalist's 'Faune Belge,' fifty-three fresh-water fishes and forty-one species inhabiting the sea are enumerated. Of the former, forty-three live only in fresh water; six in fresh water, but go to the mouths of rivers in winter; and four live in the sea, but migrate to the rivers in spring or summer. Of the sea fishes thirty pass up the Schelde as far as Antwerp. The fresh-water fishes of central Europe have engaged the attention of Agassiz. Freyer has published an account of those inhabiting Carniola, amounting to thirty-two species. Italian ichthyology has been admirably illustrated by Charles Bonaparte, the prince of Musignano. In Asia the fishes of the Caspian have been described by Eichwald in his 'Fauna Caspio-Caucasica,' published in 1841. Those inhabiting the rivers of Syria have been enumerated by Heckel from the collections of Kotschy. Fifty-seven species inhabit the rivers Orontes and Euphrates, of which no fewer than forty-five are *Cyprinidae*. Indian ichthyology has received valuable contributions from McClelland, whose papers have been chiefly published in the *Calcutta Journal*. In Siebold's 'Fauna Japonica' are accounts and figures of Japanese fishes by Temminck and Schlegel. The most valuable contribution ever made to our knowledge of the ichthyology of Eastern Asia was communicated to the British Association at Cambridge in 1845, in the form of a report on the 'Ichthyology of China,' by Dr. Richardson. From his researches it would appear that the fishes of that region are not only very numerous as regards species, but also very valuable on account of the extensive fisheries there carried on. His remarks on their distribution are highly interesting. It would appear that chains of islands or coasts having an east and west extension determine the extent of the range of species and groups of species. For example, to take the intertropical zone of the ocean, we find a great number of fishes common to the Red Sea, the coasts of Madagascar, the Mauritius, the Indian Ocean, the south of China, the Philippines, the Malay Archipelago, the northern coast of Australia, and the whole extent of Polynesia, including the Sandwich Islands. As regards the generic forms of the fresh-water fishes, China agrees with the peninsula of India. Were the vast zone in question, embracing more than two-thirds of the circumference of the globe, to be suddenly elevated, we should find the remains of fishes similar everywhere throughout, the species which have a local distribution being few and unimportant. This result of Dr. Richardson's researches is of the highest importance when brought to bear on geological considerations. Dr. Richardson has also been engaged in the special investigation of the ichthyology of Australia, and his many valuable memoirs on that subject may be consulted in the 'Transactions of the Zoological Society,' and in the 'Annals of Natural History.' In Dieffenbach's 'Travels in New Zealand,' the same indefatigable and philosophic zoologist has published, in conjunction with Mr. Gray, a list of the fishes of New Zealand. Ninety-two species are there enumerated. In Smith's 'Illustrations of the Zoology of South Africa,' figures and descriptions are given of the fishes of the Cape of Good Hope. The researches of Dr. Peters on the eastern coast of Africa made

us well acquainted with the ichthyology of that interesting region. With those of the northern part of Western Africa we have had information in the valuable memoirs of Lowe on the fishes of Madeira. The labours of Jenyns on the fishes collected during the late Admiral Fitzroy's voyages have contributed materially to our knowledge of the ichthyology of the southern extremity of South America, whilst that of Guiana has been illustrated by Sir Robert Schomburgk, in the 'Naturalist's Library.' De Kay's 'Zoology of New York,' and later publications, have made us acquainted in detail with the fishes of the United States. They amount, so far as known, to 440 species, distributed through 156 genera and 32 families. In the state of New York there are 126 *Acanthopterygii*, 115 *Malacopterygii*, 3 *Lophobranchii*, 18 *Plectognathi*, 3 species of sturgeon, and 27 cartilaginous fishes.

ICHTHYOPHIS (Gr. *ichthys*, 'a fish,' and *ophis*, 'a serpent'), a genus of fishes of the Eel kind, of the family *Murinidae*.

ICHTHYOSAURUS (from *ichthys*, *sauros*, literally, 'Fish-lizard'), the generic name given by Mr. König to the extinct fossil animal noticed by the

late Sir Everard Home, under the appellation of *Proteosaurus*, and by Wagler under the name of *Gryphus*.

We are indebted to the late Sir H. T. De la Beche and the Rev. W. D. Conybeare principally for pointing out and illustrating the structure of this extraordinary creature; and that at a time when the materials were far more scanty than they are at the present day. Dr. Jäger, Mr. Hawkins, Dr. Buckland, Sir Philip de Malpas Grey Egerton, and Professor Owen, have all contributed to throw light on the organization of a being that has long ceased to exist; and the anatomy and animal economy of this tyrant of the seas of former ages is now nearly as well known as that of the porpoise, which revels in the ocean that washes the shores of our existing continents and islands.

'If,' writes Dr. Buckland, 'we examine these creatures with a view to their capabilities of locomotion, and the means of offence and defence which their extraordinary structure afforded to them, we shall find combinations of form and mechanical contrivances which are now dispersed through various classes and orders of existing animals, but are no



Ichthyosaurus communis.

longer united in the same genus. Thus, in the same individuals the snout of a porpoise is combined with the teeth of a crocodile, the head of a lizard with the vertebræ of a fish, and the sternum of an *Ornithorhynchus* with the paddles of a whale. The general outline of an *Ichthyosaurus* must have most nearly resembled the modern porpoise and grampus. It had four broad feet or paddles, and terminated behind in a long and powerful tail. Some of the largest of these reptiles must have exceeded thirty feet in length.' These aquatic reptiles fed upon fishes, as is proved by the mass of fish scales (chiefly referable to the *Pholidophorus limbatus*) intermingled with coprolite throughout the entire region of the ribs, and in the more matured coprolites themselves. They also devoured other animals and even the weaker of their own species. Their prey was transmitted into a stomach which must have been nearly coextensive with the cavity of the body, and the contents were thence made to pass through an intestinal canal which appears to have resembled, as Dr. Buckland observes, the spiral intestines of some of the swiftest and most voracious of our modern fishes.

Armed with enormous jaws and teeth, and furnished with huge glaring eyes, protected by bony sclerotic plates, and constructed either for subaquatic or aerial vision, the *Ichthyosauri* were admirably adapted for their oceanic home, and their life of oceanic warfare. They could give chase to their prey along the surface, pursue it into the depths,

and reascend with the utmost rapidity. In fact, their whole structure befitted them for an aquatic abode, and betokened their carnivorous appetite. Several species have been discriminated, and it is probable that a rigorous examination may bring others to light. We may enumerate as examples *Ichthyosaurus communis*; *Ich. tenuirostris*; *Ich. intermedius*.

Ichthyosauri abound throughout the lias and oolitic formations. The chief repository has been hitherto considered to be in the lias at Lyme Regis; but, as Dr. Buckland states, they abound along the whole extent of this formation throughout England, from the coasts of Dorset, through Somerset and Leicestershire, to the coast of Yorkshire. The lias of Germany and France contains them. 'The range of the genus *Ichthyosaurus*,' says Dr. Buckland, 'seems to have begun with the Muschelkalk, and to have extended through the whole of the oolitic period into the cretaceous formation. The most recent stratum in which any remains of this genus have yet been found is the chalk marl at Dover, where they have been discovered by Dr. Mantell: I have found them in the gault near Benson, Oxon.' (See Dr. Mantell's *Medals of Creation, and Wonders of Geology*; Professor Owen, *Paleontology*; Lyell, *Principles of Geology*, &c., &c.)

ICICA, a genus of plants belonging to the natural order *Burseraceæ*. *I. heterophylla* is a tree 50 feet in height, growing in Guiana, on the banks of the river Couron. When an incision is made in the bark of

this tree, a yellow balsamic aromatic fluid exudes, which retains its fluidity a long time after exposure to the air. A resin is found also in the seeds, and the natives of Guiana carry the nuts about with them on account of the scent they give out. The Caribs also use the exudation for mixing with oil with which they anoint their bodies. *I. heptaphylla* is a small tree, a native of the woods of Guiana, possessing the same properties as the former species. There are many species of *Iceia*, all of which yield a resinous sweet-scented gum.

ICOLMKILL. [IONA.]

ICONOCLASTS (Gr. *eikon*, 'image,' and *klaō*, 'I break') signify those who object to the use of images, statues, pictures, or other representations of sacred objects in the church. At many various times in ecclesiastical history have movements been directed to the putting down of image-worship. In the sixth and seventh centuries the bishops of the Eastern Church condemned the popular practices regarding images, and the use of them by Christians was alleged to be an obstacle to the conversion of the Jews, and one of the causes of the progress of Mohammedanism. In the year 726 the Emperor Leo III., of Constantinople, commanded the removal of all images, except that of Jesus Christ, from the churches. Again, in 730, he prohibited all acts of reverence to them under pain of death, and ordered all such images, wherever found, to be destroyed. Notwithstanding the opposition of the Popes Gregory II. and III., Leo and his successor Constantine Copronymus persevered in their iconoclastic propensities. The subject created great agitation in France and Germany in the time of Charlemagne.

The usage of the Greek Church at the present day allows pictures, but rejects statues or graven images. At the Reformation the reforming party generally repudiated all use of images in worship as idolatrous, but Luther permitted the simple use of them for purposes of instruction. Hence, in the Lutheran churches of the present day, pictures, crucifixes, &c., are the usual ornaments. The Roman Catholic Church has ever retained such symbols in its services. As a rule the Protestant churches may be considered very iconoclastic, though the High party in the English Church have of late years endeavoured to reconcile the use of crucifixes, images of saints, and other sacred representations, with the provisions of the Rubric. (Schlosser, *History of the Iconoclast Emperors*; Gibbon; Stanley, *Lectures on the Eastern Church*.)

ICOSAHEDRON (Gr. *eikosaedros*), a solid figure bounded by twenty planes. It has twenty equal faces, each of which is an equilateral triangle; thirty edges, and twelve solid angles, each formed by the meeting of five plane angles.

ICOSA'NDRIA, the twelfth class in the sexual system of botany invented by Linnæus. The name was applied by Linnæus to plants having an indefinite number of stamens inserted into the calyx, such as the melon, pomegranate, plum, &c.

ICTERIA (Gr. *ikteros*, 'the jaundice'), a genus of birds of the family *Merulida*, and belonging to the short-footed thrushes.

ICTIDES, a name given by M. Valenciennes to the Benturonga, a genus of plantigrade carnivorous quadrupeds, which had been formerly referred by

F. Cuvier to the genus *Paradoxurus*. It is the genus *Arctictis* of Temminck.

General Character.—Head rather short, muzzle pointed; ears, which are small, tufted with long hairs; tail long, hairy, prehensile; five toes on each foot. Dental formula:—

$$\text{Incisors, } \frac{6}{6}; \text{ Canines, } \frac{1-1}{1-1}; \text{ Molars, } \frac{5-5}{5-5} = 36.$$

Geographical Distribution, India, Malacca.

Between the Viverrine family and that which is composed of the racoons and bears there had existed a considerable gap, which is now in a great measure filled up by the newly-discovered forms, the Benturong and the Panda. The external appearance of the *Ictides* corresponds in the same degree with both that of the civets and racoons, having the plantigrade motion of the latter and the slender snout of the former. It is indeed completely plantigrade, and has on each foot five toes armed with strong compressed claws, apparently adapted for climbing. 'Its tail, the thickness of which at its commencement is almost monstrous, is prehensile beneath, without being terminated by a naked skin, like that of the Ateles, but resembling entirely the tail of the Sajous. The eye, like that of the domestic cat, has the pupil vertically elongated; the habits of the *Ictides* are consequently nocturnal. The ears are small and rounded; and the nostrils are surrounded by a muzzle, which is divided into two portions by a deep sulcus. The hairs are long and thick, and a peculiar character is given to the physiognomy by the moustaches, which are very voluminous on the lips, the eyes, and the cheeks, and by the pencil of long and numerous hairs which terminates the ears. The cry is intermediate between those of a cat and a dog.'

Three species are recorded: we select *Ictides albifrons*.—Fur gray, hairs long, silky, black at the base, and white in their extreme third, shorter on the head and limbs; sides of the snout, forehead, pencils of the ears (which are edged with white) black; upper part of snout and forehead white; iris yellow; belly gray, with shorter hairs than those on the upper parts of the body. Size, that of a very large domestic cat. In another specimen the sides of the snout, and the tail, its extremity excepted, were gray. Locality, Bootan, Nepaul. Sir Thomas Stamford Raffles describes the gait of this Benturong as low and crouching, the body being long and heavy, and the legs short. The tail, thick at its insertion, gradually tapers to the extremity, where it curls upwards. In climbing trees the animal is assisted by this tail, which is strong.

IDA. [CANDIA; TROY.]

IDEA (*ἰδέα*, from the root *id*, 'to see'), in its widest and now generally received acceptation, is used to indicate every representation of outward objects through the senses, and whatever is the immediate object of thought. Like many other terms of mental philosophy, it is derived from the most eminent of the senses, that of vision. In the Platonic philosophy, the word *idea* signified primarily, the archetypes of all created things as they subsist in the divine intellect; and, secondarily, the conceptions of the human understanding, by means of which the essence of a thing is conceived. Plato's

own definition is very extensive: 'an idea may be attributed to whatever, as a plurality, may be indicated by the same name.'

For the term *idea* the schoolmen employed the word *species*, by which, Cicero tells us, the Greek word *idea* was usually rendered in Latin ('Top.' 7), though he himself proposed the term *form*, which has been adopted by Kant and his followers to designate that constant element in the perception of outward objects which is independent of matter, and which the mind presents to itself in accordance with its own laws. These species the schoolmen divided into sensible and intelligible, of which we shall here extract Hobbes' succinct account. 'The philosophyschools teach that for the cause of vision the thing seen sendeth forth on every side a visible species, (in English) a visible show, apparition, or aspect, or a being seen, the receiving of which into the eyes is seeing. . . . Nay, for the cause of understanding also, the thing understood sendeth forth an intelligible species, that is, an intelligible being seen, which coming into the understanding makes it understood.' ('Of Man,' part i., c. 1.)

According to Locke, 'Ideas are whatever is the object of the understanding, whatever a man thinks, or whatever it is the mind can be employed about thinking.' In this large sense the word is generally employed by English and French writers, and also by the Germans before the time of Kant, who ascribes to *idea* a higher but limited signification. By *idea* Kant eminently designated every conception formed by the reason (as distinct from the understanding), and raised above all sensuous perception. These ideas he subdivides into, 1st, empirical, which have an element drawn from experience, for instance, organization, a state, a church; and, 2nd, pure, which are totally free from all that is sensible or empirical, such as liberty, immortality, holiness, felicity, deity. Another division of the Kantian ideas is into theoretical and practical, according to a similar division of the reason itself. Thus the idea of truth is a theoretical idea, that of morality a practical idea. The best work on the various theories, and the author's opinion respecting them, is the 'Lectures on Metaphysics,' by the late Sir W. Hamilton, published under the editorial supervision of the Rev. H. L. Mansel and J. Veitch, in 1859, which the reader may compare with the strictures of John Stuart Mill and others.

IDE'ALISM, the theory that denies the existence of material bodies, and makes everything to consist in ideas.

IDENTITY signifies sameness. In this sense it is employed in the phrase personal identity, where it signifies the invariable sameness of the thinking subject, or the *I*. In a secondary sense it denotes a merely relative identity, which may also be called logical or abstract. Thus, in logic, whatever things are subjects of the same attribute or collection of attributes are considered the same; e.g., dog and lion are the same relatively to the common notion quadruped under which they are both contained. Again, in physics, a tree may be asserted to be the same in relation to all the rights of property, notwithstanding the physical change it undergoes from the constant segregation of old and aggregation of new particles. Lastly, it is only in this logical use of the term that

we can be said in memory to be conscious of the identity of the reproduced and the original idea; for if they were absolutely identical, it would be impossible to distinguish between the first appearance and the recurrence of an idea.

According to Butler it is impossible to define the idea of personal identity, but it is easily ascertained; for a comparison of one's self in any two moments of our existence suggests immediately the idea, and at the same time the identity of ourselves.

IDES. [KALENDAR.]

IDIOPATHIC (Gr. *idios*, and *pathos*), a disease which is independent of any other disease, and consequently opposed to those diseases which are symptomatic.

IDIOSYNCRASY, literally means a peculiar temper or disposition, and is the name given to any constitutional peculiarity, whether physical or mental. Uncommon partialities or dislikes, unlooked for effects produced on persons by ordinary causes, and unusual conditions of body or mind, are usually termed *idiosyncrasies*.

IDIOT and **IDIOTCY**. An idiot is one who never had any understanding from his infancy; and *idiocy* is the non-development of the mental faculties, or the state of an idiot. There are, however, many degrees of deprivation—some being as helpless as infants, others able to engage in some simple work, while a few have been known to maintain themselves by their own industry. It is a great mistake to place the idiot and the insane in the same category, though this is often done.

M. Séguin defines a typical idiot as one who knows nothing, can do nothing, and cannot even desire to do anything, which condition must certainly be regarded as the maximum; and it has been observed that it would be hardly possible to find such a being as this, little above a sensitive plant, fashioned externally as man, but shorn of all other human attributes. Yet such instances as these do occasionally occur. Idiots have been divided into three classes by Dr. Howe, no mean authority, who observes:—'Idiots of the lowest class are mere organisms, masses of flesh and bone in human shape, in which the brain and nervous system have no command over the system of voluntary muscles; and who, consequently, are without power of locomotion, without speech, without any manifestation of intellectual or affective faculties. Fools are a higher class of idiots, in whom the brain and nervous system are so far developed as to give partial command of the voluntary muscles, who have consequently considerable power of locomotion and animal action, partial development of the affective and intellectual faculties, but only the faintest glimmer of reason, and very imperfect speech. Simpletons are the highest class of idiots, in whom the harmony between the nervous and muscular system is nearly perfect; who consequently have normal powers of locomotion and animal action, considerable activity of the perceptive and affective faculties, and reason enough for their simple individual guidance, but not enough for their social relations.' Generally speaking, these descriptions will be found to meet the various degrees of *idiocy*. Still there is nothing more difficult to define, nothing of which it is less possible to find a standard. The word *idios* points

to a human being isolated from his fellows, and no better term, in the midst of the many used to designate his condition, has been found than that of *idiots*. The words folly, imbecility, fatuity, stupidity, and others employed by various writers, are but different expressions of the same thing.

Diminutive stature is usually regarded as, in most cases, a symbol of idiocy, but no dimensions of the head, except in the extremest diminutiveness, or other measurements often relied upon, can be regarded as true criteria of imbecility. It is very curious, however, that the result of the examination of more than two hundred cases showed that in an immense number the sides of the face were unequal, in many the palates were inordinately arched, and in some the two sides were unsymmetrical, in others the palate was excessively flattened, while in some it was prominently keeled, and in a few the palate bones did not meet. Their dentition also was found to be peculiar, and the tongue in an abnormal condition—the size being sometimes larger than common, and occasionally inordinate. That therefore so many are mute, or semi-mute, or indistinct in utterance, is no wonder. These corporeal defects are attended by uncleanly habits, gluttony, peculiar unhealthy looks, an awkward and irregular gait, an involuntary flow of saliva, and automatic motions of the head, limbs, tongue, and lips; while the ear heeds not the instruction it receives, and the eye sees the light, but makes no definite distinction of form, colour, or size. Yet nothing further can be safely stated as a generalization than that, as a rule, the perceptive powers are defective, the fancy frivolous, and the whole bearing more or less eccentric. Some are vociferous, grinning, and facetious; others mutter, mope, and sulk, and are very vicious. Again, many are mild, affectionate, and tractable, while others are violent, depraved, filthy, and repulsive. As previously stated, the classification of idiots is indeed no easy task, and it is well said by Dr. Howe—‘The highest of the lower class of idiots can hardly be distinguished from the fool, the least stupid of fools can hardly be distinguished from the simpleton, and the highest among simpletons stand very near the level of hundreds who pass in society for feeble-minded persons, but still for responsible free agents.’

Causes of Idiocy.—Even at the present day the causes of idiocy are but very imperfectly understood. It is generally considered that it is sometimes the consequence of moral impressions, accident, or disease on the part of the mother, as in the case of the deaf and dumb; or it may commence during infancy from bad nursing, want of nutrition, or constitutional disease. But we are far from knowing certainly how it has happened that human beings have been born, in whom the harmony of nature has been so disturbed by the excesses or defects of physical constitution. It is due from society to the thousands of its members who are so blighted and bowed down, to make accurate investigation into all their peculiarities, with a view to beneficial operations.

Statistics of Idiots.—It has been asserted that the British isles contain 50,000 idiots or imbeciles, but we have no certain means of verifying these figures, on account of the census reports making no distinction between the idiots and the insane. That there are many thousands, however, is placed beyond a

doubt by the annual reports of the Poor Law Board, which state that in the different unions and parishes of Great Britain there are generally about 35,000 insane paupers, of whom nearly 20,000 are idiots.

Institutions for Idiots.—It is only during the present century that any efforts, on a large scale, have been made for the amelioration of the condition of idiots, and at the present day the number of asylums established is by no means equal to the national requirements of society. Desultory efforts were first made in Paris, Berlin, Switzerland, &c.; but little permanent good was effected till the year 1846, when an asylum was set up by the authorities of Massachusetts, which example was quickly followed in Pennsylvania, New Jersey, and New York. Great Britain also at this time became alive to the necessity of special provision for the idiot. The first practical endeavour for this object was made at Bath, where four pupils were placed under the care of a matron, and with such success, that the institution was afterwards removed to an airy, elevated situation, and now contains about two dozen pupils, the number of which it is still desired to augment. In 1847 the interest of a lady living in London was greatly excited on this subject by reading two articles which appeared in *Chambers' Journal*. She saw the well-known philanthropist, Dr. Andrew Reed, on the matter, and he, with others, induced the then lord mayor, Sir George Carrol, to preside at a meeting to institute an idiot asylum; the result of which was the hire of Park House, Highgate, with several acres of land surrounding it. Here, in six months, the change was so great, that Dr. Connolly declared he could scarcely believe the pupils to be the same who had been originally received, and whose first gathering together was so shocking a scene, that in some spectators it induced disgust, and in others despair. The success of the Highgate asylum having awakened the benevolent interest of the queen, and received her majesty's patronage, the establishment was soon visited by her lamented consort. The building speedily became too small for the numerous applicants, and it was necessary to form a branch institution till one large national asylum could be erected. For this purpose Essex Hall, Colchester, a commodious and handsome building, the property of Sir Morton Peto, was obtained upon advantageous terms, and a few of the pupils were removed thither. At length, in 1853, his royal highness Prince Albert laid the foundation of the National Asylum at Earlswood, near Redhill, Surrey; and such was the interest taken in the work, that about 10,000*l.* were placed before him as offerings on the foundation stone. The asylum was opened in 1855 by the prince in person; and the inmates of Essex Hall were then transferred to the new building. The latter place has, however, been continued as a separate institution for the eastern counties, and is still in effective operation.

The Earlswood asylum was incorporated by royal charter in 1862. From the report of the board of management issued in 1865, it appears that the number of children then in the asylum was 404 (some of whom are elected for life, others for periods of five years), and, but for want of space, many more would be admitted. The Commissioners of Lunacy, in their annual report, amongst other approving remarks,

say:—'We have inspected every part of this institution, have examined personally all the inmates, and have had satisfaction in observing the progress generally made. The system of combining bodily exercise and drill with the instruction given in the schools, seems to be worked successfully. The children sing together with good effect, and accompany with their voices the morning and evening prayers, a portion of every Thursday afternoon being given to practising them in sacred music.' Of the personal habits of the children generally, the report appears to be very favourable, nearly all being found to be amenable to improvement. The committee's report further states that the number of inmates in the asylum is greater than that for which it was constructed, and the board feel it is desirable that the building should be very considerably enlarged. They wish to double its capacity, so as to receive 800 inmates—a number that competent authorities allow can be managed most efficiently and economically. The asylum is open to idiotic and imbecile persons from all parts of the United Kingdom, either by payment or election, excepting (in the latter case) those who are more than sixteen years of age at the time of their being brought before the board for approval as candidates, and paupers who are provided for by the law of the land.

The 25 & 26 Vict. c. 43—'an Act to provide for the education and maintenance of pauper children in certain schools and institutions'—enables the guardians of a union to contract with the managers of any institution, supported wholly or in part by voluntary contributions, for the education of idiotic persons, and to pay for their maintenance and education a sum not exceeding the cost of their relief in the workhouse.

The success of Earlswood Asylum has directed the attention of philanthropists to the special claims of the idiot, and has tended to the initiation of several institutions in various parts of the country; and every assistance in the way of encouragement and suggestion has been given to their originators by the kind and obliging medical superintendent, Dr. Down. In Scotland the benevolent work was commenced at Aldovan, near Dundee, by Sir John Ogilvy. Dr. Brodie began similar operations in Gayfield Square, Edinburgh, and now superintends the new Scotch asylum at Larbert, near Falkirk, which is intended for the reception of 200 pupils, and is zealously aided both in the capital and at Glasgow.

Education and Occupations of Idiots.—The possibility of teaching an idiot to read, write, and cast accounts depends much on taking advantage of personal peculiarities, and a perseverance which knows of no limit to its repetitions of the same thing till the conquest is achieved. The first step is to eradicate bad habits, and as soon as possible to engage the pupils in some occupation, rewarding their efforts with praise and encouragement. These employments are of the simplest kind, as the unravelling cocoa-fibre for mats, splitting rods for baskets, and preparing horse-hair for mattresses. Besides these gentle inducements to daily work, the improvement of the bodily condition is a matter of hourly and daily care. It would be wearisome to enumerate the school methods in the various institutions. All that can be said is, that they are furnished with the most

ingenious appliances, and something new is being continually added. Varied and clever use of the black board is productive of great effects. The master draws on it some animal, and sees if the pupil can tell what it is, and distinguish one part from another. Boys who have commenced learning in this way have become great proficient in drawing, and one youth at Earlswood especially so; his drawings having attracted the attention of the most celebrated of modern artists of animal forms, Sir Edwin Landseer: yet it was six months before he could be taught to distinguish with certainty a dog's head from his tail—a fact which was mentioned to the late Prince Consort, when he inquired if the youth whose drawings he was admiring could ever have been an idiot. Some subjects are taught to a large number collectively. The multiplication tables are sung, accompanied by various movements of the arms and legs. Reading, writing, arithmetic, drawing, and, in the lower classes, letters and figures, counting, imitation, speaking, weighing, telling the time, colours, and other simple things, are taught to less numbers together. As the pupils advance, of course the teaching advances also; to writing from dictation, to reading in classes, to object-lessons, and to instruction in writing, arithmetic, and drawing.

Nothing is more remarkable than the cheerful aspect of the schools, workshops, and other portions of the establishment at Earlswood, where these various employments are carried on. The learners enter into their work with surprising pleasure; and it is a curious fact that they frequently perform examples in the rules of arithmetic quickly and accurately, without knowing their names properly or their meaning.

In the girls' school, efforts have been successfully made to introduce domestic work as a part of the lessons. Bedmaking, scrubbing, and the processes of household economy are systematically taught, and afford agreeable diversion from the more strictly scholastic labour.

The amusements in summer and winter are carried out with much spirit. The monthly winter concerts are sources of great pleasure. The love of music is almost universal among the inmates, and the efforts of the staff in this direction have been amply rewarded by the delight which they have been able to inspire.

Nearly all the inmates who are considered competent to undertake it are encouraged to follow some industrial occupation—such as shoemaking, tailoring, carpentering, mat-weaving, and farming—and the interest which they manifest, and skill which they exhibit in it, is often surprising.

Nothing is more striking in many idiots than their susceptibility of religious impressions and instruction. It is most certain that many who were once profane and vulgar have been thus brought into the sunlight of religious purity and decency, taught the fear of God, and the necessity of keeping his commandments, with a sense of moral obligation seemingly beyond the scope of their limited capacities.

We have derived much of the preceding information from an admirable article on 'Idiot Asylums' in the *Edinburgh Review* for July, 1865. Other works of reference on the subject are:—'*Traitement Moral, Hygiène et Education des Idiots et des autres*

Enfants Arriérés,' &c., par Édouard Séguin; Paris, 1846: 'Remarks, Theoretical and Practical, on the Education of Idiots and Children of Weak Intellect,' by W. R. Scott, Ph.D.; London, 1847: 'Teaching the Idiot,' by the Rev. Edwin Sidney, A.M.; London, 1854: 'The Causes of Idiocy,' Edinburgh, 1858: 'The Idiot and his Helpers,' by W. Millard, Essex Hall, Colchester, 1864: 'The Training of Idiotic and Feeble-minded Children,' by Cheyne Brady, Esq., M.R.I.H.; Dublin, 1864.

IDOCRASE, *Vesuvian*, *Pyramidal Garnet*, &c. This mineral occurs crystallized and massive; the crystals are either attached or imbedded. Primary form a square prism. Colour various shades of brown, black, gray, blue, green, and yellow. Lustre vitreous-resinous. Translucent and transparent. Specific gravity 3.08 to 3.4.

The massive varieties are amorphous; the structure is fibrous, granular, or compact. The component ingredients of this mineral are silica, alumina, lime, oxides of iron and manganese.

IDOL, **IDOLATRY** (Gr. *eidolon*, 'an image,' *latreia*, 'worship'). An idol is an image worshipped as a god, and the act of worshipping such an object is called idolatry. From the very earliest times people have fallen from the worship of the true God into idolatry, and adored the creature instead of the Creator. The numerous varieties of idolatry may be reduced to four systems:—1. *Nature-worship*, or the worship of the vegetable and mineral kingdom—chiefly trees, stones, and pillars. 2. *Animal-worship*, for which purpose many animals have been held in sacred reverence by various nations. 3. *Star-worship*, or astrology, which at first addressed itself to the heavenly bodies themselves; then to their symbol, fire; and finally descended to idolatrous representations of the sun, moon, stars, &c., as the worship of Baal, Moloch, Adonis, &c., testify. 4. *Anthropolatry*, or the worship of representations of the human form. With this class of idolatry we are familiar through the mythology of Greece, Rome, Egypt, and India, and from the specimens of idols brought home from heathen lands by our missionaries. Most of the various forms of idolatry will be found under separate articles, as **FETICHISM**, or described under the countries where they have been practised.

IDRIALINE, a substance derived from a mineral, found in the quicksilver mines of Idria, which imparts to sulphuric acid a beautiful blue tint.

IDUMÆA (Ἰδουμαία), usually called Edom in the New Testament, included, in the time of Christ, a considerable portion of the southern part of Palestine, and extended S.W. as far as the Lake Serbónis; but in the Old Testament it was used to designate the mountainous district N. of Arabia, which extended from the S. of the Dead Sea to the Bay of Elana in the Red Sea. The Edomites, who were descendants of Esau, originally dwelt on Mount Seir. They were governed by kings from the earliest times, and appear to have possessed considerable power when the Israelites invaded Canaan. They were defeated by Saul, and were made tributaries of the Jews during the reign of David.

After the division of the Jewish kingdom, the Edomites continued subject to Judah till the reign of Joram, when they again established their independence. They were subdued again during the

reigns of Amaziah and Uzziah; but in the reign of Ahaz the Syrians seized upon Elath, and drove the Jews out of Edom. Edom, in common with the rest of Syria, appears to have been subdued by Nebuchadnezzar; but after the downfall of the Babylonish empire, the Edomites are again mentioned as an independent people. They appear about this period to have been driven from their original settlements by the Nabathæi, who are supposed to have been descended from Nebajoth, the eldest son of Ishmael. The Edomites were constantly at war with the Jews after the return of the latter from Babylon, till they were entirely subdued by John Hyrcanus. From this time the Edomites were regarded as a part of the Jewish nation, and were governed by a prefect appointed by the Asmonæan princes of Judæa. One of these governors, Antipater, a native of Idumæa, was appointed by Julius Cæsar procurator of Judæa, and was succeeded by his son, the celebrated Herod, who put an end to the dynasty of the Asmonæan princes.

The Idumæans marched to the assistance of Jerusalem when it was besieged by Titus, and entered the city; they did not, however, continue till it was taken, but returned to their own country laden with plunder. We have no further mention of the Idumæans in history. Origen, in his 'Commentary upon Job,' informs us that the name of Idumæa did not exist in his day, and that the inhabitants of the country were called Arabs, and spoke the Syriac language.

Ptolemæus is the only author who applies the name of Idumæa to the country west of the Jordan. The whole of Judæa was frequently called Idumæa under the Roman emperors.

IDYLL (Greek, εἰδύλλιον; Lat. *Idyllium* or *Edyllum*) is a poem, in which the appearances of external nature, or manners and sentiments, are described, or both. The bucolic poems of Theocritus are called idylls; and all the bucolic poetry [**BUCOLICS**] may be included under this name, though the ancients did not, any more than ourselves, confine the name to pastoral poetry. The 'Idylls of the King,' by Tennyson, are epic in their style and treatment, and romantic and tragic in their incidents. The Greek Idyll has been styled by Sterling an anecdote drawn from rustic life, and rounded into song.

IGLAU. [**MORAVIA**.]

IGNATIA, a genus of plants, of the natural order *Loganiaceæ*; one of the species of which produces the St. Ignatius beans of India, erroneously said to be a specific for cholera.

IGNATIUS, one of the apostolic fathers. He was one of the earliest successors to St. Paul (if not the next) in the presidency over the Christian church at Antioch. During the persecution of that body by Trajan, Ignatius refused to abandon his opinions, and accordingly was sent to Rome, where he suffered death in a very cruel manner, being thrown to the lions in a public spectacle. What little remained of the feeble old man was gathered by a few friends, removed to Antioch, and preserved as sacred relics. The martyrdom of Ignatius (which took place about 107), is celebrated in the Roman Catholic Church on February 1st, and in the Greek Church on December 20th. During the last twenty years the writings of Ignatius have been made the subject of much controversy, and it is now generally admitted

that the ordinary Greek text has been seriously tampered with, and many passages interpolated relating to episcopal authority and the Deity of Christ.

The writings of St. Ignatius which have been handed down to us, are seven short epistles addressed to the Romans, the Philadelphians, the Smyræans, the Magnensians, the Traillians, the Ephesians, and to Polycarp. An English translation may be found in Archbishop Wake's 'Genuine Epistles of the Apostolic Fathers,' London, 8vo., 1693.

IGNATIUS, Patriarch of Constantinople, was born in 799, and was the son of the Emperor Michael Curopalata, who, on the revolt of Leo the Armenian, surrendered to him the throne, and embraced the monastic life. His sons followed the example of their father, and the youngest, Nicetas, then aged fourteen, changed his name into that of Ignatius. The new emperor separated the several members of the family of Michael, and caused his two sons Eustratius and Nicetas to be made eunuchs.

Ignatius was admitted into the order of priesthood by Basil, bishop of Paros, in the Hellespont. Under the regency of the Empress Theodora, Ignatius was elected Patriarch of Constantinople. In consequence of his refusal to join the young Emperor Michael in an attempt to overturn the rule of his mother, he was deprived of his see. But he was eventually restored by the authority of a council presided over by the legate of Pope Adrian II., and from that time was allowed to rule the Greek Church without opposition. He died on the 23rd of October, 878, on which day the Greek and Roman Churches still celebrate his memory.

IGNATIUS LOYOLA. [JESUITS.]

IGNEOUS ROCKS, the materials poured forth by active volcanoes, either in a molten state, or as ashes, lapilli, and scoriæ, such as lava and basalt. They belong to all geological periods, but the most recent are necessarily the most distinct. They must not be confounded with metamorphic or plutonic rocks, and are, strictly speaking, only those which before eruption existed in a molten form. [GEOLOGY.]

IGNIS FATUUS, a meteor resembling a flame, which floats in the atmosphere at a few feet above the surface of the ground. It is generally observed by night, either stationary or in motion, over marshes or burial grounds; and sometimes, after becoming invisible, it reappears. Occasionally such meteors have been observed to follow or advance towards a spectator; but in general they appear to recede on being approached, and it has happened that, from their resemblance to the flame of a distant lamp, they have led the unwary traveller into dangerous swamps. Hence they have been named 'Jack with a lantern,' 'Will o' the wisp;' ignorant people ascribing their appearance to evil spirits.

A plausible hypothesis which has been proposed in order to account for this phenomenon is that a phosphuretted or a carburetted hydrogen gas, produced by the decomposition of animal or vegetable substances, rises from the ground or from stagnant water, and takes fire by electricity or spontaneously, at a spot where the atmosphere is particularly free from moisture. Spontaneous ignition is well known to take place occasionally in a number of vegetable and

animal substances while undergoing decomposition, in consequence of the inflammable matter coming in contact with common air or with oxygen gas.

IGNITION, INCANDESCENCE. These terms refer to that property of bodies, by which they give out light when raised to certain high temperatures, the quantity of light increasing with the temperature within certain limits. At first it is of a dingy red, or worm-red as it is sometimes called, then bright red, then an orange or yellow tint, and lastly white heat, when the light is painful to the eye. Sir Humphrey Davy's experiments placed the degree of incipient luminosity in the dark at about 810°; but a dull red visible in daylight is probably equal to 1000°; a full red heat 1200°; an orange heat 1700°; a white heat 3000°; and the high white heat of a good wind furnace (according to Daniell) about 3300°. These remarks apply to bodies which can be raised to these high temperatures without changing their state. Most bodies are destroyed before they attain the temperature necessary for ignition, and if heated in the air they inflame and undergo combustion.

IGNORAMUS (Lat. 'we do not know'), the endorsement formerly written by a grand jury when there was not sufficient foundation for the prosecution. It corresponds to the words 'not a true bill,' which are now used. The ordinary use of the word ignoramus now is to signify a foolish fellow, a vain ignorant pedant.

IGNORANTIA JURIS, or *Ignorance of the Law*, does not legally excuse a man from the consequences of offences against it. If it were not so, and crimes or social delinquencies were allowed to go unpunished because the offender was ignorant of the law, it would be placing a premium upon ignorance, and such a plea would lead to endless inquiries as to the state of a man's mind. It is, however, sometimes taken into account when passing judgment, and a more lenient punishment awarded.

IGUALDAS. [CATALUÑA.]

IGUANA, a restricted genus of Saurian reptiles, belonging to the section *Pleurodonta* of the family *Iguanidae*.

The *Pleurodonta*, with the exception of one genus, are all confined to America, and are characterized by the teeth being implanted, not along the ridge of the jaw, but in a furrow along the side of the jaw, to which latter they adhere by one side of the bony substance of the root without being implanted in the jaw itself, like a nail in a board.

The genus *Iguana*, as at present restricted, contains, according to M. Bibron, only three species, natives of Brazil, Cayenne, the Antilles, the Bahamas, Mexico, &c. They attain to considerable dimensions, and have a fierce and strange aspect. Their flesh is esteemed a delicacy.

The Iguanas (or Guanans) are characterized by a cutaneous expansion like a pendent dewlap, or flaccid pouch, under the lower jaw and throat, which is capable of being inflated; and there are cuticular folds on the lateral regions of the neck and throat. The head is stout at the base, moderately long, and of a somewhat pyramidal shape, covered with plates forming a sort of tessellated pavement. The scales of the body are small, almost lozenge-shaped, slightly keeled, and but little imbricated. A serrated dorsal

crest, consisting of elevated, compressed, and pointed scales, runs along the ridge of the back, and also of the tail to its tip. The tail is of great length, very flexible, and laterally compressed. The orifice of the ear is covered by a large tympanic membrane, and generally there are several large scales about the angle of the lower jaw. The limbs are long; the toes unequal, rough, with elevated points on the under surface, and armed with acute claws. A range of tuberculous pores runs along the inside of each thigh. The colour of the Iguana is yellowish green below, and above of a green more or less deep, becoming sometimes bluish, and sometimes a slate-colour.

The Iguanas, of which three species are known, are arboreal in their habits, and feed principally on vegetable aliment; indeed, in the stomachs of the numerous specimens examined by M. Bibron, nothing but leaves and flowers were found. Captain Belcher found in the island of Isabella swarms of Iguanas which appeared to be omnivorous, feeding voraciously on eggs, on the intestines of fowls, and on insects.

These animals haunt the borders of water, into which they often plunge and swim with great velocity, lashing their tail from side to side. During the pairing season the male is very savage, watches over his mate, and defends her with fury. The female deposits her eggs along the margin of rivers, in savannahs, or on the sea-shore, burying them in the sand. Both the eggs and the flesh of these animals are in great request, inasmuch that in some of the islands where the Iguana was very common, as, for example, Jamaica, it is now very rare. They are taken by nooses, in traps, or nets, and sometimes are hunted by dogs. They are very tenacious of life, and as they struggle violently, snapping at every person, are generally dispatched as soon as captured.

The Common Iguana (*Iguana tuberculata*, the *Iguana delicatissima* of Daudin) is a native of Brazil, Cayenne, the Antilles, and the Bahamas. It attains to a considerable size, sometimes measuring six feet in length, including the long tail. Formerly this species was an important article of commerce in the Bahamas, and cargoes of living Iguanas, or salted Iguanas, and also of their eggs, were imported into the Carolinas. The practice was to sew up the mouths of the living animals in order to prevent them from biting. They were as eagerly sought after by the epicures of the Carolinas and other places as the turtle is by the epicures of our island.

IGUANIDÆ, an extensive family of Saurian reptiles, divided by MM. Duméril and Bibron into two subfamilies, viz., *Pleurodonta* (Pleurodontes) and *Acrodonia* (Acrodonates). In the *Pleurodonta* the teeth are not implanted in the ridge of the jaw, but are affixed in a furrow along the side of the jaw, adhering to the latter by one side of their bony root. The *Pleurodonta*, with the exception of one genus (*Brachylophus*, an Indian group), are all peculiar to the New World and the adjacent islands. The genus IGUANA may be regarded as a typical form.

The *Acrodonia* are distinguished by the teeth being seated on the ridge of the jaws, to which they are soldered, and of which they appear to be a continuation. This subfamily is distributed through Asia, Southern Europe, Africa, and Australia.

The genera comprehended under the family group *Iguanidæ* are very numerous; those of the *Pleuro-*

donta constitute five tribes, viz., *Anolians*, *Polychrians*, *Iguanians*, *Tropidolepidians*, and *Ophurians*. Those of the *Acrodonia* constitute four tribes, viz., *Galeotians*, *Agamians*, *Phrynocephalians*, and *Stelionians*.

IGUANODON, the name of an extinct gigantic reptile, whose remains were discovered by Dr. Mantell in Tilgate Forest, Sussex. In its characters this fossil Saurian closely approaches to the genus *Iguana*, and there can be no doubt that it was herbivorous; indeed Cuvier, at first sight, took the teeth for those of a rhinoceros. The teeth exhibit two kinds of provision to maintain sharp edges along the cutting surface, from their first protrusion until they were worn down to the very stump. The first of these is a sharp and serrated edge, extending on each side downwards, from the point to the broadest portion of the body of the tooth. The second provision is one of compensation for the gradual destruction of this serrated edge, by substituting a plate of thin enamel, to maintain a cutting power in the anterior portion of the tooth, until its entire substance was consumed in service. Whilst the crown of the tooth was thus gradually diminishing above, a simultaneous absorption of the root went on below, caused by the pressure of a new tooth rising to replace the old one, until, by this continual consumption at both extremities, the middle portion of the older tooth was reduced to a hollow stump, which fell from the jaw to make room for a more efficient successor.

The size of this giant of the Weald in former ages was enormous. In Dr. Mantell's collection there is a portion of a femur twenty-two inches in girth in the smallest part. The thigh-bone, then, of the Iguanodon exceeded in bulk that of the largest elephant, and its length is on good grounds calculated to have been from four to five feet. Dr. Mantell carefully compared the bones of the Iguanodon with those of the Iguana, and, by taking an average from eight separate parts of the respective skeletons, he gives the following as the dimensions of the Iguanodon:—

	Feet.
Length from snout to end of tail, ...	70
Length of tail, ...	52½
Circumference of body, ...	14½

Geological Distribution.—The Wealden freshwater formation of the south of England, intermediate between the marine oolitic deposits of the Portland stone and those of the green-sand formation in the cretaceous series; Tilgate Forest; Isle of Wight; Purbeck; Rag-quarries, near Maidstone.

I.H.S., the initial letters of *Iesus Hominum Salvator*, 'Jesus, the Saviour of Mankind.'

IKENILD STREET, one of the four great roads formed by the Romans in England. It commenced at Tynemouth, in Northumberland, and passing southward through Derby, Lichfield, &c., terminated at Southampton.

ILCHESTER. [SOMERSETSHIRE.]

ILDEFONSO, S. [CASTILLA-LA-VIEJA.]

ILE-DE-FRANCE, one of the old provinces of France, was bounded N. by Picardie, W. by Maine and Normandie, S. by Orléanais, and E. by Champagne. It now forms the departments of Seine-et-Oise, Seine-et-Marne, Aisne, Oise, and parts of Eure-et-Loire, Loiret, and Yonne. Paris was its

capital. This province formed part of the monarchy under the first kings of France, and was governed by the dukes or counts of Paris, who were numbered among the great vassals of the crown. It was united to the crown in the year 987 under the reign of Hugues Capet.

ILEUS, or ILIAC PASSION, is the name given to a severe form of intestinal disease, characterized by violent griping pain around the umbilicus, spasm and retraction of the muscles of the abdomen, obstinate costiveness, and vomiting. These symptoms are, however, common to several very different conditions of the bowels, as colic, hernia, intussusception, &c. The *iliac region* is the side of the abdomen between the ribs and hips.

ILEX is a name given to two very different plants. As that of a species, it indicates the Evergreen Oak of the south of Europe, or *Quercus Ilex*. As that of a genus, it belongs to the common Holly, *Ilex aquifolium*. This latter is common in the middle of Europe, and the southern side of the range of the Caucasus, where it is only a bush, and it probably extends far to the eastward. It is chiefly valued as an ornamental tree, but its fine-grained, heavy, compact timber is used for a great number of useful purposes, especially by the turner and mathematical instrument maker. The berries are poisonous, producing purgative and violent emetic effects.

Besides the common Holly and its numerous varieties, the genus *Ilex* comprehends a large number of species, the most remarkable of which are the *I. Balearica*, or broad-leaved species of Minorca, a very handsome kind, which is hardy in the middle and south of England; the *I. vomitoria*, or Cassena Tree of the North Americans, whose leaves possess strongly marked emetic qualities; and the *I. Paraguayensis*, or Maté plant, of whose leaves a very large consumption takes place in South America under the name of Paraguay Tea. The leaves are dried, and afterwards used like the common tea.

ILFRACOMBE. [DEVONSHIRE.]

ILIAD. [HOMER.]

ILISSUS. [ATTICA.]

ILIUM. [TROY.]

ILK. A term used in Scotland to denote each, every; as, *ilk* one of you, every one of you; and also to signify the same; as, for example, Macintosh of that *ilk* means a gentleman whose surname and the title of his estate are the same; that is, Macintosh of Macintosh.

ILKESTON. [DERBYSHIRE.]

ILLE-ET-VILAINE, a department in France, formed out of a portion of the old province of Bretagne, is bounded N. by the English Channel and the department of La Manche, E. by the department of Mayenne, S. by that of Loire-Inférieure, and W. by those of Morbihan and Côtes-du-Nord. It lies between 47° 37' and 48° 31' N. lat., 1° and 2° 13' W. long., measuring 74 miles from N. to S., and 55 from E. to W. The area is 2597 square miles. The population in 1863 was 584,930.

Surface.—The department is divided by the Armoric hills [CÔTES-DU-NORD; BRETAGNE] into two slopes, one inclining to the English Channel, the other to the Bay of Biscay. It presents a great variety of hill and dale, heaths, moors, forests, ponds, and marshes, which are rendered productive

by drainage, or on the coast by banking out the sea. The soil, except in the marsh land, is shallow and light; the most fertile soils are in the neighbourhood of St.-Malo, Montfort, and Rennes, and in the marshes north of Dol. The coast, which extends between the embouchures of the Couesnon and the Rance, measures about 40 miles; it is washed by the fine Bay of Cancale; but access to it is much impeded by a great number of isolated rocks and islets. St.-Malo in the north and Redon in the south of the department, are the most important ports.

The department takes its name from the Ille and the Vilaine, the two principal rivers. The *Ille* rises near Combours, N. of the Armoric range, through a gap in which it runs S. and joins the Vilaine on the right bank at Rennes after a course of about 20 miles. Its waters supply the *Ille-et-Rance* Canal, which runs a considerable way along the Ille, and then, turning N.W., joins the Rance a little above Dinan. [CÔTES-DU-NORD.] The *Vilaine* rises a little W. of Ernée, in the department of Mayenne, and runs generally W. past Vitré as far as Rennes, 5 miles above which it becomes navigable. Having received the Ille at Rennes, its course is S.S.W. past Redon, whence to its mouth in the Bay of Biscay, below Roche-Bernard, it is a tidal river and navigable for vessels of 250 tons. Its whole length is 116 miles, 78 of which are navigable. On the right it receives the Canlache, the Chèvre, the Ille before mentioned, the Meu, and the Oust [MORBIHAN]; on the left its feeders are the Seiche, the Sennon, the Cher (which enters it on the borders of Loire-Inférieure), and the Don and the Isac, which flow from Loire-Inférieure, and are both navigable. The *Couesnon* rises E. of Fougères, and runs first W., then N. past Antrain, and enters the Bay of Cancale, below Pontorson, in the department of Manche. It is navigable at high water for barges from Antrain. The Rance is described under CÔTES-DU-NORD. The department contains 1,652,446 acres, and is traversed by eleven imperial, twelve departmental, and four military roads; the railroad from Paris to Brest passes Vitré and Rennes.

Products.—The farms are small, the largest not exceeding 75 acres, and many not more than 5. The soil is made to produce all kinds of breadstuffs, in quantity sufficient for the wants of the population. In the rich soils, wheat of excellent quality is raised; tobacco is grown near St.-Malo; rye, barley, oats, buckwheat, and mixed grain are produced in the middling and poorer soils. The cultivation of flax and hemp for the manufactures of the department is very extensive; the flax and hemp in the dressed state, as also the seeds, are important objects of commerce. The apple and the pear are very extensively cultivated for making cider and perry, the chief drinks of the population; the cider is strong enough to keep for two years, and is considered the best made in France. The grass land along the river bottoms is rich; and as the outlet on the heaths and moors is large, great numbers of cattle are reared, and excellent butter and cheese are made. The honey and wax of the department are also celebrated. There is little meadow land; of artificial grasses only clover is grown. Horses, in general of small breed, sheep, goats, poultry, and pigs of the large white breed are numerous. Game, including

wild boars, hares, rabbits, partridges, quails, woodcocks, &c., is abundant. The fisheries on the coast, which are actively plied, yield excellent oysters, soles, lobsters, turbot, skate, crabs, &c. The forests of the department contain fine timber: the prevailing kinds are oak and beech; next come chestnut, poplar, and birch. The cultivated land also presents the appearance of a forest, such is the number of apple trees planted in the fields, and of timber trees in the hedges that separate each field; but as these latter are regularly stripped of their branches to supply firewood, they are of little value as timber.

Several iron mines are worked; roofing and clay slate, white quartz for the glass factories, limestone, and granite are quarried; lead and copper ore is found. Mineral springs are numerous.

The most important manufactures are linen, sailcloth of the best quality, Russia duck, canvas, and shoe and morocco leather; felt and straw hats, sewing thread, thread stockings, ship cordage and ropes, fishing nets, hooks and lines, pottery, cotton and woollen yarn, are also made. There are, besides, several glass-making, tanning, and bleaching establishments, brandy distilleries, paper-mills, iron-forges and smelting furnaces, and flour-mills; in the towns on the coast shipbuilding is carried on to some extent. Salt is made in some of the marshes on the coast. The commerce is composed of the various articles named, and of groats, chestnuts, salt pork, hides, oak staves, firewood, &c. About 300 fairs are held in the year.

Climate.—The climate is damp, but temperate; much rain falls in winter; the prevailing winds are the west, north-west, and south-west; hurricanes are less frequent and less destructive than in some of the more western departments.

The condition of the peasantry is similar, but rather superior, to that of the peasantry of FINISTÈRE. The department contains many Druidical and Celtic remains, consisting of monoliths (menhirs), altar-tables (dolmen, kistvaen), cromlechs, and cairns.

Divisions and Chief Towns.—The department is divided into six arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Rennes, . .	10	78	144,804
Fougères, .	6	57	84,911
Montfort, .	5	46	60,305
St.-Malo, .	9	62	130,302
Vitré, . .	6	61	81,605
Redon, . .	7	46	83,003
Total, . .	43	350	584,930

Of the arrondissement of Rennes, and of the whole department, the capital is RENNES. *Hédé*, a small place of about 1000 inhabitants, on the road from Rennes to Dinan, is remarkable for the remains of its ancient castle, which was taken by Henry II. in 1168. *Janzé*, S.S.E. from Rennes, has 4471 inhabitants, who manufacture sailcloth, and deal largely in excellent poultry. *Liffré*, N.E. of Rennes, has a population of 2885. *Mordelles*, S.W. of

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Rennes, on the left bank of the Meu, has mineral springs, and 2560 inhabitants.

In the arrondissement of Fougères the chief town is *Fougères*, which stands on a hill, at the intersection of five high roads, in the north-east of the department. It is one of the best built towns of the department, has wide, straight streets, a tribunal of first instance, a college, and 9470 inhabitants, who manufacture sailcloth, canvas, tape, flannel, lace, hats, bricks, leather, paper, and glass. There is a good commerce in these articles, and in corn, groats, butter, honey, cattle, &c. The castle of Fougères is a picturesque object, but a feeble defence, as it is commanded by the higher part of the town. In the forest of Fougères, within half a mile of the town, there are many Druidical remains. *Antrain*, N.W. of Fougères, on the left bank of the Couesnon, which here becomes navigable, has a population of 2262, and some manufactures of linen, coarse woollens, serge, and leather. *St.-Aubin-du-Cormier* stands on a steep hill, S.W. of Fougères, and has 2098 inhabitants. It owes its origin to a strong castle built by Pierre de Dreux, duke of Bretagne, in 1223, and is famous for the victory gained here by the Count de la Tremouille, the commander-in-chief for Charles VIII., over François II., duke of Bretagne, the prince of Orange, and the duke of Orleans, afterwards Louis XII. *Louvigné-du-Désert*, 9 miles N. from Fougères, had formerly a large establishment belonging to the Templars, whose church is now become the parish church. It has a population of 3675, and several tanyards.

In the arrondissement of Montfort the chief town, *Montfort-sur-Meu*, situated 10 miles W. from Rennes, on a hill above the confluence of the Meu and the Chailloux, has a tribunal of first instance, a college, and 2168 inhabitants. It is closed in by ramparts, flanked with towers, and encircled by a wide ditch. The town was formerly of much larger size. In the environs, which are very pretty, are the oak forests of Bresilien and Montfort, in the former of which are several Druidical remains; among others the tomb of the enchanter Merlin, so celebrated in Breton fables. *St.-Méen*, 10 miles W. from Montfort, has an ecclesiastical school, and 2304 inhabitants. *Montauban*, formerly the chief town of a county belonging to the dukes of Rohan, is 7 miles N.N.W. from Montfort, and has a population of 3082. *Plelan-le-Grand*, 12 miles S. by W. from Montfort, has 4138 inhabitants, who manufacture great quantities of sewing thread.

In the arrondissement of St.-Malo the chief town, *St.-Malo*, is built on the rocky isle of Aron, which communicates with the mainland by a causeway named Le Sillon, and defended from the violence of the waves by strong outworks. The town covers the whole island; it is surrounded by strong ramparts, which are flanked with towers and bastions, and form a fine promenade. The streets are narrow, but formed by high and in general well-built houses. There are four gate entrances, near one of which, called La Grande Porte, is a large reservoir, whence water is supplied to the fountains in the streets. The most remarkable building is the strong castle built by Anne, duchess of Bretagne, which forms part of the fortifications. The former cathedral is a very capacious church, built in the

Gothic style, and ornamented with several good marble statues. St.-Malo has tribunals of first instance and of commerce, a chamber of commerce and manufactures, a naval school of the first class, and 9330 inhabitants. The harbour lies S. of the town; it is capacious and safe, but the entrance to it is rendered intricate by a great number of islets and rocks which stud this part of the coast, and many of which are fortified. It is a tide harbour, protected by a strong pier, and lined with a broad quay, which runs just under the walls of the town; it is dry at low water, but large ships can enter, as the tide rises very high here, 49 feet at spring. A wet dock has been formed by throwing a strong granite wall across the head of the bay between the town and the suburb of *St.-Servan*; it contains an area of above 270 acres, and is entered by wide flood-gates, through which steamers and war frigates can pass. The roadstead of St.-Malo lies W. of the town, at the embouchure of the Rance: it is protected by seven forts, one of which, called *Conchée*, was constructed by Vauban. The manufactures of St.-Malo are hosiery, fishing-nets, ship pulleys and cordage, soap, fishing-hooks, &c. Shipbuilding is carried on, and there is a large tobacco factory. The imports consist of colonial produce, spices, flax, hemp, &c.; there is also a considerable trade in corn, fruit, wine, brandy, salt, linen, cider, butter, honey, fish, salt provisions, &c. The town has long been celebrated for its brave and skilful seamen. Vessels are fitted out for the foreign and coasting trade, and for the whale, cod, and mackerel fisheries. St.-Malo is much frequented as a bathing town. It was the birth-place of Jacques Cartier, the discoverer of Canada, and also of the illustrious Chateaubriand. The railroad from St.-Malo to Rennes was opened in 1864. *Boussac*, near Dol, is a small place, with 3029 inhabitants. *Cancale*, a small seaport on the western side of the Bay of Cancale, with 6352 inhabitants, is eight miles E. from St.-Malo. The principal part of the town stands on a height, above the bay of which it commands a fine view, and is well built. The other part, called *La-Houle*, is built on the shore, and is inhabited chiefly by fishermen, who take vast quantities of oysters and other fish in the bay for the supply of Paris and the towns in the interior. *Combours*, twenty miles S.S.E. from St.-Malo, is situated on a small lake, and has 5033 inhabitants. There is an old chateau, flanked with towers, in good preservation in the town. *Dol*, remarkable for its ancient cathedral, which is one of the handsomest churches in Bretagne, is fifteen miles S.E. from St.-Malo, and has 4191 inhabitants. It is surrounded by old walls and wide ditches, the remains of its ancient fortifications. The interior is irregularly built; the houses are constructed of dark granite with projecting gables; arcades seven or eight feet wide, supported on granite pillars, run along the streets. The town has a good corn market; there is also some trade in cider, hemp, flax, tobacco, cattle, &c. The neighbourhood of Dol is fertile; all the land between it and the sea northwards is drained marsh, protected from the sea by dykes. *Plaine-Fougères*, twenty-five miles from St.-Malo, has a population of 3201. *St.-Servan*, a well-built town and much frequented watering-place situated on the south side of the harbour of St.-Malo, of

which town it may be considered a suburb, has 12,709 inhabitants. The most remarkable structure is the isolated tower called *Solidor*, which is 60 feet high, and approached by a drawbridge. This tower is now used as a prison. Beer, ship cordage and biscuits, wine, brandy, &c., are the chief articles of trade; shipbuilding is carried on. It has an active trade with the East and West Indies. *Tinténiac*, on the Ille-et-Rance Canal, has 2149 inhabitants, who trade in corn, butter, poultry, &c.

In the arrondissement of Vitré, the chief town, *Vitré*, situated on the Cantache, 22 miles E. from Rennes, has a tribunal of first instance, an ecclesiastical school, and 8904 inhabitants. The town is large, but irregularly built; and its feudal fortifications, consisting of a castle, high ramparts flanked with machicolated towers, and surrounded by a deep ditch, give it a gloomy appearance. The church of Notre-Dame is the most remarkable structure in the town. Vitré has manufactures of thread stockings, serge, flannel, hats, casks, brandy, leather, and sailcloth, and trades in these articles, and in wine, linen, honey, wax, hides, cattle, and cantharides flies, which are found in the neighbourhood. The other towns are *Argentré*, which is a few miles S. of Vitré, and has 2242 inhabitants; *La-Guerche*, a town of 4678 inhabitants, which stands in a rich corn and grazing country, 11 miles S. from Vitré; it gives name to a neighbouring forest, and has manufactures of fine linen, leather, and nut oil, besides a good trade in butter, corn, flax, hemp, chestnuts, cattle, sheep, &c.; and *Rhetiers*, which is a few miles W. of La-Guerche, and has 3127 inhabitants.

Of the arrondissement of Redon the chief town, *Redon*, stands at the foot of a hill on the Vilaine, which here forms a good tide harbour, with a rise of from ten to thirteen feet at high water. The town, which is situated in the most southern angle of the department, at the junction of the two branches of the canal from Nantes to Brest, and at the southern extremity of the river and canal navigation that terminates to northwards in the harbour of St.-Malo, enjoys great advantages for trade, in addition to its connection with the Bay of Biscay by a navigable tide river. It is in general well built; the chief structures are the former abbey buildings, now used as a college, and the abbey church, the semicircular apse of which is considered a masterpiece. Redon has a tribunal of first instance, a college, and 5943 inhabitants, who carry on a considerable trade in colonial produce, wine, brandy, salt, butter, chestnuts, timber, hemp, oak staves, planks, masts, pitch and tar, slates quarried in the neighbourhood, sheet and bar iron, lead, resin, hides, linen, flax, canvas, &c. Vessels of 50 to 400 tons are built. The harbour of Redon, to which the French attach great importance, as in case of a war with England their trading vessels could enter here without exposing themselves in the Channel, was greatly improved in 1847. The other towns are—*Bain*, which stands on the great road from Rennes to Nantes, and has a population (with commune) of 4454, and some woollen manufactures; *Fougeray*, 16 miles N.E. from Redon, which has 5859 inhabitants; it had formerly a strong castle, of which only one high massive tower remains, and from which the English were driven by Du Guesclin in 1356; *Guichen*, which is 25 miles

N.N.E. from Redon, and has cold mineral springs, and 3696 inhabitants; *Maure*, 15 miles N. from Redon, which has a population of 4075, and an ancient castle taken by Henri IV. in 1597; and *Pipriac*, 12 miles N. from Redon, which has 3343 inhabitants.

The department forms the see of the bishop of Rennes, is included in the jurisdiction of the Cour Royale and University Academy of Rennes, and belongs to the sixteenth Military Division, of which Rennes is head quarters.

(*Dictionnaire de la France; Annuaire pour l'An 1866; Guide Classique du Voyageur en France*; Jephson, *Travels in Brittany*; Malte Brun and Lavallée, *Géographie Universelle*.)

ILLECEBRACEÆ, a small natural order of exogenous plants, chiefly consisting of herbaceous weeds, found in the temperate parts of the world. The species are often conspicuous, especially when dried, for their silvery stipules and shining calyxes, and are sometimes beautiful microscopic objects; but they are too small to be interesting in any other way, and are of no known use.

ILLEGITIMACY. [BASTARD.]

ILLICEBRUM, a genus of plants the type of the natural order *Illicebraceæ*. The only species is a small trailing shrub with opposite leaves, having scarios stipules at the base. *I. verticillatum*, Whorled rush-grass, is found in bogs and wet marshy places, chiefly in Cornwall and Devonshire.

ILLICIUM, a genus of plants now generally described as a separate family under the name of WINTERACEÆ. It is known as the Aniseseed-tree.

ILLINOIS, one of the United States of North America, is bounded S.E. by the river Ohio; E. by Lake Michigan and Indiana; N. by the parallel of 42° 30' N. lat.; W. by the Mississippi. It lies between 42° 30' and 37° N. lat., and between 87° 30' and 91° 25' W. long. The greatest length is about 380 miles, and breadth 310 miles. The entire area is 55,409 square miles, or about 35,500,000 acres. The inhabitants in 1860 numbered 1,711,951, of whom 7,628 were free coloured. The population has increased very rapidly, having been only 12,000 in 1810, and includes many Germans and Irish.

The Kaskaskia rises on the east side of the state, and, flowing to the S.W. for about 250 miles, falls into the Mississippi about 80 miles above the junction of the Ohio. The Illinois, the largest river in the state, rises near Lake Michigan, and flows W. and S.S.W. into the Mississippi, which it joins 20 miles above the Missouri. This large river takes the name of Illinois only from the confluence of the Plane River from the N.E., and the Kankakee from the E., both considerable streams, and navigable for boats. Thirty miles below their confluence the Fox River falls into the Illinois from the north: it rises in the Huron territory, and has a course of 200 miles S.S.W., more than half of which is in this state. The other principal tributaries of the Illinois are the Vermilion River from the S.E., the Mackinaw from the N.E., Spoon River from the N.W., and the Sangamon or Sangano from the E. The last is by much the largest of these tributaries. Rock river rises in the Huron territory, and entering the state of Illinois on its north boundary, crosses it in a S.W. course of about 200 miles to the Mississippi.

There is a range of low hills near the Ohio, and the western part of the state has an undulating surface; but with these exceptions, Illinois is one great plain, having a general slope to the south-west. Its soil consists of exceedingly fertile prairie and timbered land. The minerals are iron, copper, and lead, in the north-western angle of the state. Lead mines are worked, and are very rich. Coal is found in every part of Illinois. Limestones and sandstones are the usual rocks. The climate is much the same as that of Missouri, except that it is more humid, and in the swampy districts less healthy. The agricultural products of the state are maize, wheat, hemp, flour, tobacco, and fruits. Swine are reared in great numbers from the abundant mast of the forests. There are few manufactures in the state, except those of salt from salt-springs, and lead from the ore.

Illinois is divided into ninety-nine counties. The following are the principal towns, with the population of each in 1860:—

Springfield, near the centre of the state, is the seat of government. It has a state and courthouse, and will hereafter be famous in history as the burial-place of President Lincoln. *Alton* is 82 miles W. by S. from Springfield. Population, 7338. This town has one of the best landings on the river Mississippi. [CHICAGO.] *Galena*, 230 miles N. by W. from Springfield, is the chief town of the great lead districts of the Upper Mississippi, which is navigable here for the largest steamers. The town contains about 14,000 inhabitants, and sends out about 50,000,000 lbs. of lead annually. *Nauvoo* is 124 miles N.W. from Springfield, on the east bank of the Mississippi. A Mormon city, containing at one time 18,000 inhabitants, was founded here by the famous "Joe Smith" in 1840. He was killed by a mob in 1844, and their great temple was burned to the ground in 1848. The Mormons have since been expelled, and have settled at Utah; their place is now occupied by a colony of French socialists. *Quincy*, 104 miles S. from Springfield, is situated on a bluff, on the east bank of the Mississippi. Population in 1863, 13,632. It is visited by numerous steamers, and exports large quantities of pork.

In 1860 there were 2868 miles of railway in operation in the state, all the cities and towns being connected by lines.

Illinois sends nine members to Congress. It includes churches of all denominations, 4 colleges, 42 academies, and 10,238 primary schools; 14 incorporated, 9 theological seminaries, and 2 medical colleges. Nearly all the settlements have taken place since 1800. The constitution of the state was formed in 1847, and consists of 75 representatives elected for a period of two years, and 25 senators for four years. The governor and lieutenant-governor are, like the presidents of the United States, elected every four years.

This state is within the limits of the cession which Virginia made to the United States in 1787; but the first settlements made in it were by the Canadian French before 1763. It was governed, with Indiana, as a territory of the United States from 1800 to 1809. In 1809 they were made separate territorial governments, and in 1818 Illinois was admitted into the Union.

ILLUMINATI, the name of a secret order of society existing in Germany and some other parts of the Continent. Their professed object was to disseminate the purest principles of wisdom and virtue; but their real intention, it has been said, is the subversion of all existing governments and religions, in order to establish a perfect system of freedom and independence among mankind.

ILLYRIA, formerly a kingdom and province of the Austrian empire, now divided into the districts Carinthia, Carniola, and the Littoral, and lying between $44^{\circ} 43'$ and $47^{\circ} 5' N.$ lat., and $12^{\circ} 40'$ and $15^{\circ} 55' E.$ long. It was founded by a decree of Napoleon in 1809, and remained as a kingdom till the present arrangement into three provinces was adopted in 1849. The area of the country is about 11,000 square miles, and the population 1,300,000.

Face of the Country.—Illyria is on the whole a mountainous country, but the coasts are partly low and sandy, and partly marshy, especially towards the west. On the west the Bay of Trieste, and on the east that of Quarnero, run deep into the land, and form the peninsula of Istria, the extreme point of which is Capo-Promontore. In Villach and Clagenfurt the soil is good, and the valleys are in general fertile; but a great portion of the surface is rocky, and so high that the temperature is unfavourable to vegetation. Neustadt, Adelsberg, and Laybach consist of rock, marshes, and sandy flats, and are unfruitful. The coast has a dry limestone soil, and in many parts suffers from a scarcity of water, but the vegetation is very luxuriant. Three great chains of mountains, the Noric Alps in the north, the Julian and Carnic Alps in the centre and south, traverse the kingdom from west to east. All the mountains belonging to the chain of the Julian Alps are composed of primitive limestone, and are remarkable for the number of stalactitic caves they contain. [ADELSBERG.] The principal rivers are—the DRAVE, which is navigable, and flows for 120 miles through Villach and Clagenfurt; the SAVE, which becomes navigable at Laybach; the Isonzo, which rises in Mount Terglou (9300 feet high), the point of junction of the Carnic and the Julian Alps, and flowing S. enters the Gulf of Trieste, having received the Torre on the right, the Idria and the Wippach on the left bank; a few miles before reaching the gulf it divides into two branches, called the Isonzato and the Sdobba, which afterwards unite, inclosing between them the island of Morosina; the course of the Isonzo is important as having once formed the eastern limit of Italy towards Austria; and the *Quieto*, which enters the Adriatic through the harbour of Città-Nuova. Of the numerous lakes, the largest are—the Lake of Clagenfurt, 11 or 12 miles long, but narrow; the Ossiach Lake, 7 miles long; and the Mühlstaller Lake, $8\frac{1}{2}$ miles long, and from 2 to $3\frac{1}{2}$ miles wide; this is the deepest and most beautiful lake in Carinthia, and the surrounding scenery is highly picturesque.

The most remarkable lake in Carniola is that of Zirknitz, about 3 miles long and 2 wide, of which many wonderful stories are told, all originating in the fact that it is sometimes quite full, and at others dried up, or considerably reduced in size, and this without any regularity or regard to the season of

the year; sometimes it does not dry up for years together. This peculiar phenomenon is apparently dependent upon subterranean cavities. Carinthia is much more abundant in mineral waters than Carniola, but there are none that enjoy any remarkable celebrity.

Climate.—The climate of course varies in different parts. The lofty mountains, covered with snow, which either never melts or only in the height of summer, cause the air to be rather sharp and raw in Villach and Clagenfurt: the vine does not thrive here. Though there are some persons afflicted with goitre, the climate is on the whole healthy. It is much milder in Laybach, Adelsberg, and Neustadt, where the vine, chestnut, and maize flourish. Trieste has a hot climate; the vegetation is luxuriant, but there is a deficiency of water. In the western parts on the coast the air is rendered unhealthy by the exhalations from the lagunes.

Products.—Illyria abounds in mineral wealth. Besides quicksilver, it has copper of the finest quality, and yields excellent iron, lead, silver, cinnabar, alum, coals, marble, rock-crystal, porphyry, jasper, garnets, &c.

The vegetable products contain many rare Alpine plants, medicinal herbs, and roots; also wheat, rye, barley, oats, maize, buck-wheat, potatoes, pulse, some flax, hemp, and hops, garden vegetables, and fruit. The forests have been much thinned for the use of the iron-works, but there is still an abundance of pine, oak, and other timber. The horned cattle and the horses are in general small. The largest flocks of sheep are in the islands, especially in Veglia, which has likewise many horses. Swine and poultry abound everywhere. Of wild animals there are stags, deer, wild boars, chamois, foxes, &c. Bears and wolves are rare. The game consists of pheasants, bustards, partridges, snipes, and waterfowl. The tunny, mackerel, and anchovy fisheries on the Adriatic are very important. The most important manufactures are those of various articles in iron and steel. The commerce consists chiefly of the transit trade between Vienna and Trieste.

Chief Towns.—Laybach, the capital of Carniola, is situated in an extensive valley at the mouth of the navigable river Laybach, a feeder of the Save, which divides the city into two parts, connected by five bridges. Laybach has 21,000 inhabitants. It is a bishop's see, and has a fine cathedral, twelve other churches, a lyceum, a gymnasium, and many other excellent public institutions. The castle is situated on a commanding eminence. At a short distance to the north of the town there is a stone bridge of 11 arches, 540 paces in length, over the Save. It is on the line of railway from Vienna to Trieste. There are manufactures of porcelain, refined sugar, and linen fabrics; and an active transit trade exists between Germany and Trieste. Laybach was, on two occasions, for some months the residence of Sir Humphrey Davy, and the seat of the congress of 1820-21, which was for a time fatal to Italian liberty. Neustadt is beautifully situated on the river Gurr, a feeder of the Save; it is a very pretty, regularly built town, with three churches, a gymnasium, a Franciscan convent, and 1750 inhabitants. Adelsberg, only important from the remarkable grotto in its vicinity, is noticed under

ADELSBERG. *Idria*, famous for its quicksilver mines, is situated at the bottom of a narrow valley surrounded by high mountains, on the banks of the little river *Idria*, and has 4450 inhabitants, who subsist partly by lace-making and straw-plating; but the greater part are employed in the mines and in the quicksilver works and cinnabar factories in the neighbourhood. The entrance to the mine is nearly in the middle of the town, by a large iron gate, which opens to a horizontal passage leading to a flight of 757 steps cut in the limestone rock. The mine is worked in the service of the government, and is one of the most productive in the world. It employs upwards of 600 workmen; and from 3200 to 3500 cwt. of quicksilver are produced annually. The inhabitants of the town indicate by their pale countenances the pernicious atmosphere they inhale, impregnated by the vapours of the various preparations of mercury manufactured in the place. The whole district is said to be so affected that cattle cannot be reared, and neither fruit nor grain will ripen. Formerly criminals were deported to the mine as workmen, but now free labourers are employed, tempted by high wages. *Clagenfurt*, the chief town of Carinthia, is noticed under **CLAGENFURT**. *Villach*, another town of Carinthia, is situated on the Drave, in a beautiful country, which has been called the Inner Austrian Switzerland. The town, which was formerly much larger than it now is, has 2487 inhabitants. Villach is a place of some importance in a commercial point of view, as it stands at the junction of three great roads leading to Vienna, Venice, and Innspruck. Villach was the scene of one of the first great defeats sustained by the Turks, in 1492, in their attempt to reach the heart of Christendom. A few miles W. of Villach are the important lead mines of *Bleiberg*, so named from the little town of **BLEIBERG**, which has a population of 2255.

Trieste, the principal seaport of Austria, is described in the article **TRIESTE**. *Capo d'Istria*, a seaport on an island a few miles to the southward, but connected with the main shore by a causeway, was formerly a dependency of the Venetian republic. It has 5000 inhabitants, and produces large quantities of salt by the evaporation of the sea-water.

Ancient *Illyria* comprehended all the provinces on the east coast of the Adriatic, with the adjacent islands as far as Epirus, and was inhabited by a people called by the general name of the *Illyric* nations. *Illyria* also extended into the interior as far as the *Ister* (Danube) and the Alps which lie between Italy and Germany. Macedonia formed the eastern boundary.

IL OBEID. [KORDOFAN.]

ILSLEY, EAST. [BERKSHIRE.]

IMAGINATION denotes in its widest sense that faculty of the mind by which it produces at will thoughts, or ideas, as materials for every other mode of the mental activity. It is often employed in a narrow acceptance as synonymous with fancy, which properly is only a particular species of imagination combined with judgment. Still narrower is the faculty of imagination according to the definition of Dr. Reid, who confines it to a lively conception of the objects of sight, and makes imagination differ from conception only as a part from the whole. And

similarly Addison teaches, that 'the pleasures of imagination are such as arise from visible objects, since it is the sense of sight that furnishes the imagination with its ideas.' In its widest signification, however, imagination is coextensive with invention, furnishing the writer with whatever is most happy and appropriate in language, or vivid and forcible in thought. In the same manner it is the imagination that suggests to the scientific inquirer those bold conjectures of analogy or difference which lay open the secrets of nature, and multiply its usefulness to man. Indeed, to adopt the language of Dugald Stewart, 'all the objects of human knowledge supply materials for her forming hand; diversifying infinitely the work she produces, while the mode of her operation remains essentially uniform.'

It is in this illimitable activity that imagination differs from conception, which also is a reproductive faculty, but apparently a mere passive potentiality to bring forth certain given and particular ideas; while the former, when once awakened by the presentation of a single thought, produces out of its storehouse of ideas all the manifold variations of similar and dissimilar.

A disordered imagination exhibits itself under various forms or characters; as the fantastic, the fanatic, and the enthusiast.

On the particular character of the imagination depends much of the happiness or misery of the individual. Acting upon human hopes and fears, it assumes the name of sensibility, and by the bright or sombre images with which it fills the distant prospect of life, it affords a double relish to every enjoyment, or gives a keener edge to sorrow and misfortune.

IMAGO. A name given by Linnæus to the third state of insects, when they appear in their proper shape and colours, and undergo no further transformation.

IMAN, the title or designation of a Mohammedan priest, or one who has the care and superintendence of a mosque. It is sometimes applied, *par excellence*, to the founders of the four chief sects of the Mohammedan religion.

IMBECILITY. [INSANITY AND IDIOTCY.]

IMBROGLIO (Ital.), a term applied to the little burlesque theatrical pieces, the plot of which is perplexed or complicated. In literature it is also applied to the plot of a drama, or romance, which is involved in confusion.

IMBROS, an island of the Grecian Archipelago, belonging to Turkey. It is of an oval form, and its circumference about 40 miles. The surface is hilly and well wooded. The valleys produce corn, wine, oil, and cotton. The population consists of about 4000 Greeks, who inhabit four villages, the principal of which has a castle.

IMIRETIA. *[GEORGIA.]

IMMATERIALISM. [MATERIALISM.]

IMMORTALITY. [MATERIALISM.]

IMMORTALS, among the ancient Persians, a body of 10,000 soldiers, who constituted the personal guard of the sovereign, and were always of the same number. The same term was applied to the body-guard of the Roman emperors.

IMOLA. [RAVENNA.]

IMPACT (*in* and *pango*), the shock of two bodies, one or both of which are in motion: impact and

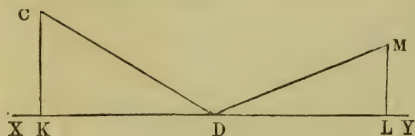
collision are the technical terms used in mechanics for the meeting of bodies in motion.

It is usual to treat the first principles of this subject by supposing the bodies in question to be spherical; because, if spheres of equal magnitudes be made to strike one another on a plane in the direction of a line joining their centres of gravity, and there be no friction on the plane, a motion of translation simply, without any rotatory motion, will take place. The conclusions deduced from the impact of such spheres, of equal or different weights, will hold good for bodies of any other form, provided there be no rotation, and the line joining their centres of gravity pass through the point of contact.

The consequence of friction taking place between the balls and plane is that the former acquire a rolling motion on the latter; and to this circumstance is owing many of the phenomena observed in games of billiards.

Let us now suppose the ball A to be impelled directly towards an immovable obstacle, such as an upright ledge at the end of the table. On striking this ledge the ball will, generally speaking, recoil more or less. Some substances will hardly give any recoil, while others will send the ball back with nearly the same velocity as that of its approach. At the moment of impact, the ball and obstacle compress one another, and the pressure continues until the reaction has destroyed all the velocity of the ball. If, then, there were no effort in the parts of the obstacle, nor in those of the ball, to recover their former position, the ball would remain at rest, close to the obstacle. If the recoil were complete, that is, if the parts of both bodies endeavoured to recover their position with a force equal to that which disturbed them, the recoil would rapidly but gradually [IMPULSE] create in the ball a velocity equal to that with which it approached. In the first case the bodies are said to be wholly inelastic, and in the second the elasticity is said to be perfect. But if only a fraction, e , of the velocity of approach be restored, then e is said to be the measure of the elasticity of the bodies. Perfect elasticity is usually represented by unity.

Now suppose the ball A (which is so small that its size may be neglected) to approach obliquely



towards the obstacles X Y, say in the direction C D. Let C D be the velocity or length moved over in one second. Then [COMPOSITION; VELOCITY] the velocity C D is equivalent to the two velocities C K and K D. The first is destroyed and then partially restored by the impact; the second remains unaltered, except by the friction at the moment of impact, which we do not consider. If, then, we take D L equal to K D, and draw L M perpendicular to X Y, and in length such a fraction of K C as e is of 1, the ball will move, after impact, with the velocities D L and L M, that is, with the velocity D M in the direction

D M. If the system were perfectly inelastic, the ball would proceed along D L; if perfectly elastic, M L would be equal to C K, and D M and C D equally inclined to X Y. If the size of the ball be taken into account, X Y must be supposed to be a line parallel to the obstacle, and distant from it by the radius of the ball. On the same principle may the motions resulting from the oblique impact of two elastic balls be determined.

It is proved in all treatises of elementary mechanics that, if two balls designated A and B (which letters represent their weights) move in the same direction with the velocities a and b , A being the hindmost and a the greater velocity; also if e , a proper fraction, represent the elasticity of each ball, we have, after the impact, the velocity of

$$A = \frac{Aa + Bb - eB(a - b)}{A + B} = u,$$

and the velocity of

$$B = \frac{Aa + Bb + eA(a - b)}{A + B} = v.$$

Subtracting the former from a , and b from the latter, we obtain the velocity lost by

$$A = (1 + e)(a - b) \frac{B}{A + B} = \alpha,$$

and the velocity gained by

$$B = (1 + e)(a - b) \frac{A}{A + B} = \beta;$$

hence the momentum lost by A and gained by

$$B = (1 + e)(a - b) \frac{AB}{A + B}.$$

Again, by subtraction, $v - u = e(a - b)$.

Lastly, from the above values of u and v we obtain

$$\begin{aligned} Au^2 + Bv^2 &= Aa^2 + Bb^2 - (1 - e^2)(a - b)^2 \frac{AB}{A + B} \\ &= Aa^2 + Bb^2 - \frac{1 - e}{1 + e} \{Aa^2 + Bb^2\}. \end{aligned}$$

The preceding formulæ will remain true when the bodies are moving in contrary directions, if, the direction of A's motion being called positive, b , or the velocity of B, be made negative. The signs of the formulæ will show in which direction the motion after impact takes place. Making $e = 0$ in the above formulæ, we have the corresponding formulæ for inelastic bodies; and, making $e = 1$, we get the formulæ for bodies whose elasticities are supposed to be perfect, the necessary attention being paid to the signs in all cases. Thus, when the momenta Aa and Bb are equal to one another, two inelastic bodies moving in opposite directions rest after impact; and, when $b = 0$, or B is at rest before impact, the

common velocity after impact becomes $\frac{Aa}{A + B}$.

If two perfectly elastic balls be equal in magnitude, the velocity of each after the impact is that which the other had before the impact, both in magnitude and direction.

In all cases perfectly elastic balls recede from

each other after impact with the same velocity with which they approached before impact; since, if $e = 1$, $v - u = a - b$. But in every other case the rate of recess after impact is the same proportion of the rate of approach before impact, which e is of 1.

The *vis viva* of a couple of perfectly elastic balls is the same before and after impact; in every other case it is less after impact than before.

In every case of impact, when the balls approach one another with uniform velocities, the centre of gravity of the balls moves uniformly, and in a straight line. After the impact, though the directions and velocity of the balls may have changed, yet their centre of gravity still continues to describe the same line, and with the same velocity as before. This proposition also is proved in all works on elementary mechanics.

IMPALE, in Heraldry, means the arranging of two coats of arms side by side in one shield. This is usually done by husband and wife, and by bishops, deans, heads of colleges, and knights-at-arms, who impale their own arms with the insignia of office.

IMPATIENS, a genus of plants so called from the sudden and elastic force with which they burst their capsules. One of the species is well known as a highly ornamental annual by the name of Balsam, whence the natural family to which it belongs has been called BALSAMINÆ. The genus is especially an East Indian one, though single species extend into Europe, Siberia, and North America.

IMPEACHMENT. [PARLIAMENT.]

IMPENETRABILITY, a name given to the property of matter, the existence of which is suggested when we see that any attempt to place one solid body in the part of space occupied by another is either resisted by, or its success preceded by the removal of, the latter; or, in other words, that no two bodies can at the same time occupy the same space.

In some cases the impenetrability of matter can only be taken in conjunction with the hypothesis of its porosity. Otherwise it might be successfully disputed. For instance, salt may be dissolved in water without increasing the bulk of the fluid; the (impenetrable?) matter is then penetrated, or else the matter of the fluid has interstices. But if any attempt be made to press the fluid into a smaller space, the impenetrability of the water will appear by its resistance to the pressing substance. Are we not then making a purely gratuitous introduction of words to supply explanations of phenomena? The answer to this difficulty and others of a similar kind which occur in attempting to define simple mechanical terms, is that the beginner must not receive them as explanations or as doctrines, but simply as statements of observed phenomena, or as terms which imply that explanation is wanted, and serve, till further elucidation, to enable us to recast the phenomena themselves and the universality of their existence. The notion of impenetrability is founded on the supposition that, when one body approaches another which is at rest, it must be in contact with it before the latter will move; but many circumstances render it highly probable that actual contact never takes place, and that when the bodies are within a certain small distance from one another repulsive forces begin

to be exerted between them: the resistance alluded to is apparently therefore dependent on repulsive forces of whose cause and modes of action nothing is known.

IMPERATOR. [EMPEROR.]

IMPERATORIA, a genus of plants belonging to the natural order *Umbelliferae*. *I. ostruthium* is a native of Europe and Newfoundland in damp meadows and woods. This species is the Masterwort of old English herbalists, and the root has been much celebrated as an antidote against poisons, a diuretic, and sudorific.

IMPERIAL CHAMBER. [AULIC COUNCIL.]

IMPERMEABILITY, the property which certain bodies possess of resisting the passage of other bodies through their substance; thus the pores of glass are so minute that no pressure has been able to force any fluid through them, whereas gold is permeable by water. Oil skin, or waterproof cloth, is impermeable to the passage of water, in consequence of the repulsion existing between the particles of oil and water.

IMPETIGO is a disease of the skin, which has been defined to be 'an eruption of yellow itching pustules, appearing in clusters and terminating in a yellow, thin, scaly crust.' It is commonly known in this country as the humid or running Tetter, and occurs on all parts of the body, though most frequently on the extremities.

IMPLEMENTS, AGRICULTURAL. The principal of these are noticed in separate articles. The term comprises all the implements used by the farmer in the cultivation of the land and the processes of in-gathering the produce. Those implements which first suggested themselves to supply man's wants, were doubtless the spade, fork, and hoe; when animals were reduced to the service of man ploughs and harrows appeared in their rude forms. The scythe and sickle have existed from remote antiquity; but grubbers, cultivators, drilling machines, thrashing, winnowing, and crushing instruments, are comparatively of modern date. Wonderful improvements have of late years been made in the application of machinery to agriculture, and steam-power now performs a large share of the labourer's work. For a full description of all the modern improvements, see the article AGRICULTURAL IMPLEMENTS, and Plates 1-10, Vol. I.

IMPORTATION AND EXPORTATION. The regulations which govern the bringing of merchandise into, and sending it from, the United Kingdom, are embodied in the Customs Consolidation Act, 16 & 17 Vict., c. 107, which came into operation August 20, 1853. This enactment would seem to have met nearly all the requirements of the mercantile community; for since it became law but slight amendments have been found necessary, and these are recorded in 18 & 19 Vict., c. 96; 22 & 23 Vict., c. 37; 23 Vict., c. 22; and 25 Vict., c. 22.

By the forty-second section of the Consolidated Act the precise time at which an importation of goods shall be deemed to have had effect, is held to be the time at which the ship had actually come within the limits of the port at which such ship shall in due course be reported and the goods be discharged; and if a question arise upon her arrival in respect of any charge or allowance upon such ship, exclusive of cargo, the time of arrival shall be that

when the report of such ship has been or ought to have been made. No goods are deemed to be imported from any particular place unless they be imported direct from such place, and shall have been there laden on board the importing ship, either as the first shipment of such goods, or after the same shall have been actually landed at such place.

IMPORTS AND EXPORTS are the various kinds of merchandise brought into and sent from a country. Until the latter part of the seventeenth century no opportunities existed for the collection of an authentic account of commercial statistics. Scattered notices of the nature and amount of our trade, at various periods, may be found interwoven with the narrative of historians, but the authority on which such statements generally rest is usually obscure. As to the money value attached to those imports and exports, we may safely conclude, especially in regard to imports, that it was derived from the assessment which regulated the system of poundage; an assessment which, though conventionally representing the marketable worth of the various descriptions of merchandise subject to a uniform percentage, was arbitrary in effect, and admitted of adjustments by which the assumed prices of particular commodities were either raised or lowered, so as to aggravate or lighten the pressure of the tax. Artifices of this kind were not inconsistent with the spirit of an age imperfectly civilized and ignorant of the true principles of commercial policy. More correct views, however, began to be entertained of the real interests of the country, and of the use to be derived from commercial statistics. One evidence of this change of feeling is afforded by the institution of the Board of Trade in 1670; another is to be found in the establishment of the office of Inspector General of Imports and Exports in 1697, whereby provision was made that an account should be kept of the trade carried on by England with each foreign country, and with each of the British settlements and possessions abroad, showing the goods imported and exported, methodically enumerated and classified; their quantities by weight, tale, or measure; and their equivalent in money, computed at certain official rates of valuation then first assigned.

The weak point of this scheme was the fixed character of the official rates of valuation by which the amounts of the imports and exports were henceforward estimated. Those rates, it is reasonable to presume, corresponded as nearly as possible with the actual prices of the several commodities at the time when they were established. The general results obtained by their use would, therefore, for some years approach pretty closely to the truth; but the difference between the computed 'official' value and the unascertained real value, whose place it supplied, was always growing wider, and as commerce and manufactures enlarged the sphere of their activity, the divergence became rapid. Had it affected all branches of commerce alike, the mischief would have been less serious; for although the amounts of the imports and exports would both have been falsified the proportion between them might have been correctly shown, and the progress or declension of the trade carried on with particular countries might also have been indicated with tolerable exactness: but this was by no means the case. Various causes

were in operation to set the 'official value' and the 'real value' at variance, and those causes affected different articles with a different measure of force and in different directions. The prices of agricultural produce increased with the number of the population and the influx of the precious metals. The prices of manufactured goods declined as the use of machinery was extended and the supply of raw materials from abroad grew more abundant. The spices of the East were cheapened in proportion as the improvement of navigation diminished the cost and risk of their transport to Europe. The timber of the Baltic rose in value as the home supply became scanty and buildings of every kind were multiplied. By these and by similar causes all traces of the original agreement between the official and the real value were nearly effaced, and the habit of regarding the former as identical with the latter at length was very generally abandoned.

But another notion had by degrees gained ground, that the official value, however unsuitably designated, being at least a fair representative of quantity, its fluctuations would furnish a true index of the forward or retrograde movements of our trade, and a just criterion of its comparative extent at different periods, irrespectively of the rise or fall of prices. The notion was, however, fallacious, and it is a matter of surprise that a fallacy so easily detected should have so long maintained its hold of the public mind.

The truth is, that the official value *was not* a fair representation of quantity, except in those cases in which the quantity itself might have been exhibited with equal facility, and in which, therefore, the employment of the substitute was at best superfluous. Being deduced from the quantity by a direct arithmetical process, it represented it faithfully when any article was taken singly, and not less faithfully, of course, when several articles were taken collectively, provided they were all entered under some uniform denomination of weight or measure, and all valued at the same rate; but beyond these limits, its relation to quantity became confused, incapable of being appreciated, and therefore practically null. The official value, however, might in one sense be said to be of indispensable use, even though that use was deceptive. In the absence of any record of the real value of the imports or exports, it furnished the means of collecting into one sum a multitude of articles dissimilar in kind and variously registered, by the hundred-weight, the gallon, the dozen, and the yard, which otherwise it would have been impossible to reduce into a total; thus it filled up blanks, and gave the accounts of the national commerce a semblance of completeness. It supplied an answer, though a delusive one, to questions such as these:—'What is the annual balance of our trade?' 'What proportion do our present importations from France bear to those of a period twenty or fifty years ago?'

The first partial improvement in this state of things took place in 1798, when to assist in defraying the expenses of the war, the 'convoy duty' was imposed on the exports of British produce and manufactures. This being rated *ad valorem*, it was provided, by the Act of Parliament under which it was levied, that the shippers of such merchandise should make a declaration of its actual value, and that a

false declaration should render the party liable to a penalty. Thus was laid the foundation of an authentic record of the real value of one great branch of our commerce. The utility of this enactment was soon perceived, and some years later, after certain goods had been exempted from the export duty, it was deemed expedient to pass a special act (53 Geo. III., c. 98) providing that in all cases the shippers of 'free goods' should be held liable to furnish a declaration of value. In 1842 the last remnant of the *ad valorem* export duty was swept away; but the declaration of value continues to be required on the exportation of all goods the produce or manufacture of the United Kingdom, and it constitutes the only source of information we possess on that point. That the establishment of a record of the real value of British exports would be followed by the institution of some corresponding registry of the real value of imports might have been expected; but many years passed before steps were taken to accomplish that object. In the year 1848, however, a plan, which had originated in the office of the inspector-general of imports and exports, was submitted for the approval of the Treasury by the commissioners of customs; but no decision was obtained upon it until the year 1854, when by Treasury minute dated 6th October, the said commissioners received instructions to carry out the necessary arrangements.

The scheme thus sanctioned was accordingly brought into operation without delay, and after ten years' experience it may be affirmed with confidence, that the end proposed has been fully accomplished.

It may be proper here briefly to explain how the real value of the imports into the United Kingdom is ascertained. 1stly, In the case of certain articles—of those, namely, in regard to which the tariff prescribes that their value (either with or without a

specification of quantity) shall be stated in the entry inwards at the custom house—it rests on the declaration of the importers. If the officer of customs should see sufficient reason to question its correctness, he is entitled to require further evidence on the point, or he may examine the goods. 2ndly, Upon returns of the *average prices* of the articles belonging to each class of imported merchandise which are obtained by the statistical office at the Custom House monthly, either directly from some of the leading merchants or brokers in the city of London, who furnish the information from a desire to assist an undertaking which they believe to be serviceable to the public, or else through the agency of three gentlemen specially qualified for the duty, who have been appointed by the Treasury to collect such prices in London, Liverpool, and Hull respectively.

The returns thus procured from different quarters are carefully examined; their deficiencies supplied, when other means fail, by reference to the most trustworthy of the prices current and market reports printed for general circulation; they are compared with each other, so far as they are susceptible of such comparison; where they differ the cause of difference is investigated; and when this process has been gone through for each successive month, mean averages are struck for each article, which are applicable to the kingdom at large in respect to the importations of the entire year. These resulting averages are not always *single*; in many instances the diversity of species or quality, and the consequent diversity of price, attaching to the similar products of various soils and climes, render it necessary to apply different rates to the importations from different countries. The manner in which the operation is effected is shown in the annexed Table, transcribed from a recent Parliamentary paper:—

TABLE SHOWING THE MANNER IN WHICH THE REAL VALUE OF IMPORTS IS COMPUTED IN THE OFFICE OF THE INSPECTOR GENERAL OF IMPORTS AND EXPORTS, CUSTOM HOUSE, LONDON.

Yellow Muscovado and Brown Clayed Sugar imported from Bengal.

MONTHS.	Imported into London.			Imported into Liverpool.			Imported into London and Liverpool Jointly.		Average Price of the Imports into London and Liverpool adjusted for the United Kingdom.	Quantities Imported into the United Kingdom	Computed Real Value.
	Rate per Cwt.	Quantity.	Value.	Rate per Cwt.	Quantity.	Value.					
	s. d.	Thousand Cwt.	s.	s. d.	Thousand Cwt.	s.	Thousand Cwt.	s.			
January,.....	27 2	—	—	27 8	8	221	8	221	27 8	8,097 0 24	11,201
February,.....	27 2	5	136	27 6	3	82	8	218	27 3	8,386 1 4	11,426
March,.....	27 8	2	55	27 0	4	108	6	163	27 2	6,133 2 10	8,357
April,.....	28 2	4	113	27 0	6	162	10	275	27 6	9,565 2 15	13,153
May,.....	29 8	10	297	26 3	11	289	21	586	27 11	20,986 0 20	29,293
June,.....	29 8	1	30	25 9	4	103	5	133	26 6	4,568 2 9	6,053
July,.....	30 2	4	121	25 9	—	—	4	121	30 2	3,982 2 15	6,007
August,.....	30 2	11	332	25 9	18	463	29	795	27 5	28,476 1 3	39,036
September,...	30 8	17	521	26 0	16	416	33	937	28 4	33,002 0 5	46,753
October,.....	31 2	26	810	26 0	21	546	47	1356	28 10	46,559 2 26	67,124
November,....	30 8	38	1165	25 6	7	179	45	1344	29 10	45,466 0 1	67,820
December,....	29 8	47	1394	25 0	20	500	67	1894	28 3	66,342 0 12	93,708
										281,566 1 4	399,931

Average Price of the Year 1861, 28s. 5d. per Cwt.

Linseed imported from the Russian Ports on the Black Sea.

MONTHS.	Imported into London.			Imported into Hull.			Imported into London and Hull Jointly.		Average Price of the Imports into London and Hull adopted for the United Kingdom.	Quantities Imported into the United Kingdom.	Computed Real Value.
	Rate per Quarter	Quantity.	Value.	Rate per Quarter.	Quantity.	Value.					
	s. d.	Thousand quarters.	s. d.	s. d.	Thousand quarters.	s. d.	Thousand quarters.	s. d.	s. d.	Quarters.	£
January,...	56 0	—	—	55 0	—	—	—	—	55 6	6,629	18,395
February,...	50 0	2	100 0	50 0	17	850 0	19	950 0	50 0	21,563	53,907
March,.....	51 0	—	—	47 6	31	1472 6	31	1472 6	47 6	56,061	133,145
April,.....	50 6	1	50 6	47 6	19	902 6	20	953 0	47 6	29,324	69,645
May,.....	51 6	2	103 0	47 6	2	95 0	4	198 0	49 6	6,880	17,028
June,.....	51 6	—	—	47 6	1	47 0	1	47 6	47 6	1,526	3,624
July,.....	52 9	—	—	47 6	—	—	—	—	50 1	3,576	8,940
August,.....	55 8	—	—	50 0	6	300 6	6	300 0	50 0	10,059	25,148
September,...	57 6	2	115 0	52 6	13	682 6	15	797 6	53 2	29,449	78,040
October,....	59 6	5	297 6	55 0	21	1155 0	26	1452 6	55 10	36,048	100,634
November,...	60 6	2	121 0	55 0	14	770 0	16	891 0	55 8	35,597	99,913
December,...	61 0	20	1220 0	55 0	20	1100 0	40	2320 0	58 0	54,490	158,021
										291,502	766,440

Average Price of the Year 1861, 52s. 7d. per Quarter.

Having indicated the mode by which the valuation of imports and exports was obtained in the earlier as well as in the later stages of British commerce, it remains to show the amount of the trade of *England* with foreign countries, stated in official value in each year from 1725 to 1778 inclusive; likewise of the import and export trade of *Great Britain* from 1779 to 1800 inclusive.

TRADE OF ENGLAND WITH FOREIGN PARTS.

YEARS.	Imports.	Exports. (British and Foreign Merchandise conjointly.)	YEARS.	Imports.	Exports. (British and Foreign Merchandise conjointly.)
1725	6,760,837	8,007,045	1765	9,910,350	12,806,109
1726	6,345,261	7,123,286	1766	10,358,944	12,162,224
1727	6,491,869	6,839,147	1767	10,970,672	11,986,909
1728	7,251,152	8,231,454	1768	10,652,566	12,871,647
1729	7,252,973	7,722,726	1769	10,643,453	11,473,493
1730	7,485,863	8,016,283	1770	11,002,540	12,142,187
1731	6,682,561	7,243,794	1771	11,441,258	14,629,669
1732	6,793,430	8,256,085	1772	12,056,146	14,095,626
1733	7,630,708	8,242,884	1773	10,154,024	12,574,450
1734	6,694,438	7,672,249	1774	11,899,130	13,810,517
1735	7,742,762	8,559,596	1775	11,998,306	13,032,757
1736	6,860,790	8,981,884	1776	10,180,217	11,551,497
1737	6,727,162	9,350,503	1777	10,338,688	10,721,563
1738	7,057,588	9,498,953	1778	8,932,556	10,080,398
1739	7,417,449	8,170,003			
1740	6,313,214	7,569,501			
1741	7,531,221	8,871,370			
1742	6,520,050	8,798,542			
1743	6,985,555	10,450,119			
1744	5,972,096	8,487,393			
1745	6,405,624	8,160,866			
1746	5,673,002	9,970,681			
1747	6,575,364	9,026,662			
1748	7,671,920	10,234,778			
1749	7,350,028	11,672,712			
1750	7,159,232	11,382,481			
1751	7,278,951	11,245,005			
1752	7,325,409	10,554,303			
1753	8,069,540	11,094,052			
1754	7,483,006	10,614,000			
1755	8,129,699	9,995,179			
1756	7,033,792	10,608,944			
1757	8,565,847	11,377,713			
1758	7,364,691	11,691,448			
1759	8,090,843	13,016,429			
1760	8,928,622	13,644,571			
1761	8,690,097	13,397,075			
1762	7,980,866	12,221,798			
1763	10,429,229	13,026,676			
1764	9,613,637	14,626,512			

Trade of Great Britain with Foreign Parts.

1779	9,888,085	11,893,741
1780	9,955,845	11,363,574
1781	11,094,092	9,257,517
1782	8,215,612	10,422,130
1783	11,510,331	12,612,844
1784	13,492,892	13,161,358
1785	14,267,130	13,656,048
1786	13,615,108	14,316,951
1787	15,582,297	14,317,411
1788	15,842,206	14,817,478
1789	15,416,317	16,844,909
1790	16,398,193	17,636,425
1791	17,190,504	20,010,555
1792	17,036,625	22,095,380
1793	16,971,796	17,733,787
1794	19,538,994	22,632,827
1795	20,100,184	22,239,793
1796	20,422,440	25,130,624
1797	17,900,372	23,881,157
1798	25,122,203	27,317,087
1799	24,066,700	29,556,638
1800	23,257,781	34,381,617

The subjoined statement shows the amount of the imports into and the exports from the *United Kingdom*, stated in official and in real value, so far as the latter is recorded, from 1801 to 1864 inclusive.

YEARS.	Official Value.				Real Value.			
	Imports.	Exports.			Imports.	Exports.		
		Produce and Manufactures of the United Kingdom.	Foreign and Colonial Merchandise.	Total Exports.		Produce and Manufactures of the United Kingdom.	Foreign and Colonial Merchandise.	Total Exports.
	£	£	£	£	£	£	£	£
1801	31,786,262	24,927,684	10,437,710	35,365,394	—	Records not complete for these years.	—	—
1802	29,826,210	25,632,549	12,776,180	38,408,729	—		—	—
1803	26,622,696	20,467,531	8,073,874	28,541,405	—		—	—
1804	27,819,532	22,687,909	8,988,654	31,675,963	—		—	—
1805	28,561,270	23,376,941	7,687,551	31,064,492	—		38,077,144	—
1806	26,899,658	25,861,879	7,782,265	33,644,144	—	40,874,983	—	—
1807	26,734,425	23,391,214	7,673,726	31,064,940	—	37,245,877	—	—
1808	26,795,540	24,611,215	5,837,821	30,449,036	—	37,275,102	—	—
1809	31,750,557	33,542,274	12,834,955	46,377,229	—	47,371,393	—	—
1810	39,301,612	34,061,901	9,506,856	43,568,757	—	48,438,680	—	—
1811	26,510,186	22,681,400	6,222,769	28,904,169	—	32,890,712	—	—
1812	26,163,431	29,508,508	9,717,775	39,226,283	—	41,716,964	—	—
1813	Records destroyed	by fire.	—	—	—	—	—	—
1814	33,755,264	34,207,253	19,365,981	53,573,234	—	45,494,219	—	—
1815	32,987,396	42,880,817	15,748,554	58,629,371	—	51,610,480	—	—
1816	27,431,604	35,714,681	13,480,780	49,195,461	—	41,653,930	—	—
1817	30,834,299	40,111,157	10,292,684	50,403,841	—	41,817,540	—	—
1818	36,885,182	42,702,068	10,859,817	53,561,885	—	46,470,863	—	—
1819	30,776,810	33,534,176	9,904,813	43,438,989	—	35,211,401	—	—
1820	32,471,766	38,393,768	10,556,112	48,949,880	—	36,423,959	—	—
1821	30,837,712	40,832,499	10,629,695	51,462,194	—	36,655,302	—	—
1822	30,531,141	44,242,532	9,227,567	53,470,099	—	36,966,023	—	—
1823	35,798,433	43,826,607	8,603,905	52,430,512	—	35,377,041	—	—
1824	37,468,279	48,730,467	10,204,785	58,935,252	—	38,422,404	—	—
1825	44,208,503	47,150,690	9,169,492	56,320,182	—	38,870,945	—	—
1826	37,813,890	40,965,736	10,076,287	51,042,023	—	31,536,723	—	—
1827	44,908,173	52,221,934	9,830,821	62,052,755	—	37,181,335	—	—
1828	45,167,443	52,788,089	9,946,546	62,734,635	—	36,812,757	—	—
1829	43,995,286	56,217,962	10,620,165	66,838,127	—	35,842,623	—	—
1830	46,300,473	61,152,354	8,548,394	69,700,748	—	38,271,597	—	—
1831	49,727,828	60,686,364	10,745,126	71,431,490	—	37,164,372	—	—
1832	44,610,546	65,025,278	11,044,870	76,070,148	—	36,450,594	—	—
1833	45,944,426	69,987,357	9,833,753	79,821,110	—	39,667,348	—	—
1834	49,364,733	73,835,231	11,562,037	85,397,268	—	41,649,191	—	—
1835	49,029,334	78,360,059	12,797,724	91,157,783	—	47,372,270	—	—
1836	57,296,045	85,220,144	12,391,712	97,611,856	—	53,293,979	—	—
1837	54,762,285	72,544,071	13,235,497	85,779,568	—	42,069,245	—	—
1838	61,258,013	92,453,967	12,711,512	105,165,479	—	50,061,737	—	—
1839	62,048,121	97,394,666	12,795,990	110,190,656	—	53,233,580	—	—
1840	67,492,710	102,706,850	13,774,165	116,481,015	—	51,406,430	—	—
1841	64,444,268	102,179,514	14,723,373	116,902,887	—	51,634,623	—	—
1842	65,253,286	100,255,380	13,586,422	113,841,802	—	47,381,023	—	—
1843	70,214,912	117,876,659	13,956,288	131,832,947	—	52,279,709	—	—
1844	75,449,374	131,558,477	14,398,177	145,956,054	—	53,584,292	—	—
1845	85,297,508	134,598,584	16,279,318	150,877,902	—	60,111,082	—	—
1846	75,934,022	132,312,894	16,802,519	148,615,413	—	57,786,876	—	—
1847	90,921,866	126,131,029	20,040,979	146,172,008	—	58,842,377	—	—
1848	93,547,134	132,619,154	18,376,886	150,996,040	—	52,849,445	—	—
1849	105,884,263	164,527,753	25,559,670	190,087,423	—	63,596,025	—	—
1850	100,469,067	175,437,098	21,874,212	197,311,310	—	71,267,885	—	—
1851	110,484,997	190,658,314	23,729,616	214,387,930	—	74,445,722	—	—
1852	109,331,158	196,176,601	23,328,308	219,504,909	—	78,076,854	—	—
1853	123,099,313	214,327,452	27,744,772	242,072,224	—	98,993,781	—	—
1854	124,338,478	214,071,848	29,820,656	243,892,504	152,591,513	99,184,726	18,648,778	115,833,704
1855	117,402,366	226,920,262	31,504,132	258,424,394	143,660,335	95,688,085	21,012,956	116,701,041
1856	131,937,763	258,505,653	33,423,724	291,929,377	172,544,154	115,826,948	23,393,405	139,220,353
1857	136,215,849	255,396,713	30,797,818	286,194,531	187,844,441	122,068,107	24,108,194	146,174,901
1858	138,159,144	271,654,822	33,887,881	305,542,703	164,583,832	116,608,756	23,174,023	139,782,779
1859	145,643,939	297,357,668	37,231,098	334,588,766	179,182,355	130,411,529	25,281,446	155,692,975
1860	164,736,457	315,711,075	43,537,511	359,248,586	210,530,873	135,891,227	28,630,124	164,521,351
1861	171,212,549	289,355,186	50,158,162	339,513,348	217,485,024	125,102,813	34,529,684	159,632,498
1862	160,609,056	240,720,859	50,956,956	291,677,815	225,716,976	123,992,264	42,175,870	166,168,134
1863	171,913,852	258,195,551	54,914,637	313,113,188	248,919,020	146,602,342	50,300,067	196,902,409
1864	173,961,690	267,150,982	54,955,045	322,106,027	274,863,924	160,436,302	52,220,240	212,656,542

It is manifest enough from the preliminary observations, that the scale of prices according to which the official value of the imports and exports is determined having been fixed so far back as 1698, the

COUNTRIES.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
FOREIGN.											
Russia—Northern Ports, Imports	1,299,547	20,173	9,999,579	9,999,104	8,452,979	1,683,575	11,082,798	8,860,521	10,288,153	9,292,004	11,480,769
Exports	1,14,487	452,996	3,158,936	4,621,577	4,833,975	5,727,711	5,119,196	5,321,421	3,224,455	4,838,053	5,713,104
— Southern Ports, Imports	2,952,741	—	1,562,941	3,618,540	3,487,091	3,794,580	5,118,700	4,462,167	4,772,906	3,127,259	3,230,433
Exports	69,552	—	211,918	353,482	428,118	615,455	444,059	444,059	509,163	448,459	973,274
Sweden and Norway, Imports	3,878,979	3,924,813	2,979,795	2,754,313	2,519,224	3,599,659	4,354,305	3,571,925	3,804,189	4,463,162	5,099,372
Exports	1,092,844	1,414,850	1,562,061	1,280,636	1,043,881	1,424,240	1,571,386	1,750,523	1,577,202	1,846,231	2,245,930
Denmark (including Iceland), Imports	2,705,188	2,201,831	2,715,520	1,977,943	1,977,943	2,593,036	2,575,958	2,555,837	2,165,040	2,425,959	2,542,300
Exports	989,728	1,020,282	1,387,087	1,007,180	783,928	1,334,429	916,917	1,141,894	1,129,602	1,218,159	1,603,471
Danish West Indies, Imports	101,562	104,131	46,528	55,577	59,586	124,822	65,992	379,204	75,898	160,352	121,139
Exports	606,906	609,103	653,879	932,391	594,673	767,557	719,532	767,649	731,653	783,407	763,407
Prussia, Imports	9,055,503	10,242,892	4,534,815	6,732,078	4,107,509	4,755,683	7,513,821	6,440,891	7,883,927	6,281,503	5,862,915
Exports	2,515,719	3,116,671	1,558,626	2,637,401	2,674,041	2,296,820	2,879,446	4,057,850	3,968,663	4,219,004	2,314,886
Hanover, Imports	899,117	358,316	377,040	405,827	329,363	199,771	357,251	284,984	276,253	180,643	196,294
Exports	971,273	512,095	1,762,731	2,521,401	2,366,687	1,461,481	1,892,772	1,859,716	1,628,365	1,538,608	1,464,782
Hanse Towns, Imports	6,221,524	4,816,298	5,302,739	5,822,185	4,319,067	5,241,687	7,027,741	6,058,490	5,957,260	6,946,235	7,922,853
Exports	10,133,989	11,694,944	13,395,356	12,599,341	11,577,777	12,742,059	13,779,890	13,046,541	14,115,552	17,133,407	20,763,354
Holland, Imports	6,731,141	6,460,932	7,433,442	7,203,785	6,265,271	6,712,455	8,256,690	7,692,589	7,863,031	8,661,119	11,069,589
Exports	6,893,911	7,169,977	8,262,531	8,895,602	8,093,697	8,159,321	9,752,962	10,989,361	10,641,103	12,664,018	14,053,161
—, Java and Sumatra, Imports	214,384	172,433	40,893	151,684	67,861	290,321	349,919	191,203	96,026	22,417	13,749
Exports	641,912	533,752	776,275	754,347	836,062	1,150,407	1,425,794	1,096,004	780,682	655,170	801,911
Belgium, Imports	3,631,161	2,533,732	2,935,796	3,392,046	3,060,654	3,532,891	4,079,245	3,817,800	4,876,212	5,174,221	6,410,959
Exports	3,355,672	3,947,207	4,013,017	3,919,336	4,328,939	3,703,546	3,964,670	4,914,359	4,550,152	5,059,722	5,979,754
France, Imports	10,447,774	9,146,418	10,386,522	11,965,407	13,271,890	16,870,858	17,774,037	17,826,646	21,675,516	24,025,717	25,640,551
Exports	6,991,465	10,421,881	10,471,077	11,295,823	9,242,201	9,561,956	13,701,372	17,427,271	21,705,666	23,294,566	23,825,403
—, Algeria, Imports	68,884	19,127	16,174	17,236	17,141	5,212	1,572	30,322	47,264	104,204	137,467
Exports	12,367	21,268	20,233	19,406	21,105	21,980	43,754	20,955	47,126	13,767	12,244
—, Possessions in Senegambia, Imports	9,141	11,380	5,463	10,500	15,845	10,891	877	4,017	11,389	5,031	7,462
Exports	56,982	46,122	103,011	123,126	79,165	24,633	110,625	79,752	166,176	117,036	117,987
—, India, Imports	—	—	—	8,060	831	—	1,472	—	—	—	—
Portugal, Imports	2,101,126	1,962,044	2,164,090	2,485,723	1,079,775	1,510,740	1,880,149	1,969,899	2,040,396	2,333,809	2,892,506
Exports	1,519,600	1,535,371	1,889,224	1,779,861	1,669,101	1,671,072	2,041,236	2,385,105	1,888,255	2,638,268	2,475,354
—, Azores and Madeira, Imports	373,707	331,449	266,228	289,487	337,237	388,633	434,524	363,816	338,923	389,334	359,313
Exports	128,558	132,688	94,654	123,034	134,541	106,107	167,387	164,623	159,887	169,467	205,941
Spain and Balearic Islands, Imports	5,894,501	4,799,728	6,645,083	3,684,787	2,258,288	3,285,394	3,991,730	4,458,327	4,844,324	4,844,324	5,673,638
Exports	1,436,106	1,293,992	2,112,303	2,545,288	2,366,562	2,125,586	2,623,291	3,386,434	3,778,398	4,481,407	3,845,360
—, Canary Islands, Imports	88,309	133,439	162,729	131,723	117,141	177,989	118,715	174,347	141,754	147,404	127,437
Exports	88,920	116,942	130,018	115,278	116,848	144,714	141,670	132,460	152,766	141,333	176,886
—, Fernando Po, Imports	125,801	158,136	111,169	23,182	3,199	8,767	24,054	25,007	14,030	22,335	26,248
Exports	67,045	54,527	17,806	12,716	12,257	6,858	24,574	15,049	17,802	32,314	19,005
—, Cuba and Porto Rico, Imports	3,369,444	2,332,753	2,654,580	3,471,133	3,798,778	3,498,707	3,288,116	4,271,793	4,281,083	4,276,040	6,305,735
Exports	1,078,588	1,100,678	1,424,027	1,917,180	1,916,220	1,752,060	1,609,698	1,460,269	1,966,300	2,225,385	3,176,128
—, Philippine Islands, Imports	652,133	619,179	866,530	891,648	745,178	776,776	606,798	846,369	708,866	1,392,198	854,435
Exports	354,972	400,482	426,641	588,432	549,389	690,890	679,320	731,988	468,890	576,080	790,088
—, Sardinia, Imports	130,449	247,231	238,258	206,786	148,337	216,732	285,713	263,344	263,198	281,191	227,512
Exports	1,225,008	1,109,921	1,041,667	1,573,666	1,361,140	1,839,120	2,297,192	2,733,164	2,741,072	1,018,052	1,252,717
—, Tuscany, Imports	751,595	747,957	554,437	534,494	538,500	648,420	575,064	560,917	441,088	558,471	398,722
Exports	637,736	885,171	1,045,540	903,061	1,086,670	1,198,257	1,264,998	1,264,998	3,086,654	1,294,468	1,123,273
—, Two Sicilies, Imports	1,411,457	1,281,940	1,505,582	1,897,680	1,856,522	1,632,317	1,867,904	1,540,453	1,805,289	1,448,218	1,522,463
Exports	672,291	1,096,441	1,400,108	1,249,430	1,787,300	1,344,063	1,479,960	2,340,274	1,891,074	2,641,879	2,716,641

COUNTRIES.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
FOREIGN—Cont.											
Adriatic Ports—Ant-											
con & Romagna,	67,848	104,217	184,591	60,805	96,656	85,119	39,843	119,250	48,786	70,928	42,410
Papal Ports on the	156,691	148,480	392,577	326,884	420,966	265,601	802,371	494,113	508,288	444,823	372,543
Mediterranean,											
Austria, ...	846,202	1,019,028	902,432	648,813	669,565	968,597	986,361	1,246,046	1,179,844	879,457	881,308
Exports	894,433	940,833	1,490,949	1,450,867	1,596,445	1,027,352	1,458,098	1,705,659	1,701,042	1,509,670	1,254,872
Greece, ...	95,607	731,915	1,427,289	570,915	696,352	696,352	677,341	780,544	917,042	980,435	910,924
Exports	94,373	238,658	280,271	219,405	280,515	305,696	374,211	394,196	914,197	888,801	707,075
Turkey, ...	2,919,298	2,994,371	2,883,929	2,347,282	2,604,606	2,728,415	3,190,315	3,636,892	4,361,009	5,201,920	5,663,139
Exports	3,076,081	4,088,029	4,708,020	3,623,295	4,576,488	4,042,949	4,588,108	5,103,957	3,853,927	6,007,444	6,304,983
Wallachia and	446,913	64,080	474,782	569,885	1,213,316	1,047,506	2,232,245	1,123,290	633,524	634,738	381,607
Moldavia, ...	16,615	47,037	172,074	222,283	210,263	127,921	201,273	166,348	220,431	182,903	197,045
Syria and Pales-	108,819	134,479	130,526	184,779	150,150	84,779	72,880	77,425	126,242	121,873	261,569
time, ...	335,928	376,137	773,420	711,559	774,416	698,437	668,548	884,544	603,513	1,054,910	1,397,110
Egypt, ...	3,555,283	3,674,137	5,753,518	7,853,878	6,026,191	8,572,311	10,347,642	8,398,493	12,223,783	16,495,582	19,692,235
Exports	1,367,248	1,571,906	1,690,830	1,955,446	1,411,075	2,341,893	2,508,912	2,398,479	2,550,069	4,511,883	6,195,910
Morocco, ...	231,583	379,631	482,940	344,301	291,085	283,562	280,434	438,688	434,071	457,382	272,243
Exports	92,556	162,321	120,344	190,097	120,344	114,898	214,510	187,736	212,146	235,236	224,542
United States and Cali-	29,795,302	25,741,752	36,047,773	33,647,227	34,357,515	34,294,042	27,727,202	49,380,554	17,927,010	19,572,577	17,924,577
fornia, ...	22,333,403	18,062,903	22,616,577	20,076,895	15,735,701	24,417,892	22,907,681	11,025,683	19,173,907	19,696,755	20,183,566
Mexico, ...	220,605	230,791	342,383	342,383	317,568	380,509	491,221	397,559	619,508	2,294,537	3,139,334
Exports	463,884	614,873	929,640	911,643	450,616	647,358	538,949	652,862	816,879	1,485,918	2,232,695
Central America, .	185,166	277,335	252,634	323,764	176,726	296,854	2,486	313,869	492,340	1,455,918	427,394
Exports	71,940	153,361	187,942	271,994	64,900	112,400	123,067	137,471	172,246	146,447	252,921
Haiti and San Domingo,	198,099	161,208	187,942	271,994	64,900	112,400	123,067	137,471	172,246	146,447	252,921
Exports	376,065	440,492	486,453	478,765	495,528	562,124	555,190	433,060	479,842	545,192	439,876
New Granada, . .	282,853	608,717	515,024	573,025	545,328	781,243	884,500	837,436	826,083	774,311	1,684,508
Exports	41,996	47,012	36,890	29,505	39,141	21,035	24,940	24,556	9,897	23,737	2,119,169
Venezuela	507,033	386,515	363,300	384,801	320,704	326,848	327,357	434,086	229,901	411,940	403,436
Exports	28,907	57,457	49,125	62,037	133,108	3,501	107,633	81,802	95,023	68,608	26,965
Ecuador, ...	13,611	9,616	23,470	24,169	28,075	23,474	76,271	156,911	1,076	10,060	5,899
Exports	2,083,589	2,273,819	2,299,048	3,502,324	2,975,497	2,828,770	2,269,180	2,631,480	4,414,187	4,491,000	7,019,992
Brazil, ...	3,011,822	3,441,278	4,264,516	5,762,682	4,161,887	3,840,904	4,571,308	4,900,875	3,890,342	4,082,641	3,039,343
Exports	388,996	430,292	576,247	642,769	532,307	711,105	867,328	639,717	992,325	1,220,629	1,009,271
Uruguay (Monte Video),	471,240	302,528	404,614	592,968	529,786	1,613,792	944,002	692,087	467,688	549,042	1,006,554
Exports	1,285,186	1,052,083	981,193	1,573,558	1,194,977	763,792	1,097,755	1,133,071	1,133,071	1,239,551	1,103,181
Argentine Confederation,	1,269,690	768,825	1,042,221	1,342,419	1,036,204	957,743	1,820,985	1,403,227	689,295	1,348,122	1,782,090
Exports	1,380,563	1,925,271	1,700,776	1,932,682	1,900,322	1,969,547	2,586,217	2,416,895	2,863,434	2,988,862	3,088,061
Chili, ...	1,465,444	1,387,073	1,460,938	1,568,853	1,156,556	1,510,176	1,737,929	1,380,533	979,344	1,474,040	1,790,586
Exports	3,138,527	3,843,288	3,048,694	4,412,589	4,822,263	3,645,002	2,581,142	1,969,532	2,994,092	3,565,728	2,655,431
Peru, ...	971,525	1,346,498	1,072,164	1,200,419	1,181,150	806,030	1,438,172	1,221,018	896,365	1,055,065	1,324,458
China (including Hong	9,125,040	8,746,590	9,421,648	11,448,639	7,075,509	9,014,310	9,323,764	9,070,445	12,137,095	14,186,310	15,673,896
Imports	1,027,116	1,303,992	2,286,734	2,505,172	2,966,432	4,586,236	4,940,446	4,940,446	3,237,336	4,908,785	1,989,959
Kong, ...	1,528,896	1,516,729	1,657,375	1,892,162	1,563,085	1,517,177	1,776,565	1,480,959	1,703,738	1,389,953	1,037,395
Western Coast of Africa,	808,941	1,059,638	890,216	1,017,575	781,755	906,091	1,145,847	1,476,432	1,175,506	813,109	688,158
Imports	848,549	1,335,094	770,886	936,223	859,223	970,728	1,292,847	1,452,434	1,550,935	2,150,970	2,276,043
Other Countries, .	224,899	214,732	240,166	394,120	269,245	563,892	384,068	555,955	372,497	715,636	1,324,518
TOTAL OF FOREIGN	118,239,554	109,959,539	129,517,568	141,661,245	125,969,434	139,708,900	167,571,386	164,946,878	160,588,446	165,594,180	184,019,087
COUNTRIES, . . .	79,446,217	88,232,224	103,362,596	106,497,772	97,774,106	108,063,725	130,594,414	116,271,905	121,909,391	143,450,659	158,677,063

COUNTRIES.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.
BRITISH POSSESSIONS:											
Channel Islands, ...	£ 330,121	£ 244,501	£ 294,678	£ 377,738	£ 414,698	£ 478,055	£ 686,462	£ 836,772	£ 646,801	£ 648,508	£ 836,465
Imports	618,318	601,121	713,695	709,435	659,690	745,446	945,595	822,024	946,869	1,012,572	1,208,569
Exports	65,961	70,622	52,695	48,139	48,750	44,268	132,511	133,591	97,559	69,180	117,059
Gibraltar, ...	830,579	906,185	960,395	720,415	923,375	705,739	1,144,233	1,163,142	1,144,698	1,471,451	1,383,028
Imports	303,378	201,075	215,202	161,312	88,690	165,858	138,390	143,437	110,519	158,563	138,013
Exports	472,318	702,313	616,273	511,957	523,788	707,465	795,966	678,691	617,901	726,179	870,809
Ionian Isles, ceded to	164,913	184,632	307,975	208,571	322,589	109,640	277,141	213,135	339,254	435,031	128,870
Imports	146,850	231,246	401,045	278,149	389,941	109,640	277,141	213,135	339,254	435,031	128,870
Exports	7,192,134	4,693,065	6,854,324	6,899,110	4,679,486	5,474,025	6,898,662	8,077,980	8,469,393	8,163,613	6,850,744
Greece, 2nd June, 1864, ...	6,281,303	3,080,170	4,278,507	4,668,560	3,448,336	3,965,671	3,884,810	4,155,352	4,581,353	5,226,932	6,289,646
Imports	567,234	424,364	485,110	468,560	337,820	286,671	300,299	297,138	278,746	297,873	372,223
Exports	143,976	173,521	212,114	166,102	144,589	122,515	153,666	207,138	185,504	175,451	175,451
West India Islands and	5,613,538	5,470,212	5,736,043	7,124,666	6,342,327	5,397,969	5,992,041	5,865,055	6,285,027	8,003,238	11,076,260
Imports	2,069,143	1,982,601	2,095,444	2,600,795	2,477,127	2,425,275	2,638,394	2,677,770	3,353,529	4,215,363	4,611,849
Exports	4,301,868	4,500,200	5,575,362	5,925,305	5,291,287	5,894,641	6,493,243	6,907,187	7,131,802	7,160,666	10,089,329
Australia, ...	13,405,986	7,221,625	11,672,389	13,175,125	11,612,696	12,495,285	10,599,247	11,530,904	12,847,295	13,641,204	12,826,228
Imports	10,672,862	12,668,732	17,262,851	18,650,253	14,989,030	15,244,860	15,106,597	21,968,752	34,193,555	48,434,740	52,287,869
Exports	9,620,710	10,353,475	11,024,518	12,191,960	17,394,400	20,782,853	17,684,598	17,053,355	15,346,436	20,817,409	20,783,864
British India, ...	794,105	615,738	806,490	940,181	691,299	1,082,385	1,054,041	1,913,425	2,375,813	2,066,817	2,066,817
Imports	540,418	691,299	891,582	921,728	989,188	1,456,696	1,718,686	1,913,425	1,530,322	1,850,322	1,850,322
Exports	1,506,646	1,474,251	1,304,174	1,508,897	1,679,852	1,456,391	2,271,648	2,251,019	2,488,262	3,200,456	3,200,456
Ceylon, ...	413,504	325,897	411,095	549,054	570,404	697,825	711,598	608,349	607,215	1,382,320	1,382,320
Imports	1,677,533	1,723,807	2,427,007	2,288,188	1,534,952	1,639,657	1,854,264	1,914,042	1,982,270	1,982,270	1,982,270
Exports	401,146	317,945	437,157	682,200	654,001	582,107	564,787	589,750	542,120	519,369	519,369
Cape of Good Hope and	691,352	949,640	1,582,898	1,793,717	1,723,445	1,684,646	1,715,502	1,421,647	1,517,851	1,919,843	1,919,843
Imports	985,266	836,760	1,417,465	1,949,224	1,812,881	2,045,435	2,169,731	2,101,616	2,034,568	1,626,345	2,287,771
Exports	71,253	113,287	75,531	86,509	81,829	42,763	51,577	74,466	91,836	89,268	198,506
Coast, ...	134,885	128,306	118,751	114,364	105,906	75,103	106,069	157,893	140,149	101,568	134,702
Imports	28,002	29,326	19,522	23,273	31,368	22,555	26,300	47,015	45,246	37,253	47,202
Exports	75,307	76,062	65,205	78,611	70,759	59,747	41,994	61,901	90,790	101,870	45,196
Gambia, ...	153,559	141,167	99,982	107,062	145,050	98,798	68,261	72,732	97,692	61,666	58,890
Imports	130,814	177,000	198,456	258,119	142,204	184,963	238,793	203,305	190,682	229,904	180,013
Exports	15,140	3,323	8,383	31,041	189,736	97,185	72,928	19,606	23,157	36,364	26,150
Other Possessions, ...	74,521	69,964	91,236	101,031	89,438	183,424	121,278	89,863	134,264	107,306	99,571
Imports	—	6,953	48,420	—	—	—	—	—	—	—	—
Exports	29,831	571,595	152,160	—	—	—	—	—	—	—	—
TOTAL OF BRITISH POSSESSIONS, ...	£ 34,149,499	£ 33,583,311	£ 40,026,586	£ 46,188,196	£ 38,614,398	£ 39,474,155	£ 42,950,457	£ 52,598,146	£ 65,128,530	£ 83,394,840	£ 90,844,537
Imports	36,374,575	35,456,076	42,857,757	39,676,529	42,008,673	47,039,250	43,996,937	43,360,593	44,258,736	53,411,758	53,942,551
Exports	—	—	—	—	—	—	—	—	—	—	—
TOTAL OF FOREIGN COUNTRIES, ...											
Imports	152,389,053	143,542,850	179,544,154	187,844,441	164,583,832	179,182,355	210,530,873	217,485,024	225,716,576	248,919,020	274,863,924
Exports	115,821,092	116,691,300	139,220,363	146,174,301	138,762,779	155,632,975	164,521,351	159,692,498	186,108,184	196,902,409	212,619,614

account is of no use as showing their true value; but it possesses some interest as indicating the fluctuations in their quantity. Unfortunately, however, the means do not exist of giving the quantities of the various articles imported and exported at different periods during the last century. The tables published by Sir Charles Whitworth, Mr. Macpherson, and others, specify only the aggregate official values, without specifying the articles or their values of which such imports and exports consisted, the records having been destroyed by the burning down of the Custom House in the year 1814.

In the preceding tables we have, however, given as complete a view of the trade of this country with all parts of the world from 1725 down to 1864, both inclusive, as can be derived from existing means of information.

The preceding statistics record the real value of total imports from, and of total exports to, the various foreign countries and British possessions, from 1854 to 1864 inclusive.

The chief articles of import during the present century have comprised—coffee, tea, sugar, spirits, spices, tobacco, wine, corn, cotton, wool, drugs, silks, tallow, hides and skins, timber and wood. In the last fifteen years—cattle, provisions of all sorts, seeds of various kinds, gutta-percha, and a lengthy list of miscellaneous articles, have been imported to an extent far beyond that contemplated on the remission of the Customs duties thereon.

During the first half of last century, and previously, woollen manufactures formed the principal article of home produce exported from Great Britain; next in importance were hardware and cutlery, leather manufactures, linen, tin, lead, copper and brass manufactures, coal, earthenware, and articles of apparel. Corn also, down to the year 1770, formed a considerable item in the list of exports; since that period, however, the balance of the corn trade has been with few exceptions very decidedly on the side of importation. Cotton was of small moment as an article of export till after 1770; but subsequently the extension and improvement of cotton manufactures has been so enormous that the value of cotton stuffs and cotton yarn amount, at present, to more than one-third of the entire exports of British produce and manufactures. [COTTON MANUFACTURES.]

On taking a review of this important subject, one cannot fail to be struck with the marvellous increase which has taken place in the import and export trade of this country within the last few years, as the preceding tables abundantly testify. It is, however, unnecessary here to reproduce the statistics of the various commodities which have contributed to swell the totals to such enormous magnitudes, inasmuch as the import and export accounts for every staple are set forth under its proper designation. (For much of the preceding matter we are indebted to two Reports of the *Inspector-General of Imports and Exports*—Mr. Messenger—and to *Parliamentary papers for 1865*.)

IMPOST (*Imposta*, Ital.), the horizontal mouldings serving as a sort of cap or cornice to the piers of arches, and by which the archivolt or curved mouldings and fasciæ surrounding the arches themselves are supported. Imposts are contrary to the

genius of the Pointed style, but generally essential in Roman and Græco-Roman architecture.

IMPOUNDING. Occupiers of land have the right to seize and impound all cattle which may stray on their property. They may either detain them on their own premises, or take them to the nearest pound—that is, a public place inclosed for the purpose—till the amount of damage which they have committed is paid for. In either case they must feed and water the cattle (at the owner's expense), and they cannot impound them at all unless they are found actually straying on their land. In Scotland the power is called the pounding of strayed cattle.

IMPREGNATION (in Vegetable Physiology). Plants in their more perfect species are furnished with organs, by the mutual action of which they are multiplied, the matter contained in the one fertilizing that which belongs to the other, and the result being a young plant, or embryo, or vegetable foetus. In what way this occurs is still very obscure, although modern observation has thrown some light upon the subject.

In a perfect plant the anther contains a matter called pollen. The pollen is a congeries of excessively small hollow cases, having to the eye the appearance of fine dust. Each case contains a mucilaginous residuum, which at the proper time is discharged, and falls upon the open orifice of the pistil. This process appears necessary to the formation of the seed, and is called impregnation. [EMBRYO; STAMEN.]

IMPRESSION. [SEAMEN.]

IMPRIMATUR, a license to print a book, &c., which is granted by the licenser in those countries where censorship of the press is exercised in its rigour. The power of granting or withholding it was assumed by an act of the Long Parliament passed in 1647. After the Restoration the same power was assumed by King, Parliament, and Privy Council. This state of things continued till the Revolution.

IMPROPRIATION. [BENEFICE.]

IMPROVVISATORI are extempore versifiers upon any subject. This practice is of frequent occurrence in Italy. The improvvisatore delivers his verse, generally accompanied by a guitar, and with a sort of chanting cadence; and he spins out hundreds, nay, at times thousands of lines, with apparent ease: whole dramas have been thus delivered.

Some improvvisatori have been men of real information and poetical genius, and their compositions are consequently superior to the majority. Gianni, of Genoa, was made improvvisatore to Napoleon's court, and Sgricci, of Florence, became known throughout Europe by giving specimens of his art in the various capitals. Several ladies have distinguished themselves in the same art; they are styled improvvisatrici.

IMPULSE is that cause by which velocity is suddenly communicated to a body, apparently in an instant and without any perceptible gradations of motion.

Though the term impulse may be of convenient application to cases of motion in which velocities are changed very rapidly, it must be remembered that the idea of absolutely instantaneous change of velo-

city is in no degree less absurd than that of a point which is in two different positions at the same instant of time. Impulse, then, must be considered as pressure which, beginning from nothing, increases so rapidly with the time as to produce large effects in a small fraction of a second. [PRESSURE.]

INA, called also INAS, and IN, king of the West Saxons, and one of the kings of the heptarchy, was the son of Cenred, king of Wessex. He succeeded Ceadwalla, but how is not known, in 689, in the lifetime of his father Cenred; for a collection of laws which he published in the fifth year of his reign are stated in the introductory paragraph to have, been enacted with the advice of Cenred and other counsellors. These laws of Ina, to quote the summary of Dr. Lingard, 'regulated the administration of justice, fixed the legal compensation for crimes, checked the prevalence of hereditary feuds, placed the conquered Britons under the protection of the state, and exposed and punished the frauds which might be committed in the transfer of merchandise and the cultivation of land.' In 728 Ina resigned his crown, and retired to Rome, where he died before the end of the year.

INARCHING. [GRAFTING.]

INCA. [PERU.]

INCANDESCENCE. [IGNITION.]

INCANTATION, a term used to denote that mode of magic which was supposed to gain its efficacy from mysterious words uttered by the magi. Incantations were generally accompanied by the mixing of drugs and the performance of other magical rites, and the powers ascribed to them pass the bounds of modern credulity.

In a few remote regions even of our own country, incantations are still in use for curing dislocations and some diseases. In Chambers' 'Popular Rhymes of Scotland,' an account is given of the manner in which sprains are sought to be healed at the present day in the Shetland isles. The operation is thus described: 'When a person has received a sprain, it is customary to apply to an individual practised in casting the "wresting thread." This is a thread spun from black wool, on which are cast nine knots, and tied round a sprained leg or arm. During the time the operator is putting the thread round the affected limb, he says, but in such a tone of voice as not to be heard by the bystanders, nor even by the person operated upon—

Our Lord rade, His foal's foot slade;
Down he lighted, His foal's foot righted.
Bone to bone, Sinew to sinew,
Blood to blood, Flesh to flesh;
Heal, in name of the Father, Son, and Holy Ghost.'

INCENDIARY. [ARSON.]

INCENSE, perfumes exhaled by fire, and formerly used in honour of some god or goddess. Among the Jews the burning of incense was an act of worship, and appears to have been exclusively used for this purpose by them, as it was also by the Egyptians. By the Persians it was offered as a mark of honour to royalty.

In the Roman Catholic Church it has been used from time immemorial, and continues to be so in the service of high mass, in solemn consecrations, and in the burial of the dead. At the Reformation the Protestant clergymen abandoned the use of incense, as

unwarranted by Scripture; but it has recently been revived in one or two of the extreme 'high' churches. Incense, such as used in the present day, is usually made of gum olibanum, styrax, benzoin, and powdered cascarilla bark mixed together, placed in the censer in such a manner that when moved the ingredients fall on a hot plate, which immediately volatilizes them, and diffuses their odour through the building.

INCEST. During the Protectorate, in the year 1650, incest and adultery were made capital offences, but at the Restoration this law was not confirmed. Incest in England is now only punishable by the ecclesiastical courts, according to the rules of the canon law, which also determines what kind of sexual connection is incest. The notion of incest is founded solely upon the degree of consanguinity or affinity between the parties who have had the sexual connection. [MARRIAGE.]

INCHBALD, MRS. ELIZABETH, whose maiden name was Simpson, was the daughter of a farmer residing near Bury St. Edmund's. She was born in 1753. Losing her father in youth, she ran away at the age of sixteen to seek her fortune. After several adventures, she obtained a place in a country theatre, and soon married Mr. Inchbald, a respectable actor, much older than herself. Mr. and Mrs. Inchbald performed for four seasons in Edinburgh, and, after an engagement at York, went to France for a time. In 1779 Mr. Inchbald died at Leeds; and in the winter of 1780–81 Mrs. Inchbald played secondary parts at Covent Garden. She continued on the stage till 1789. She had begun to write dramatic pieces several years before her retirement from the stage; the first of these, a slight afterpiece, was successfully acted and printed in 1784; and from that time till 1805 she wrote plays in rapid succession, producing nineteen in all, one of which, 'Lovers' Vows,' is an adaptation from Kotzebue. They gained for her the means not only of supporting herself, but of making a handsome allowance to an invalid sister, and of saving a considerable sum. Her melodramatic comedy of 'Such Things Are' produced for her more than four hundred pounds: as much was the result of 'Wives as they Were and Maids as they Are;' and for 'Every One has His Fault,' the most strongly characterized of her plays, she received seven hundred pounds. Mrs. Inchbald's literary talents are best exhibited by her two novels, 'A Simple Story,' first published in 1791, and 'Nature and Art,' in 1796. She died on the 1st of August, 1821, at Kensington, leaving nearly 6000*l.* in legacies to her relatives and friends, to the Roman Catholic poor, and to the Covent Garden Theatrical Fund. She had written an account of her own life, for which she refused a thousand pounds; and, in obedience to her will, it was destroyed after her death: but her journal, kept regularly for many years, was preserved, and from it and her letters were written Mrs. Boaden's 'Memoirs of Mrs. Inchbald,' 1833.

INCHCOLM (*Insula Sanctæ Columbæ*), a small island in the Frith of Forth, near Edinburgh, and lying a short distance to the north-west of Granton harbour. It is noticed by Shakspeare as 'Saint Colm's Inch' (*Macbeth*, act. i., scene 2). The isle is not more than a third of a mile broad, and nearly three-quarters of a mile in length. St. Columba,

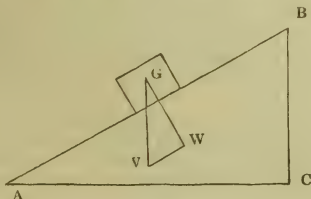
from whom it takes its name, is said to have long dwelt here. Alexander I. of Scotland was shipwrecked on it in 1223, and in gratitude founded an abbey on the island, traces of which, and of ecclesiastical buildings of a later date, are still to be seen. At the last census it was inhabited by seven persons. The word *inch*, it may be added, signifies 'island.'

INCIDENCE, ANGLE OF, the angle made by a straight line which passes through any point of a line or surface with the perpendicular to the tangent, or tangent plane of that line or surface, drawn through the point in question.

INCLINATION. The inclination of two lines is a phrase commonly used for the angle which they make with one another; thus, two lines which make a very small angle are said to be at a very small inclination to each other.

INCLINATION OF MAGNETIC NEEDLE.
[MAGNET, MAGNETISM.]

INCLINED PLANE, a plane surface making any angle with the horizon. A body placed on it is capable of being moved upwards along it with more facility than it can be raised in a vertical direction. The principle on which it constitutes a mechanical power was first introduced by Stevinus in the sixteenth century, and may be explained as follows:—Let AB represent a section of the plane, and G a section of the weight. Let GV represent the magnitude and direction of the weight, and draw GW and WV perpendicular and parallel to AB. Then [COMPOSITION] the pressure GV is equivalent to the two pressures GW and WV, of which the former is destroyed by the resistance of the plane, and the latter only acts to propel the heavy body down the plane. Now VW is to VG as BC is to AB; that is, a weight placed upon an



inclined plane is propelled down the plane by such a fraction of the whole pressure of the weight as the height of any section of the plane is of its length.

If, then, it were required to draw the heavy body G up the plane, any pressure exceeding WV would be sufficient for the purpose; and a pressure equal to WV, applied in the direction AB, would keep the weight at rest.

If a body be allowed to descend by gravity on an inclined plane, the force of descent is to the force downward, in a vertical direction, as WV to GV, or as AB to BC; that is, if θ be inclination BAC, and g represent the force of gravity vertically, as $g \sin \theta$ to g . Hence, if v represent the velocity on the plane and s the space descended from a state of rest in the time t , we have $v = g \sin \theta t$, $s = \frac{1}{2} g \sin \theta t^2$, and $v^2 = 2g \sin \theta s$. [ACCELERATED MOTION.]

From these formulæ it may be shown that the

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velocity acquired by a body in descending from the top to the foot of a plane, whatever be its inclination, is the same as in falling vertically from the top to a horizontal plane passing through the foot.

If k be a fraction representing a portion of a weight W , to which the friction is equivalent; then, $W \cos \theta$ (represented by GW) being the pressure of W on the plane, $k W \cos \theta$ will represent the resistance caused by friction on the plane; and, if this be less than $W \sin \theta$, the impelling force on the plane, the weight will move downwards with an accelerating force $g (\sin \theta - k \cos \theta)$.

There are many remarkable properties connected with the motion or equilibrium of bodies on inclined planes; but the preceding are those which are most fundamental and most frequently required.

INCLOSURE. The term Inclosure is applied to the inclosing and partitioning of lands in England and Wales, which are comprehended under the general name of Commons or Common Lands. It is necessary to define the terms Commons and Commonable Lands. Commons or Common Lands are lands in a state of nature or waste, of which individuals have not the severalty. Commonable Lands are those lands which during a part of the year are in severalty, that is, occupied severally by individuals as their own, to the exclusion for the time of other people. [COMMONS.]

Common Rights, that is, rights of pasture and so forth on commons or waste lands, are described generally under COMMON, RIGHTS OF. Common pasture lands require an improved management. They are generally overstocked, partly in consequence of persons turning out more stock than they have a right to do, and partly by persons putting their stock on the common who have no right so to do.

In fact, for many years it was the opinion of competent judges that very great advantages would result from the general inclosure and allotment of commons, or part of them, for the purpose of cultivation, and in 1836 an Act (6 & 7 Will. IV. c. 115) was passed for facilitating the inclosure of open and arable fields in England and Wales. Previous to that time nearly every inclosure had to be effected by means of private Acts of Parliament, the expense of obtaining which and the trouble attendant in the carrying their provisions into effect, often prevented the inclosure being attempted.

In pursuance of the recommendation of a Committee of the House of Commons, which sat in 1844, an Act of Parliament was passed in 1845 (8 & 9 Vict. c. 118), the object of which is thus stated in the preamble:—'Whereas it is expedient to facilitate the inclosure and improvement of commons and other lands now subject to the rights of property which obstruct cultivation and the productive employment of labour, and to facilitate such exchanges of lands, and such divisions of lands intermixed or divided into inconvenient parcels, as may be beneficial to the respective owners; and it is also expedient to provide remedies for the defective or incomplete execution, and for the non-execution of powers created by general and local acts of inclosure, and to authorize the renewal of such powers in certain cases,' &c.

The principal provisions of this Act are, that no

A A

lands within fifteen miles of London, or within certain distances of other towns, which distances vary according to the population, shall be inclosed without the previous authority of Parliament in each particular case, nor were any town or village greens to be inclosed at all. The 30th section also provides that the commissioners to be appointed under the Act might set apart an allotment for the purposes of exercise and recreation for the inhabitants of any neighbourhood, and the 108th section makes regulations as to 'the allotment which, upon any inclosure under this Act, shall be made for the labouring poor.' Sections 147 and 148 provide for the exchange of lands not subject to be included under the Act, or subject to be inclosed, as to which no proceedings for an inclosure shall be pending, and for the division of intermixed land under the same circumstances.

In accordance with this Act, two commissioners, with a secretary, were appointed, under whose management its provisions have been, and are still being, extensively carried into operation. The commissioners make yearly reports to Parliament of the proceedings which have taken place, and Acts are passed almost every year confirming the inclosures submitted by the commissioners for approval. By the 22 & 23 Vict. c. 43, the Inclosure Acts were further amended and extended. The main object of the Act is to protect the lord of the manor's rights in mines, minerals, stone, or other substrata under the land to be inclosed, and for the purpose of providing compensation. Directions are also contained as to the assessment of damages. In their twentieth annual report, presented in 1865, the Inclosure commissioners state that since the passing of the Act the number of applications of all kinds has been 4658, and the whole acreage of inclosures confirmed was 454,437, while the acreage of those in progress amounted to 250,313 acres.

During the last seven years the number of applications and extent of inclosures have been equal to those of the previous thirteen, which seems to indicate that as the Act becomes better known its provisions are found to be well adapted to remedy the evils stated in the evidence before the select committee, and there can be no doubt that agriculture has been greatly improved, the productiveness of the land increased, and additional employment given to labour by this judicious and important piece of legislation.

INCOMBUSTIBLE FABRICS. Owing to the

great number of deaths which of late years have resulted from ignition of the clothing of women and children, many experiments have been made with the view of rendering linen, calico, and muslin garments incombustible. Many chemical preparations possess this property; but the two most recommended as being cheap, easily applied, and not liable to injure the colour or the material, are sulphate of ammonia and tungstate of soda. Of the first, a solution containing 7 per cent. of the crystalline salt is a perfect preservative; of the latter, a proportion of four ounces of tungstate of soda to one drachm of phosphate of soda, dissolved in a pint of water, will be found efficacious. The fabric should be dipped in the solution, or wetted all over with it, before ironing it. So simple a precaution ought to be universally adopted.

INCOME TAX. All persons in the United Kingdom whose incomes are over 100*l.* per annum—whether derived from property or labour—are liable to income tax. The amount has varied from time to time, the present (March, 1866) rate being 4*d.* in the *£.*—the lowest ever known. Persons whose incomes are under 200*l.* per annum are also allowed to deduct 60*l.* from the net amount, and pay only on the remainder. Income tax was first levied by Pitt, and revived by the late Sir Robert Peel in 1842, since which date it has regularly continued, and has always formed a marked feature in the budgets of Mr. Gladstone. Great difference of opinion prevails as to the fairness and public policy of the tax, the strongest arguments against it being its inquisitorial character, and its making no difference between professional and property incomes. The mode of collection is also much objected to; and if it is to be retained as a permanent tax there can be no doubt that the present district assessors—who often have to assess such persons as their rivals in business on the one hand, and their immediate friends on the other—should be replaced by the officers of the Inland Revenue, who could have no beneficial interest in knowing the incomes of persons amongst whom they may be placed.

The amount of income charged with income-tax in the United Kingdom in the year ending the 5th April, 1864, was 326,775,501*l.*—namely, 276,514,250*l.* in England, 27,137,918*l.* in Scotland, and 23,123,333*l.* in Ireland.

The following table gives the rate of income tax and the amount of revenue derived from it for the seven years ending March 31, 1865:—

	1859.	1860.	1861.	1862.	1863.	1864.	1865.
	Rate. 5 <i>d.</i> in the <i>£.</i> on all incomes.	Rate. 9 <i>d.</i> in the <i>£.</i> over 150 <i>l.</i> 6½ <i>d.</i> between 100 <i>l.</i> and 150 <i>l.</i>	Rate. 10 <i>d.</i> in the <i>£.</i> over 150 <i>l.</i> 7 <i>d.</i> between 100 <i>l.</i> and 150 <i>l.</i>	Rate. 9 <i>d.</i> in the <i>£.</i> over 150 <i>l.</i> 6 <i>d.</i> between 100 <i>l.</i> and 150 <i>l.</i>	Rate. Same as in 1862.	Rate. 7 <i>d.</i> in the <i>£.</i> on all incomes, but 60 <i>l.</i> allowance as those under 200 <i>l.</i>	Rate. 6 <i>d.</i> in the <i>£.</i> and the same allowance as 1864.
SCHEDULE.							
A. Land, &c., ...	3,188,038	4,532,870	5,136,623	5,044,655	5,060,656	4,343,126	3,803,830
B. Occupation, ...	384,564	549,509	611,929	587,738	592,080	501,433	436,654
C. Funds, ...	741,087	1,040,775	1,187,821	1,024,925	1,062,802	957,186	754,280
D. Trades and Professions, ...	2,059,394	3,012,935	3,462,886	3,331,502	3,303,691	2,904,943	2,675,077
E. Profits of office, ...	439,149	653,394	759,624	699,181	690,649	608,557	519,057
	6,812,232	9,789,483	11,158,883	10,688,001	10,709,878	9,315,245	8,188,878

Ireland was altogether exempted from payment of any income-tax until 1853, and there have been several arrangements to relieve that country from its burthen, as compared with Great Britain. For example, the amount of Schedules A and B has been assessed at the net value of lands, tenements, &c., exclusive of repairs and other charges under the Poor-law valuation, whereas this deduction has not been made from the assessments in Great Britain. Ireland and Scotland, moreover, are taxed at *one-third* of the total assessment under Schedule B, instead of *one-half* as in England and Wales.

From 1842 to 1853 incomes under £150 were exempt from income-tax.

INCOMMENSURABLES, THEORY OF. The application of arithmetic to any science of concrete magnitude supposes a certain magnitude to be taken as unity, and all other magnitudes to be expressed by the number of times or parts of times which they contain this unit. Such an application therefore requires the assumption of this proposition, that all magnitudes are either fractions or multiples, or compounded of fractions and multiples, of any magnitude that may be named. This proposition is not true; for instance, if the sides of a square be called 1, no number nor fraction whatsoever will exactly represent the diagonal. But it may be made as nearly true as we please: for instance, we may find a line as nearly equal to the diagonal as we please, which shall be a definite arithmetical fraction of the side. Quantities which are so related that, when one is capable of being represented in terms of a certain unit the other is not, are called *incommensurables*. The reason is as follows:—Any two magnitudes which have a common measure can be arithmetically represented by the same unit: for, if A and B have the common measure M, and if this measure be contained 7 times in A and 10 times in B, then it is evident that, by taking M as the unit, A is represented by 7, and B by 10. If, then, there be two magnitudes which cannot be represented by means of the same unit, they cannot have any common measure, and are therefore *incommensurable*.

The difficulty thus inherent in the application of arithmetic to concrete magnitude does not occur in practice, because no case can arise in which it is necessary to retain a magnitude so closely that no alteration, however small, can be permitted. But in exact reasoning, where any error, however small, is to be avoided, it is obvious that the arithmetic of commensurable magnitudes, and the arithmetic (if there be such a thing) of incommensurable magnitudes, must not be confounded. The difficulty was overcome by Euclid, in his doctrine of proportion, so completely and effectually, that nothing has been added to his solution of it except unsuccessful attempts to evade it. Those who avoid the fifth book of Euclid generally substitute either the tacit assumption that all magnitudes are commensurable, which is not true, or some metaphysical play upon words, which a person who feels the rigour of Euclid places on the same shelf with nature's horror of a vacuum, and other explanations of the same kind.

INCREMENT AND DECREMENT. When two quantities are considered together, one of which is greater or less than the second, the latter is said to be the former with an increment or decrement. In

the older English writings the calculus of differences is called the method of increments.

INCUBATION. [POULTRY.]

INCUMBENT. [BENEFICE.]

INCUMBERED ESTATES COURT. [IRELAND.]

INDEFINITE means 'not given or defined in magnitude.' Thus a definite straight line is that of which the extremities are known; an indefinite straight line is one of which the direction is given, and which may be supposed to have any length, or which can be lengthened, if necessary, without contravening any of the conditions of the problem. Thus Euclid, in the first book, constructs an equilateral triangle upon a definite straight line, and shows how to draw two lines making with one another the same angle as that made by two given definite straight lines.

There is, however, a reprehensible use of the word indefinite which is found in many mathematical works; namely, the employment of it to avoid the odium which attaches to the word infinite. Thus we hear of making a magnitude indefinitely great, of an indefinitely small are being equal to its chord, of the circle being a polygon of an indefinitely great number of sides. In all cases it would be better, with a proper definition, to use the word infinite at once.

A want of proper distinction between definite and indefinite sometimes leads to confusion. For instance, it is said that, if a straight line be halved, if its half be then halved, and if fresh portions be continually taken, each of which is the half of the preceding, the result will at last become less than 'any line which can be named.' This is not true if the line which is to be named be indefinite; that is, if we may at any part of the process make it as small as we please: for it is obvious that, whatever a line may be, a smaller line can be named. But it is true of a definite line, made definite, or given in length, at the beginning of the process. Name any line, however small, but such as you name it let it remain; then by continually halving any other line, however great, you must at last arrive at a line which is less than the length you named. The phraseology of a line 'less than any line which can be named,' has often caused a difficulty by not specifying the time at which it is to be named. The language used by Euclid himself is as follows (book x. prop. 1), and is free from the ambiguity in question: 'Two unequal magnitudes being given, if from the greater be taken away its half, and from what is left its half, and if this be done continually, a magnitude will at last be found which is less than the lesser of the two given magnitudes.'

INDEMNITY, ACT OF, an annual act passed to indemnify persons from penalties incurred by the omission of certain acts, such as taking the oaths, delivering qualifications, &c.

INDENTURE. When a deed was made by more than one party, there used to be as many copies as there were parts of it, and each part was cut or indented (formerly in acute angles, *instar dentium*, like the teeth of a saw, but at present in a waving line) on the top or side, to tally or correspond with the other—which deed so made was called an indenture. The term is now generally applied to an

agreement between an apprentice and his master. [DEED.]

INDEPENDENTS, the name of a denomination of English Protestant Dissenters. They are distinguished from Presbyterians by being opposed to any union or government of the church, and by regarding each congregation of faithful men as independent of every other, and competent to its own government without any interference from presbyteries, bishops, or from the state itself; this is the pure principle of English Independency. Macaulay describes the opinions of its founders in forcible language. 'They conceived,' he says, 'that every Christian congregation had, under Christ, supreme jurisdiction in things spiritual; that appeals to provincial and national synods were scarcely less unscriptural than appeals to the Court of Arches, or to the Vatican; and that Popery, Prelacy, and Presbyterianism were merely three forms of one great apostasy.'

Robert Brown, a clergyman of the reign of Elizabeth, is generally reputed to be the first person in England who acted upon these opinions. After he had given no small trouble to the authorities in the church, he was presented to the living of Achurch, in Northamptonshire. He, however, soon began to attack the order and discipline of the Established Church, and formed a distinct church on democratic principles at Norwich. His hasty temper often led him into trouble, and he closed a long and very troubled life in jail at Northampton in 1630. His followers were at first called Brownists, but they may fairly be identified with the Independents.

During the Commonwealth, the Independents were active in preventing the establishment of a Presbyterian church in England. Foremost among them was Cromwell. In 1662 the Act of Uniformity was passed, the object of which was to exclude from the ministerial office in the Church of England divines of either the Independent or Presbyterian opinions. The effect of it was, that about 2000 ministers retired from the places they held in the church. These are the ministers whom the Dissenters refer to when they speak of 'the illustrious two thousand,' or 'the Bartholomew Worthies,' because the act came into operation on St. Bartholomew's day, August 24th, and whose ejection was celebrated by the Bicentenary Movement of 1862. During the reign of Charles II. every effort was made to prevent the ejected clergy from continuing to exercise their ministry, but it was all in vain, and the Revolution of 1688 freed the Dissenters from the penalties in the way of fine and imprisonment which were imposed upon them; one of the first acts of the new government being to grant toleration to them, that is, to allow them to open chapels, and to conduct the services under the protection of law.

The 'Act of Toleration' was passed in 1689, and for the seventy years succeeding that date the Independent denomination (as indeed was the case with the whole body of Dissenters) decreased, and it would probably have become extinct but for the extraordinary revival of religious zeal, created especially by the Wesleys and Whitefield. Under this influence a large number of persons were led to join themselves to the Wesleyan or the Whitefieldian Methodists, the latter since better known as the

Countess of Huntingdon's Connection; but there were many who declined to unite themselves with either of these bodies, and joined the old Independents. By this accession the latter became the largest dissenting body in England except the Wesleyans, and so continue to the present day.

Early in the eighteenth century an agreement was come to between the Independents, Baptists, and Presbyterians, who formed themselves into a united body, under the title of the Three Denominations. They were for a long time in the habit of consulting together for general welfare, but of late years this union has been disturbed in consequence of the withdrawal of the Presbyterians—most of them having become Unitarians.

The Independents have numerous chapels in London and in various parts of the country, with many very popular ministers. They have also several institutions for the education of their ministers. They still maintain the principle of Independency, and are on this account often called Congregationalists—each congregation forming a separate church. They are in general strongly opposed to the principle of a state establishment, whether Presbyterian or Episcopal, and in doctrine vary from the high Calvinism of the Savoy Confession, which exhibits the doctrines held by the Independents of the time of the Commonwealth, to the most moderate form of Anglican orthodoxy.

Independency was introduced into Scotland at the time of the Commonwealth, but did not make much progress till 1730. There are now in that country upwards of 200 chapels, with accommodation for about 100,000 persons.

In the United States the Independents are very numerous and influential. They possess more than 3000 places of worship and about 300,000 members.

The *Congregational Year Book* for 1866 contains the following general summary of statistics of the Independent denomination compared with those of 1864:—

CONGREGATIONAL CHURCHES.

	1864.	1865.
In Great Britain, Ireland, and the Islands of the British Seas,	2768	2785
In the American colonies, . . .	117	117
In the Australian colonies, . . .	124	142
In foreign lands, ...	217	237
	3226	3281
Free Churches (Independent) in foreign lands, ...	128	229

CONGREGATIONAL MINISTERS.

In England and Wales, . . .	2139	2175
In Scotland, ...	97	106
In Ireland, ...	26	26
In the colonies, ...	215	226
In foreign lands, ...	176	179
	2653	2712
Students in theological colleges, &c.,	425	350
Students under private instruction,	30	74
Missionary students, ...	—	20
	455	444

CHAPELS OPENED IN 1865.

New, rebuilt, and enlarged, ...	110
Foundations of new chapels laid, ...	43
New schools, ...	14
	167
New churches formed, ...	14

The number of Congregational chapels in the metropolitan postal district is given at 220; of pastors, 178; of ministers without pastoral charges, 94.

(The best books to consult on English Independency are—Dr. Vaughan's *History of English Nonconformity*, London, 1862; Fletcher's *History of Independency*, London, 1862; and May's *History of the Puritans*.)

INDETERMINATE, a word which is mostly applied in mathematics, not to the character of a magnitude, but a problem. A question is said to be indeterminate when it admits of an infinite number of solutions.

INDEX EXPURGATORIUS, or INDEX LIBRORUM PROHIBITORUM is a catalogue of books, the reading of which is prohibited by papal authority to all Roman Catholics. The earliest known instance of this authority being exercised, is the prohibition of the writings of Arius. From that time and during the middle ages up to the present century, there has been a periodical publication of the Index, sometimes by sole order of the pope, at others by the councils. In the intervals between the editions, the decrees by which further additions are made to the list of prohibited books are made public at Rome, and circulated in the various countries. The books which are absolutely prohibited are all the writings of the founders of heresies, all immoral books, all books of heretical authorship on doctrinal subjects, all heretical versions of the Bible, and all books containing statements or doctrines prejudicial to the Roman Catholic religion. Among the well-known works that are put under the ban in the last edition of the Index, are Goldsmith's 'History of England,' Kant's 'Essay on Pure Reason,' Whately's 'Logic,' and Mill's 'Political Economy.' It also contains the names of Gibbon, Robertson, Hallam, Locke, Bacon, Milton, Addison, and Dante.

INDIA, BRITISH. In the article EAST INDIA COMPANY we have traced the rise and progress of the British rule in India; in that of DELHI, the mutiny of 1857 is more particularly noticed; and under HINDUSTAN will be found a general description of the physical geography of the whole country, its products, inhabitants, religion, ancient history, &c. In this article we shall, therefore, confine ourselves to the political geography of British India.

Area and Population.—The total area and population of British India are as follows, according to the latest returns:—

Presidencies.	Area in English sq. miles.	Pop.
Governor-General's district,	170,330	14,165,161
Bengal, ...	280,200	41,498,608
Madras, ...	128,550	23,127,855
Bombay, ...	137,743	11,937,512
Punjab, ...	100,406	14,794,611
North-west provinces, ...	116,493	30,110,497

Total, ... 933,722 135,634,244

The above numbers of the population are but the result of estimates, as an accurate enumeration has never been made—and, probably, cannot be made—owing to religious prejudices, and the peculiar mode of life of the natives of India.

In addition to the above presidencies, there are a large number of territories under the immediate control of the government of India, and states ruled by native princes and chiefs, but under the political supremacy and protection of the British government, so that the entire area of the whole Indian empire may fairly be said to be more than 1,500,000 square miles, and the population close upon 200,000,000. Every state of importance is described in a separate article.

The English population in India amounted, according to the returns made by the several governments, to only 125,945 persons in 1861. Of this number, 84,083 went to compose the British officers and men of the Indian army; while 22,556 consisted of men and boys in civil life, including the civilians in the public service; the remaining 19,306 being females.

Constitution and Government.—The present form of government of the Indian empire is established by the Act 21 & 22 Vict., c. 106, called 'An Act for the better Government of India,' sanctioned August 2, 1858. By the terms of this Act, all the territories previously under the government of the East India Company are vested in her Majesty, and all its powers are exercised in her name; all territorial and other revenues and all tributes and other payments are likewise received in her name, and disposed of for the purposes of the government of India alone, subject to the provisions of the Act. One of her Majesty's principal secretaries of state, called the secretary of state for India, is invested with all the powers hitherto exercised by the Company or by the Board of Control, and all warrants and orders under her Majesty's sign-manual must be countersigned by the same.

The executive authority in India is vested in a governor-general or viceroy, appointed by the Crown, and acting under the orders of the secretary of state for India.

The administration of the Indian empire is intrusted by the charter of August 2, 1858, to a council of state for India. The council consists of fifteen members, of whom seven are elected by the court of directors from their own body, and eight are nominated by the Crown. Vacancies in the council, if among those nominated, are filled up by her Majesty, and if among the elected, by an election by the other members of the council; but the major part of the council must be of persons who have served or resided ten years in India, and not have left India more than ten years previous to the date of their appointment; and no person not so qualified can be elected or appointed, unless nine of the continuing members be so qualified. The office is held during good behaviour; but a member may be removed upon an address from both Houses of Parliament. No member is to sit or vote in Parliament. The salary of each is fixed at 1200*l.* a year, payable, together with that of the secretary of state (5000*l.*) out of the revenues of India.

The duties of the council are, under the direction

of the secretary of state, to conduct the business transacted in the United Kingdom in relation to the government of and the correspondence with India; but every order sent to India must be signed by the secretary, and all despatches from governments and presidencies in India must be addressed to him. The secretary has to divide the council into committees, to direct what departments shall be under such committees respectively, and to regulate the transaction of business. He is to be president of the council, and has to appoint from time to time a vice-president. Both the president and vice-president lose office with the cabinet, of which the former is a member. The meetings of the council are to be held when and as the secretary shall direct; but at least one meeting must be held every week, at which not less than five members shall be present.

The government in India is exercised by a 'supreme council,' sitting at Calcutta, and consisting of five ordinary and from six to ten extraordinary members, presided over by the governor-general. The ministry, divided into the departments of foreign affairs, finances, the interior, military administration, and public works, form part of the supreme council. The appointment of the ministers, the members of the council, and the executive governors and lieutenant-governors of the various territories and provinces of the empire rests with the governor-general, who holds the highest office in the world filled by an uncrowned head, and who is appointed by the Crown for a term of about six years, with a salary of 25,000*l.* per annum, independently of a palace and establishment at Calcutta, and a country residence at Barrackpore.

The governors of Madras, Bombay, the north-west provinces, and the Punjab may also appoint a legislative council of from four to eight members; but the assent of the governor-general is required to render the measures passed by them valid, and they are further subject to the veto of the Crown.

The 'Covenanted Civil Service' is composed of Europeans, who conduct the general administration of British India, and whose salaries vary from 300*l.* to 8000*l.* per annum. It consists of nearly one thousand members. The staff is recruited from successful candidates at open competitive examinations, instituted for the purpose in England.

In the 'Uncovenanted Civil Service' the appointments are made by the authorities in India. It is composed of Europeans, Eurasians (the class sprung from native mothers by European fathers), and natives, with salaries of from 12*l.* to 3000*l.* per annum. It consists of nearly 7000 members, of whom about 2500 are natives.

Army.—The army of the old East India Company consisted of both natives and Europeans—the former, however, largely preponderating. The officers and non-commissioned officers were sent out from England, and the service afforded many opportunities for making rapid fortunes. The ranks were filled by enlistment; the company never compelled the natives to become soldiers, as the pay was always sufficient to secure the number required. The periods of leave of absence were liberal; and, after a much shorter period of service than in the English army, they were granted a pension sufficient to enable them to live in comfort for the remainder of

their days. Just previous to the mutiny the East India army consisted of about 24,000 royal troops (lent to and paid for by the Company), 18,000 of the Company's own European troops, 180,000 native regulars, 60,000 native irregular horse, and 40,000 contingents furnished by the native princes, making altogether about 320,000 men. Besides this force there were native armies belonging to the independent and semi-dependent princes—most of the latter being virtually under the control of the Company. As is but too well known, the Bengal portion of the Company's army was almost entirely broken up in the mutiny of 1857. Since the government of India was transferred to the Crown, the military service in that country has undergone a thorough re-organization, and there are now only 130,000 native troops in the whole empire. Many of these consist of Sikh regiments which behaved well during the crisis. The distribution of this force, according to the latest advices, was as follows:—Bengal, 71,175; Madras, 33,796; and Bombay, 25,360: total, 130,331. The British forces in India have, of course, been much increased, to compensate in some measure for the decrease of the native troops. They form part of the Queen's army generally, but their cost is defrayed out of the Indian, not the English, revenues. According to the army estimates, the European force was as follows in 1865-66:—

	Officers, mis'd Officers.	Non-com- and File.	Rank and File.	All Ranks.
Royal Horse Artillery, 201	249	2,680	3,130	
Cavalry of the Line, 352	575	5,082	6,009	
Royal Artillery, . 689	872	9,210	10,771	
Royal Engineers, . 336	—	—	336	
Infantry of the Line, 2,067	3,681	45,050	50,798	
Total, . . . 3,645	5,377	62,022	71,044	

The total cost of the army to the government of India is nearly 14,000,000*l.* per annum.

The *Indian Police* now forms a very important and useful force, and is to a great extent taking the place of the old native army. It has recently been remodelled on one uniform system, with a central organization in each presidency. It consists altogether of nearly 150,000 men of different races, and is chiefly officered by Europeans.

There is now no separate *Navy* for India, but a pilot service is still maintained.

Administration of Justice.—No code of civil or criminal law for India generally has yet been promulgated, but in the three presidential cities English laws and trial by jury have long been in force. In 1861 the supreme court at Calcutta and the Sudder Mofussil, or county courts, were abolished, and high courts of judicature were established in each presidency, and in the north-west provinces, under the control of a chief-justice, and as many other judges, not exceeding fifteen, as her Majesty may appoint. These high courts are to exercise civil, criminal, admiralty, testamentary, intestate, and matrimonial jurisdiction, original and appellate, by single judges or by division courts; so that now the verdicts of the inferior courts may be submitted to men of high legal knowledge.

Revenue, Expenditure, and Debt.—According to

the Act of 1858, the revenue and expenditure of the Indian empire is subjected to the control of the secretary in council, and no grant or appropriation of any part of such revenue can be made without the concurrence of a majority of the council.

Such parts of the revenues of India as may be remitted to England, and moneys arising in Great Britain, are paid into the Bank of England; and paid out on drafts or orders signed by three members of the council, and countersigned by the secretary or one of his under-secretaries. The sovereign of Great Britain is empowered to appoint from time to time an auditor of the accounts, with power to inspect all books and examine all officers, and his report is to be laid before Parliament. The accounts of the whole revenue and expenditure of the Indian empire must be laid annually before Parliament.

The subjoined table gives the total gross amount of the actual revenue and expenditure of India, in each of the years, ending April 30, from 1858 to 1864:—

Years ended Ap. 30.	In India.		Home charges.
	Revenue. £	Expenditure. £	
1858 ...	31,706,776 ...	35,078,528 ...	6,162,043
1859 ...	36,060,788 ...	43,590,794 ...	7,466,136
1860 ...	39,705,822 ...	44,622,269 ...	7,239,451
1861 ...	42,903,234 ...	41,529,973 ...	5,394,646
1862 ...	43,829,472 ...	37,245,756 ...	6,634,344
1863 ...	45,143,752 ...	36,800,806 ...	6,515,601
1864 ...	44,613,032 ...	38,087,772 ...	6,446,913

It will thus be seen that, after long years of chronic deficit—a state of things, however, which is attributable to the practice, unknown elsewhere, of constructing important public works and paying interest upon the hitherto unremunerative capital of great railways out of current revenue—India has at last exhibited an undeniable surplus; and there seems to be a reasonable certainty that this position of national solvency may now be looked upon as the normal state of things, if the country is favoured with continued peace, and the same persistent economy is manifested at head-quarters. Nearly one-half the revenue of India is derived from the tax on land, and from 10,000,000*l.* to 13,000,000*l.* a year from the opium and salt duties. In the different presidencies the government land-tenures vary. Up to 1860 it was impossible to purchase the fee simple of land, except in the three presidency cities, and in Chittagong, in Bengal; but since the last year of Lord Canning's administration waste land has been sold in fee simple very largely, chiefly to English tea and coffee planters. Settlers who have indigo or silk factories on other land may also purchase the same tenure on fair terms.

The principal sources of expenditure in India are the army, public works, police, civil administration, and interest on the public debt.

According to a parliamentary paper published in 1865, the following is the amount of stocks, loans, debts, and liabilities chargeable on the East India revenues, up to the latest period at which the return could then be made out, viz., in England, to December 31, 1864, and in India to the 30th of April, 1863:—

Registered debt, ...	£62,279,106
Loans, ...	2,862,382
Treasury notes, ...	1,614,706
Service funds, ...	5,580,290
Bills payable, ...	2,297,875
Deposits and miscellaneous, ...	12,383,570
East India bonds, ...	3,136,917
“ debentures, ...	4,868,000
India 5 per cent. stock, ...	15,720,100
“ 4 per cent. stock, ...	2,441,000
Capital of Indian railways remain- ing in home treasury, ...	1,912,351
Miscellaneous, ...	431,408
Total, ...	£115,527,705

The above is exclusive of the charge upon the revenues of India, under the Act of 3 & 4 Will. IV., c. 85, of the dividend at the rate of 10*l.* 10*s.* per cent. per annum on the sum of 6,000,000*l.*, the capital stock of the East India Company, which is subject to redemption by Parliament on payment to the company of 200*l.* sterling for 100*l.* stock.

Commercial Staples.—Several articles of commercial importance have of late years been added to Indian exports. Of these the chief are oil seeds, jute, wool, coffee, and tea; and the table annexed will show from what small beginnings the trade in these products has attained its present importance:—

Value of Exports.

	1842.	1852.	1862.
Oil seeds, £ 2,377 ...	£501,420 ...	£1,197,469	
Jute, . . . 24,941 ...	180,976 ...	537,610	
Wool, . . . 77,591 ...	100,612 ...	400,342	
Coffee, . . . 74,957 ...	84,306 ...	462,380	
Tea, . . . 17,244 ...	59,220 ...	192,242	

The great increase in the exportation of oil seeds has taken place since the breaking out of the Russian war, which closed to the English merchants their principal sources of supplies. Jute is exported only from Bengal; wool, principally from Bombay.

But the most remarkable—and it promises eventually to be the most valuable—of all the new articles of export from India is tea, which having, of late years, been found indigenous in Upper Assam, has been very successfully cultivated over extensive tracts. Plants, seeds, and skilled workmen were imported from China, and the growth of the native shrubs carefully promoted at the cost of the Indian government. The result proving satisfactory, a company was formed, under the title of ‘the Assam Company,’ having for its object the production of tea in that province. To this association, which included several gentlemen of varied experience and great sagacity, the government transferred its gardens and establishments on very liberal terms. As its operations grew prosperous, numerous imitators sprang up, and applications for grants of land flowed in from every quarter. There are now upwards of 170 plantations in Assam, owned by more than sixty companies and individuals, and producing an annual crop of nearly 2,000,000 lbs. of tea.

Nor has the adventure been confined to Assam. In the adjacent provinces of Cachar, where also the tea plant was found in a wild state, upwards of 70,000 acres have been leased to tea-planters; there

are thirty-one working concerns; and though the experiment has a development of only seven or eight years, upwards of 6500 acres have been brought under cultivation. Tea crops of excellent quality are also raised on the skirts of the Himalayas in the north-western provinces, the tea produced being, in the opinion of competent judges, superior to the China tea imported for mercantile purposes.

With equally rapid steps the cultivation of coffee has progressed in the highlands of Southern India. Tradition ascribes its introduction to a Mussulman pilgrim, who brought seven berries of coffee from Mocha about two centuries ago, and planted them near his lonely home in the wild hills of Mysore. The plant now extends over tens of thousands of acres in Coorg, the Wynaul district, the Neigherry hills, and along the western Ghauts, north and south. In Mysore, the number of European coffee-planters, says Colonel Onslow, has, within the last ten years, increased to twenty or thirty. The number of native planters is computed to be nearly 4000, and they are fast increasing. The elevation at which the plantations flourish (from 3500 to 4000 feet above the sea-level) affords a pleasant climate, well suited to European constitutions. During the south-west monsoon, the planter may ramble in his gardens all day long, and suffer no inconvenience in the hottest weather; the thermometer in the house in these plantations rises no higher than 81° or 82° Fahrenheit. The whole coffee district—or at least a few fever-blighted spots excepted—enjoys a climate in which the European can live and work with comfort, and, if moderately prudent, throughout the year.

Planting has of late years been so extensively carried out in Mysore that very little available land remains. The mountain and forest wastes have been converted into rich productive gardens. From being the wildest and loneliest parts of Mysore, these districts have grown very prosperous. The wilderness blossoms like the rose. The people have been raised from indigence to competency, and even, in many cases, to wealth. Both by the capital and example of European planters the natives are benefiting largely, and are learning the science of planting.

Cotton is also extensively cultivated, though the product is unable to compete in quality with the celebrated Sea Island kind. It will probably occupy a higher position among the staples of Indian commerce when British capital is more liberally expended on its cultivation, and its transportation to the ports of shipment is facilitated by the construction of roads and canals.

Indigo has been largely grown from the earliest date of British enterprise in the peninsula. The plant is indigenous, as its name, corrupted from *Indicum*, implies; but it was not until about 1780 that its growth and manufacture were systematically undertaken by British settlers under official auspices. From that time the Bengal drug rapidly obtained the command, nay, almost the monopoly, of the trade, which has, of late years, been shared in a minor degree by the produce of the other Indian presidencies.

To conclude. We rejoice, to use the words of an able writer in the *Edinburgh Review*, in the belief that both moral and physical agencies, already actively at work, are impelling India in its progress at a rate almost unprecedentedly rapid. This, too, is a

healthy and natural progress; the effect of causes which, 'like rain upon the mown grass,' are acting gently and almost imperceptibly, as well as equally, upon the whole breadth of society. The onward march of civilization is as plainly shown by the larger profits of the ryots, and the higher wages of the artisan, as by the improved education and diminished prejudices of the higher classes. At last the great driving-wheel of progress has been fairly set in motion, and India, under British auspices, is moving forward at a pace almost Anglo-Saxon in its rapidity.

Commerce.—Restrictions which hindered commerce and retarded the development of the resources of the country have been gradually removed within the last twenty years, and India now enjoys free trade. The dues on British and foreign shipping are the same. The inland duties, and duties on goods carried coastwise are abolished. Full details of the commerce of India are given in the articles on the different presidencies; but we may here state that India takes more British goods and manufactures than any other country in the world, the total being now annually valued at about 20,000,000*l.* sterling. In addition to this sum, specie to the value of several millions sterling is annually sent thither from this country. The exports from India to all parts of the world, which were only 14,000,000*l.* in 1841–42, had risen to 20,000,000*l.* in 1851–52, and in 1861–62 to no less than 35,000,000*l.*—an increase of 150 per cent. in twenty years. In 1863 there was an increase of 13,000,000*l.* on the latter sum—the total amount being 48,434,517*l.*—and in 1864 the exports to England alone were valued at 52,287,869*l.*

Currency.—The accounts of India are kept in rupees, annas, and pies—the rupee being valued at 2*s.*, the anna at 1½*d.*, and the pie at a twelfth of the latter sum.

Railways.—As upwards of 50,000,000*l.* of English capital are invested in Indian railways, we shall enter more fully than usual into this division of our article, so as to enable our readers to form a just appreciation of their importance and magnitude.

It is now twenty-one years since the first railway companies in India were proposed, but only fourteen years since a commencement was made in their actual formation. The East India and Great Indian Peninsula railways were projected in 1844, but it was not until 1849 that operations were commenced on the latter line, nor until 1853 that the first twenty-two miles of railway were actually opened in the Peninsula. After this preliminary delay, the works proceeded slowly until 1858, when an inquiry was made into the causes of the slow progress of the various lines towards completion; and it was found that the delay was partly caused by the impediments occasioned by the necessary government supervision, at home and in India, over lines upon which they had given a guarantee; partly by the incidental delays occasioned by the execution of public works at a distance; partly by the Sepoy mutiny; and partly by the natural difficulties in construction. After 1858 the railway works proceeded more rapidly, and there are now (March, 1866) nearly 3500 miles open to traffic, against 436 in 1859.

The government of India promoted the formation

of two descriptions of lines, trunk lines and feeders; and by two kinds of assistance—a qualified guarantee of interest upon capital, and a direct annual subsidy; both for a certain term of years. The guarantees are for the term of ninety-nine years from the dates of the contracts entered into between the government and the different companies, but the interest is only paid on the capital specially authorized to be raised by the government, and which has been expended according to its direction and under its inspection. When the railways are constructed and earn more than the guaranteed rate, they are to refund the money advanced by the government on their behalf, setting apart half of the excess profits above 5 per cent. for that purpose. During the last fourteen years over 13,000,000*l.* have been paid by the government in the shape of guaranteed interest, of which 3,300,000*l.* has already been paid back, and there can be no doubt that in a few years not only will the government be relieved of the present annual payments altogether, but will have received back the large sum now due to it. In the meantime, it obtains advantages which fully compensate for the liability it has incurred.

The other form of government assistance to Indian railways—viz., an annual subsidy for twenty years—is a guarantee of about $2\frac{1}{2}$ per cent. per annum upon lines whose average cost is from 4000*l.* to 5000*l.* a mile. This can, therefore, only be of service to railways of a light description, and which can hardly be expected to do much more than act as feeders to the larger lines.

As a further privilege to the Indian railways, it has been arranged that any company may, after the railway has been finished and in operation for three months at least, and at any time within ninety-nine years from the date of contract with the government, give six months' notice of their intention to relinquish the railway; and at the expiration of that time hand it over in good working order to the government, who will repay all authorized sums expended, subject to deduction of unsatisfied claims against revenue. On the other hand, the government has the power to purchase the railways at any time within six months after twenty-five or fifty years from the date of the several contracts with them. The price, in either case, will be the mean value of the stock or shares for the three years previous to the surrender or purchase. At the expiration of ninety-nine years from the date of each contract (supposing the railway neither previously bought by government nor relinquished by the company), the land and works will become the property of the government, and the rolling-stock will be purchased by it at a valuation; but as the companies have at all times within the ninety-nine years the power of surrender at a mean three years' value of their stock or shares, they are protected against being compulsorily denuded of their property by this last privilege of government, which may be considered as virtually inoperative.

From the commencement of railway operations in India the government has assumed the power of fixing the routes of all the lines; and at the beginning of the system of promotion by guarantee, certain trunk lines were laid down to be made, which, while they would be of commercial value,

would also improve the political and military communications of the country, by connecting the three presidencies by railway.

When the main lines at present in process of construction are finished, they will combine with the Indus flotilla to form five great arteries for traffic from east to west.

The first and most northerly will be from Calcutta on the east to Kurrachee on the west, being composed of the East Indian Railway from Calcutta to Delhi; of the Delhi line, from Delhi to Umritsur; of the Punjab Railway, from Umritsur to Mooltan; and of the Indus steam flotilla (which will probably some day be superseded by a railway) from Mooltan to Kotree; and of the Scinde Railway, from Kotree to Kurrachee.

The second great route is from Calcutta to Bombay, the line being formed by the junction of the southern branch of the East Indian Railway from Calcutta, and of the northern branch of the Great Indian Peninsula Railway from Bombay—the two lines meeting at Jubbulpore.

The third great route is from Madras to Bombay, and consists of a junction at Raichore between the southern branch of the Great Indian Peninsula from Bombay and the northern branch of the Madras Railway.

The fourth route is from Madras on the east to Beypore on the west coast, the whole distance being traversed by the Madras Railway.

The fifth route is from Negapatam to Beypore, and is to be formed by the junction of the Great Southern of India Railway from Negapatam with the Madras and Beypore line at Errode.

The east and west of India are therefore intended to be united by five direct lines; but as each and all of these are to be connected by one general system, a communication for interchange of traffic will also be effected between the north and south.

The following was the state of each line, according to the official report, on May 1st, 1865:—

Railway.	Total Length as at present sanctioned. Miles.	Length (1st May 1865). Miles.	Length remain- ing to be finished. Miles.
East Indian—			
Main line, . . .	1271½	1126	145½
Jubbulpore line, . . .	225	—	225
Great Indian Peninsula, . . .	1266	595½	670½
Madras—			
S. W. line and Bangalore branch, . . .	492	492	—
N. W. line, . . .	360	79	281
Bombay, Baroda, and Central India, . . .	312	306	6
Scinde, . . .	114	114	—
Punjab, . . .	253	252	—
" Delhi, . . .	320	—	320
Eastern Bengal, . . .	114	114	—
Great Southern, . . .	161	79	82
Calcutta and S.-Eastern, . . .	29	29	—
Total, . . .	4917½	3186½	1730½

It will thus be seen that of the present system of guaranteed railways in India, 3186 out of 4917 miles were open for traffic on May 1st, 1865, and about

1700 miles consequently remained to be completed. It is estimated that when the system is finished with a single line it will have cost about 77,500,000*l.* Of this sum about 57,600,000*l.* had been raised, and 55,000,000*l.* had been expended, on the 1st May, 1865. The materials which have already been sent out from England to aid in the construction of the railways amount to 2,900,000 tons, and 16,500,000*l.* has been expended upon them. The average cost per mile has been below that of the English lines. The East Indian cost 20,000*l.* per mile; the Madras only 11,000*l.* The track is laid on a uniform gauge of 5½ feet. The amount received from passengers in the year ending the 30th June, 1863, was 682,343*l.* In the year ending the 30th June, 1864, it was 981,948*l.* The amount received for the conveyance of goods in 1862-63 was 948,324*l.*, and in 1863-64, 1,406,963*l.* The net profits in the year 1862-63 amounted to 690,834*l.*, and in 1863-64 to 947,320*l.* The number of passengers conveyed in 1863-64 was 11,781,683, compared with 9,242,540 in 1862-63. Of those who travelled, 1·12 in every 100 used the first class, 4·78 used the second class, and more than 94 per cent. were third class travellers. The fares in India are much lower than in England, being generally 1½*d.* per mile first class; 1*d.* or ¾*d.* second; and ½*d.* or ⅓*d.* third. The government have the power to fix the fares, and are of opinion that low ones, as compared with those of Europe, are perfectly compatible with large and remunerative receipts. When completed, the traffic on the main lines will, doubtless, be enormous. If this traffic be properly conducted, and if economy prevail in the various departments connected with the working and maintenance of the lines, the results will be very satisfactory. But whether, as commercial undertakings, their success is great or moderate, no country in the world will, either directly or indirectly, derive greater advantages from railways than India.

Some of the engineering works connected with the Indian railways are among the finest in the world, especially the bridges and viaducts.

Over the river Soane, on the East Indian line, between Patna and Benares, a bridge has been thrown which is the longest but one (the Victoria, over the St. Lawrence, in Canada) in the world. It is about twice the length of the Charing Cross railway bridge over the Thames, and consists of twenty-seven iron girders of 150 feet each, supported on brick foundations.

The Great Indian Peninsular Railway crosses the Western Ghats, a range of lofty mountains, at the Bhore Ghaut, near Callian. The length of the incline from the base to the summit is 15 miles 68 chains. The level of its base is 196 feet above the sea, and of its summit 2027 feet; so that the total elevation surmounted is 1831 feet; the average gradient being one in forty-eight, and the steepest gradient one in thirty-seven, for one mile and 38½ chains. Several of the embankments on this line exceed 60 feet in height; many of the outer slopes are 150 feet in length, and some of them as much as 300 feet. The greatest depth in the centre line of cuttings is 74 feet; and in one cutting the excavation on the upper side is nearly 150 feet deep, through solid rock. The total length of tunnels is more than

ten miles and a quarter; and of the viaducts and vaulting arches about three-quarters of a mile. One viaduct consists of eight 50 feet arches, 143 feet from the surface.

The *branch lines* will form an important feature of the Indian railway system. They are chiefly laid down, or to be laid down, on a four-foot gauge, with rails only 31 lbs. per yard. The average expense will not exceed 4000*l.* per mile.

In opening up the Indus valley by means of steam communication the Indian government has laid the foundation of an important commercial revolution. The Indus and the Ganges are, respectively, the great natural water-ways of Western and Eastern India. It is said that a line drawn between Agra and Delhi represents the approximate boundary between the countries dependent on either river, had both afforded equal commercial facilities. But until the new era of the railroad and the steamboat such was not the case. Exceedingly difficult and dangerous was the navigation of the Indus, and sand bars choked up the port of Kurrachee. Nor were political obstacles wanting. Exorbitant toll was levied by the Ameers of Scinde on every passing trader, so that the Ganges route was naturally preferred to that of the Indus, and Bombay and Calcutta flourished at the expense of Kurrachee. But political difficulties were swept away in 1844 by the conquest of Scinde, and the conqueror, Sir Charles Napier, at once perceived the commercial and military importance of Kurrachee. 'Kurrachee,' he exclaimed, 'you will yet be the glory of the East! Would that I could come alive again to see you in your grandeur!' His dreams are being fulfilled; wharves and quays are alive with traffic; the Scinde line of railway connects it with Kotree; while the Punjab railway and the Indus steam flotilla are rapidly restoring the Indus to that importance as a great commercial channel which it formerly enjoyed.

We may add, in the words of a well-informed authority, that the Indus channel of trade is also the natural gate of Central Asia. Hitherto the trade of India with Central Asia has amounted only to about 1,000,000*l.* sterling per annum, transported by camels, mules, and ponies, and crossing the Brahooic chain at the Bolan Pass, and the Hindu Koosh at the Khyber Pass. This trade admits of great and immediate expansion. Hitherto the supply of Central Asia has been almost monopolized by Russia through her Volga and Caspian route. Russian manufactures had even competed successfully with ours at Lahore and everywhere throughout the Punjab. Under the present circumstances, we may hope to be able not only to supersede Russian manufactures by British in India itself, but by introducing British and Indian manufactures along the valleys of Afghanistan as far as Herat, and into Balkh, Khiva, and Bokhara, wrest from Russian merchants a large portion of their trade. A railroad to Peshawur, at the foot of the Khyber Pass, would thus serve the twofold purpose of guarding the Indian frontier against the aggression of Russian arms, and combating the influential position which Russian commerce has attained in Central Asia.

Roads.—The development of the traffic on most of the railways is still, to a great extent, retarded by the absence, or the imperfect condition, of the roads

leading to the stations, and hitherto the government have been unable, without neglecting other even more important claims, to devote a large share of the public funds at its disposal for their construction and improvement. Great efforts are, however, every year being made in this direction, and there are already several thousand miles finished.

Canals and Irrigation.—It is asserted by Sir Arthur Cotton, under whose direction most extensive works for irrigation and navigation have been executed in Madras, which are paying the government about 100 per cent. for their investment, and who may, therefore, be considered a good authority on the subject, that whatever else railways may do, it is impossible for them to supply *cheap* transit for goods in a continental country like India. To attain that, he says, the development of water transit is an absolute necessity, and no country in the world affords greater facility for doing this than India. In a recent report on the East India canals the Governor-General in Council also states that, although so much has already been done by the officers of the canal department, their progress must be still further advanced, and he desires to impress upon the government of the north-western provinces, the increasing importance of watching with close attention the development of irrigation in the districts of Upper India.

The first great work of irrigation undertaken by the British government, and completed between the years 1808 and 1822, was the restoration of the great Mogul canals, which had become choked up or dilapidated by neglect during the wars of the previous century. Of these the Eastern Jumna Canal, with 150 miles of main line and 500 miles of distributing channels, waters 160,000 acres. The Western Jumna Canal has a main channel of the far greater length of 445 miles, exclusive of distributing channels. In the famine of 1837-38, the value of crops saved by this canal was estimated at 1,462,000*l.*, giving food to the inhabitants of 500 villages. It irrigated at that time 212,241 acres. To restore, extend, and improve these canals was a work of great difficulty, but it sinks into insignificance when compared with the Ganges Canal, a purely British design, the main channels of which extend to a length of 898½ miles; which receives at its head no less than 6750 cubic feet of water per second; and which has attached to it nearly 2000 miles of distributing watercourses, besides many hundred miles of minor channels. No work of irrigation in any country will bear comparison with it either in the magnitude or in the extent of the benefits it will bestow upon immense bodies of mankind. It is calculated to irrigate an area of 1,471,500 acres, and will protect from risk of famine a country containing a population of no less than 6,500,000.

Many important works of irrigation have been completed or are under construction in the Debra Dhoon (fast becoming a sheet of tea plantations), Rohileund, Bundelcund, and several parts of the Punjab; and in the Presidency of Madras nearly all the rivers have been compelled to stay their downward course to the Bay of Bengal, and contribute at once to the fertilization of the land and the transport of merchandise. The two greatest works are the Krishna annicut, which serves 350,000 acres of land, and the annicut which controls the

waters of the Godavery. The three old British provinces of Bengal, Bahar, and Orissa have hitherto had less attention paid to their means of irrigation than other parts of India—probably on account of the greater amount and certainty of the rainfall which they enjoy; but at last public attention has been seriously directed towards their wants and capabilities in this respect, and most extensive works are now in contemplation or actual course of construction.

The results of the canals and works of irrigation hitherto carried out have been most beneficial. They may be said to be absolute preventatives of famine, heretofore the most frightful scourge of India, in those seasons, of not unfrequent occurrence, when the rainfall in the plains is greatly below the average; and they are at the same time an almost equally effective safeguard against inundations, which were formerly almost as terrible in their effects as the seasons of drought.

The main channels of most of the canals are also used for purposes of navigation as well as irrigation.

Telegraphic and Postal Communication.—The electric telegraph has already linked together all the principal cities and civil and military stations in India, and it was found of great service during the mutiny. Altogether about 12,000 miles are open. In 1865 a line was opened connecting Calcutta with London, *via* Constantinople and Bagdad, by means of which daily communication is established between England and India. A portion of it is submarine, and traverses the Persian Gulf for 1550 miles, at a depth of from thirty to sixty fathoms. Hyderabad, Madras, Mysore, and Ceylon are connected with Calcutta by an important branch line of telegraph, while Mysore and Beypore; Madras, Poonah, and Bombay; Bombay, Surat, Hyderabad, and Kurrachee; Kurrachee, Lahore, Agra, Delhi, and Calcutta, represent the principal points on four of the greatest branches of the Indian telegraphic system.

The postal communication of India extends over nearly 50,000 miles. The rate is only half an anna, or ½*d.*, for a single letter, which is lower than in any other country. There is a weekly communication between England and India by the overland route, first laid down by the exertions of Lieutenant Waghorn, *via* Egypt and the Red Sea. The time occupied from London to Bombay is from twenty to twenty-five days; to Madras about a month; and to Calcutta from thirty-five to forty-two days.

Religion and Education.—The religion of the natives of India is noticed in the article HINDUSTAN. The first attempt to bring the country under the influence of Christianity is said to have been made by the apostle Thomas; but whether this is true or not, it is certain that a Syrian church was planted at Malabar at a very early period. In the sixteenth century Roman Catholic missions were introduced by the Portuguese, and the number of Catholics in the country is still greater than that of any other Christian denomination. The first Protestants came from Holland and Denmark, and early in the eighteenth century the English societies of Christian Knowledge and for the Propagation of the Gospel assisted the Danish mission established in Southern India. Subsequently all missionaries were excluded by the East India Company, but in 1793 the restriction was

withdrawn and the Baptist Society sent out its first agents. Since that period various other societies have augmented the number of missionaries, and they are now scattered all over the country. Many thousand converts have been made, but the results have been by no means so striking as in many other parts of the world, owing to the peculiarities of the Hindu character, and the very great reverence they feel for their ancient faith. The government excludes the Bible from the public schools—a measure which has often been strongly censured—but about 250,000 copies of the scriptures in different languages have been distributed amongst the natives by the missionaries.

The fullest toleration in matters of faith is enjoyed throughout India; and it is decreed in the Queen's first proclamation to the people, that none shall be in anywise favoured, and none molested or disquieted, by reason of their religious faith and observances, but that all shall alike enjoy the equal and impartial protection of the law. It is only when fanaticism seeks to enforce the cruel suttee, or offer human beings in sacrifice, that the government interferes. Clergymen of the Church of England and Scotland, and Roman Catholic priests, are retained on the government establishment as civil and military chaplains, and state grants are still paid to a few Hindu temples and Mohammedan mosques, as under the past régime; but wherever possible these claims have been and are compromised either by a grant of land or one money payment. There are Anglican bishops at Calcutta, Madras, and Bombay.

For some years past the government of India has been devoting laudable attention to education, which was put on a new footing, and a university established in each presidential city, in 1854. Many schools and colleges are endowed by the government, and grants in aid are made to non-government and missionary educational establishments. English is taught in nearly all schools, and is highly prized by the native youth of India as a means of employment in government and mercantile offices.

From the preceding information it will be seen, that very much has been and is still being done for the physical, intellectual, and social progress of India, and there can be but little doubt that if the natives will but co-operate with the government the material advancement of that great country during the next fifty years will be such as the world has never yet seen in the case of an ancient and long-settled people. As the European race so rapidly degenerates, and in a few generations becomes physically weakened and mentally enervated, on account of the unhealthiness of the climate, colonization, in the strict sense of the word, will always be impracticable; but for British capital and energy India now promises one of the most secure and profitable fields of investment of any of our colonies and dependencies.

Historical Summary.—In our article on the EAST INDIA COMPANY we have briefly referred to the growth of that remarkable association, which for a century ruled over a hundred millions of subjects. The prosperity of British India dates from the victory of Plassey, won by Clive, on the 23rd of June, 1757, over the forces of Surajah Dowlah, the nabob of Bengal. This great battle rendered the British supreme in Bengal, and enabled them to concert

measures for the expulsion of their French rivals, which was finally effected by Colonel Coote's victory at Wandemash, on the 22nd of January, 1760, and the capitulation of their principal city, Pondicherry, on the 15th of January, 1761.

Meanwhile, Clive, who had been raised to the post of governor of Bengal, exerted all his subtlety and vigour in consolidating the conquests and establishing the power of the Company, while he effected the most necessary reformatations in both the civil and military departments. Finally, the revenues of Bengal, Bahar, and Orissa were formally assigned to the Company by the Mogul emperor, and all the territories conquered by its soldiers within the nominal extent of his dominions. Thus a body of comparatively obscure merchants had acquired a demesne equal in area to the most flourishing European kingdom, and from this date, 1765, commences the recognized sovereignty of the British in Hindustan.

In the south of the peninsula the Company had acquired the supremacy of the Carnatic, and entered upon measures of conquest which speedily brought them into collision with Hyder Ali, the able sultan of Mysore. So great, indeed, was its political and territorial importance that the government of Great Britain felt it necessary to intervene, and claim a share in the administration of British India. In 1773, Parliament enacted that all civil and military correspondence should be submitted to the king's ministers; that a supreme court of judicature should be sent out from England; and that the presidencies of Bengal, Madras, and Bombay should be subject to a governor-general and council, the former to be nominated by the Crown.

The first governor-general under this new system was Warren Hastings, a man of extraordinary capacity and relentless will, who, in the face of violent opposition from his own council, extended British supremacy, defeated Hyder, its most powerful enemy, and wrested from Asef-ad-Dowla, the subahdar of Oude, the Zemindary of Benares. He reigned twelve years in Hindustan, and during that period raised the Company's revenue to double its previous amount. On his return to England his services were rewarded by impeachment, and he was tried before the House of Lords on various charges of bribery, corruption, and oppression. The trial, owing to various circumstances, was protracted for seven years, and terminated in an honourable acquittal. Warren Hastings lived to enjoy a calm old age, happy in the recollection that he had founded a policy, had administered government and war with more than the ability of a Richelieu, and patronized learning with all the liberality of a Medicis.

Lord Cornwallis, a soldier of experience and repute, succeeded as governor-general in 1786. His administration was eminently successful; he consolidated the alliance of the Company with the independent native princes, and in a war with Tippoo Sahib, the son and successor of Hyder Ali, defeated his armies, and invested his capital of Seringapatam. Tippoo only saved his crown by the cession of considerable territory to the British.

In 1793 Sir John Shore assumed the reins of government, but he adopted a pacific course of policy, which, however suitable for a consolidated empire, did not meet the wants of an empire still in the

process of building up, and tended to lower the prestige of the British among the native princes. In 1798 he was succeeded by a man of more resolute character and of far greater sagacity, Lord Mornington, afterwards Marquis of Wellesley, during whose viceroyalty Seringapatam was captured by assault (May 5, 1798), the greater part of the Deccan annexed to the Company's territories, and the Mahrattese chiefs overthrown by Sir Arthur Wellesley (afterwards Duke of Wellington) at the memorable battle of Assaye. The upper part of the Douab, with Delhi and Agra, Cuttack, and part of Guzerat, were also taken possession of by the British.

After a brilliantly successful career, the marquis of Wellesley returned to England and was succeeded in the governor-generalship by Lord Cornwallis (1805), who died soon after his arrival at Calcutta. Lord Minto replaced him in 1807, and distinguished his viceroyalty by subduing the remaining possessions of the French in the East.

From 1813 to 1823 British India was ruled by the marquis of Hastings, under whose direction the fame of the British arms crossed the Himalayas and penetrated into the mountainous districts of Nepal; the Pindarees, a race of freebooters, were annihilated; and the whole of Hindustan was brought immediately under the power or indirectly within the control of the British government.

Assam, Arracan, and the Tenasserim provinces were annexed to the Company's territories by Lord Amherst (1826), and year after year the splendid fabric of British supremacy received some substantial addition through the policy of our statesmen and the bravery of our soldiers. Lord Auckland's government was fatally marked by the disasters which befell the British arms in Afghanistan (1841); disasters in some degree retrieved by his successor, Lord Ellenborough, under whose auspices the capture of the cities and citadels of Ghuznee and Cabool was effected by Generals Nott and Pollock. In 1843 the genius of Sir Charles Napier annexed to the Anglo-Indian empire the territories of Scinde and Beloochistan, and during the splendid administration of the marquis of Dalhousie, an iron-handed and far-seeing ruler, the whole was crowned by the conquest of the Punjaub, Nagpoor, Oude. The viceroyalty of Lord Canning was marked by the breaking out of the Sepoy mutiny; the tragic scenes at Meerut, Cawnpore, and Lucknow; its final repression by Havelock and Lord Clyde: a series of events which brought into vivid relief the intrepidity, courage, and heroic resolution of British statesmen and British soldiers in the Far East, and eventually resulted in the abolition of the East India Company as a political power, the authority of the Crown being established by law throughout the great Indian empire. The present governor-general (1866) is Sir John Lawrence.

(Probably the best work of general reference on India is Mr. Montgomery Martin's *Progress and Present State of British India*, London, 1862—a work to which we are indebted for much of the preceding information. We have also consulted the *Statesman's Year Book* for 1866; *Official Report on Railways of India* for 1865; *Reports on Irrigation and Navigation*, by Lieutenant-Colonel R. Baird Smith, Sir Arthur Cotton, and others; G. O.

Trevelyan, *The Competition Wallah*; and numerous Parliamentary Papers.)

INDIAN CORN. [MAIZE.]

INDIAN INK. [INK.]

INDIAN OCEAN is the name given to the vast oceanic basin separated from the Pacific on the east by the Asiatic Archipelago and Australia, bounded on the south by a line drawn from the Cape of Good Hope to Bass' Strait, divided from the Atlantic by Africa on the west, and inclosed by the countries of Asia on the north. The principal inlets are the Bay of Bengal, the Arabian Sea, and Gulf of Oman, the Persian Gulf, and the Red Sea. Steam packets are established between the principal ports, which are Calcutta, Bombay, Malacca, Aden, Muscat, Zanzibar, &c. The most important islands are Madagascar, Mauritius, Bourbon, &c. The monsoons or periodical winds prevail in the northern part of the ocean, blowing from the south-west between April and October, and from the south-east during the rest of the year. Tempests are general at the periods of change; and between latitudes 5° and 40° south violent hurricanes occur.

INDIAN RUBBER. [CAOUTCHOUC.]

INDIAN TERRITORY, a large tract of land set apart by the Federal government of the United States for the permanent residence of the various tribes of native Indians removed from the settled states and territories of the Union. It lies between 33° 30' and 39° N. lat. and 94° and 100° W. long., bounded south by Texas, east by Arkansas and Missouri, and north by the new state of Kansas; the area is about 187,000 square miles; the Indian inhabitants are estimated at about 120,000. The principal Indian tribes settled in the territory are the Cherokees, 17,600; the Creeks, 25,000; the Choctaws, 16,000; the Osages, 4941; the Chickasaws, 4709; the Potawatomes and Chippewas, 4680; the Pawnees, 4500; the Seminoles, 3000; the Saes and Foxes, 2373; the Shawnees and Senecas, 1400; the Delaware, 1130, &c., under the guidance of missionaries who have settled amongst them: and with the sanction and assistance of the Commissioner of Indian Affairs, some of the larger tribes have established regular governments, legislatures, medical officers, churches, schools, newspapers, &c.

INDIANA, one of the united states of North America, is bounded S.E. by the river Ohio, which divides it from Kentucky, E. by the state of Ohio, N. by Michigan, and W. by the state of Illinois. It lies between 37° 37' and 41° 45' N. lat., and between 84° 42' and 87° 49' W. long. Its length is 276 miles and breadth 140 miles—the entire area being 33,809 square miles, or 21,637,760 acres. The population in 1800 was 4875; in 1810, 25,520; in 1820, 147,178; in 1830, 343,031; in 1840, 685,866; in 1850, 988,416; and at the last census (1860) 1,350,428, of whom nearly one-half were emigrants from other states, and from Germany and Ireland.

The Ohio and the Wabash are the most important rivers. [OHIO.] The Wabash rises in Ohio, and flows thence into this state. Its whole course through Indiana, and along its western boundary, is between 500 and 600 miles, all navigable except at its falls or rapids. All the other principal rivers of the state are tributaries of the Wabash: the

White River is formed of two main branches, of which the northern has a S.W. course of about 300 miles, and the East Fork has also a general S.W. course of 200 miles. The Wabash also receives the Tippecanoe and the Eel River from the N.E., then the Missisnewa from the S.E., and Little River from the N.E. Many streams fall into the Ohio, but none of much magnitude. The same remark applies to those which flow into Lake Michigan.

Surface.—This state, like Illinois, slopes to the S.W. Like that state also, it is, with few exceptions, one great plain. There is indeed a tract of hilly country north of the great bend of the Wabash, and the state is skirted on the south by those eminences called the Ohio hills, which sometimes touch the Ohio and sometimes retire from it for two or three miles; they occasionally rise 300 feet above the river. The timbered and prairie lands are more intermixed in this state than is usual; and the alluvial river-bottoms are all wide. The soil is admirably suited for grass and grain. The climate is somewhat more equable than that of Illinois, and milder than that of western Pennsylvania. It is everywhere healthy except in the neighbourhood of the wet prairies and swamps. Iron, copper, coal, marble, lime, freestone, and gypsum, are found.

Products.—Indiana produces an abundance of wheat, oats, potatoes, butter, cheese, wool, maize, tobacco, and a little cotton; swine and cattle are also reared. The most successful vineyards in the United States are at Vevay on the Ohio. They are managed by the Swiss settlers at that place, and consist of native species of the vine.

There are over 2000 miles of railway in the state, and a canal, 467 miles in length, uniting the Ohio river with Lake Erie, passes through it.

Chief Towns, &c.—Indiana is divided into ninety-one counties. The following are the principal towns, with their population in 1860:—*Indianapolis*, the capital, near the centre of the state, on the east bank of White River, which is navigable thus far at high water. Population, 30,000. It is a regularly built and beautiful city, with a handsome state-house, court-house, and asylums for the blind, deaf and dumb, and insane. It also has a university, two female colleges, thirty churches, and extensive woollen factories, iron foundries, planing mills, and flour mills. *La Fayette* is 65 miles N.W. from Indianapolis. Population, 9387. It has a court-house, gaol, market-house, bank, and seven churches, and is connected by canal with Lake Erie. *Marlison*, on the north bank of the Ohio, 88 miles S.E. from Indianapolis, has an active trade. Population, 8133. *New Albany*, on the north bank of the Ohio, 121 miles S. by E. from Indianapolis, has a court-house, gaol, and numerous places of public worship. Population, 12,647. The town is regularly built, has establishments for steam-boat-building, an engine factory, and a theological college. There is excellent railway accommodation. *Terre Haute* is situated on the east bank of the Wabash. Population, 8000. *Vevay*, 94 miles S.E. from Indianapolis, on the northern bank of the Ohio, was settled by emigrants from Switzerland. *Vincennes*, on the east bank of the Wabash, 118 miles from Indianapolis, was settled by the French in 1702, and is the oldest town in the state.

In 1860 it contained thirteen incorporated colleges (one or two of which receive pupils of both sexes), theological, law, and medical schools. The public revenue amounted to 3,851,456 dollars.

There are deaf-mutes, blind, and insane asylums, and numerous churches of all denominations.

In 1860 there were 337,390 students attending the public schools.

The legislative body consists of fifty senators and one hundred representatives. The state sends eleven representatives to Congress.

Indiana was included in the cession of Virginia to the United States in 1787. It was placed under a territorial government with Illinois in 1800, and under a separate government in 1809. In 1816 it became a state, and formed its present constitution.

INDIANS, AMERICAN. [NORTH AMERICAN INDIANS.]

INDICATORINÆ, Mr. Swainson's name for the Honey guides, a subfamily of cuckoos (*Cuculidæ*).

There appears to be but one genus, *Indicator* (De Vaillant), which is thus characterized:—Bill straight, finch-like; the base triangular; the sides compressed. Culmen and gonys equally inclined towards the tip; gonys angulated. Wings lengthened, pointed. Tail moderate, rounded. Feet short. Middle toe much longer than the tarsus. Locality, Africa.

The species are not numerous. The stories told of these birds indicating the nests of bees, and guiding men to them by their motions and cries, from the time of Sparrman downwards, appear to be perfectly authentic, though some great travellers affected to disbelieve them.

Mr. Steadman, in his 'Wanderings and Adventures in South Africa' (1835), says, 'The little honey-sucker, or indicator, kept fluttering before us with its cry of *cherr, cherr*, as if inviting us to follow. It is frequently known to conduct travellers to a nest of honey deposited in the hollow of a tree. I have, however, heard many instances mentioned of its stopping short of the hive, and hovering over a spot where a lion or tiger has been reposing, justly establishing its character as an indicator.' [CUCULIDÆ; CUCULINÆ.]

INDICTION. [CHRONOLOGY.]

INDICTMENT is a written accusation against one or more persons of a crime or misdemeanour referred to and presented by a grand jury. The decision of the grand jury is not a verdict upon the guilt of the accused, but merely the expression of their opinion that the matter is fit to be submitted to the common jury; and in conducting the inquiry the evidence in support of the accusation only is heard. If the grand jury think the accusation groundless, they indorse upon the bill 'not a true bill,' or 'not found;' if the contrary, 'a true bill;' and in finding a true bill twelve at least of the grand jury must concur. When a bill is found to be a true bill, the trial of the accused takes place in the usual form; and when the bill is found not to be true, or, as it is frequently called, 'ignored,' the accused is discharged, but a new bill may be preferred against him before the same or another grand jury.

INDIGESTION. [DYSPEPSIA.]

INDIGITES, among the classical ancients, a name given to the local or inferior divinities, or to demi-gods who had existed on earth, and from

their meritorious deeds were entitled to divine honours.

INDIGO, a well-known and beautiful blue vegetable colour, which is extensively employed in dyeing and calico printing. The plants from which it is mostly obtained belong to the genus *INDIGOFERA*. Their cultivation is extensively carried on in various parts of India and America. In the spring the seeds are sown at the rate of about a dozen pounds per acre. The plants grow rapidly, beginning to blossom in about three months, when they are cropped and allowed to grow till sufficiently matured to admit of another cutting. Occasionally a third and even a fourth cropping is made, but each of these contains less and less of the colouring matter that yields the colouring principle. When growing, the plants present no appearance that would lead an observer to suppose they contained any colouring matter; nor is it even yet satisfactorily determined in what form the colouring matter pre-exists in the vegetable tissue.

When the plant is in full flower, it contains most colouring matter. It is then cut, and put into vats and covered with water; fermentation takes place, accompanied with the evolution of carbonic acid and of other gaseous products, and the copper-coloured liquor is covered with a froth which in a little time becomes of a violet colour. The liquor is then run off into another vat, placed at a lower level than the first. Here it is brought well into contact with the air by being beaten with wooden paddles for about an hour and a half. During the beating the liquor darkens in colour, and the indigo separates into flocks. These are allowed to subside, heated to boiling in order to remove certain impurities, then collected on wooden strainers, and finally pressed, dried, and the mass cut up into blocks for sale.

The usual appearance of indigo as it occurs in commerce is that of nearly cubical cakes of an intense blue colour and earthy fracture. Indigo seldom contains more than about half its weight of pure colouring matter, and frequently much less.

When common indigo has been treated with dilute acids, alkalies, and alcohol, the remainder is *indigotin*, or indigo, nearly in a state of purity. It is composed of hydrogen, 3.93; carbon, 72.34; oxygen, 12.60; nitrogen, 11.13.

Indigo was well-known to the ancients, but was not employed in Europe till the sixteenth century. Owing to the jealousy of the growers of the native woad, its importation into England was even then prohibited; and it was not till the time of Charles II. that this obstacle was overcome.

The great value of indigo as a dyeing material, and the enormous extent to which it is used, have procured for it a large share of the attention of scientific chemists; and many compounds of great interest have been derived from it.

In 1864 the total quantity of indigo imported into the United Kingdom was 76,214 cwts., of the value of 2,248,112*l*. The supplies were chiefly from India: 47,532 cwts. from Bengal, 14,450 cwts. from Madras, and 3099 cwts. from Pondicherry. In the same year 57,664 cwts., value 1,700,848*l*., were exported; principally to Holland, Belgium, Hamburg, Russia, and the United States.

INDIGOFERA, a genus of plants of the natural family of *Leguminosae*, indigenous in the equinoctial

parts of Asia, Africa, and America, and celebrated for some of the species yielding indigo. The species are about 150 in number. *I. tinctoria* is the species generally cultivated in India, whence it has been introduced both into Africa and America. *I. anil* is said by De Candolle to grow wild in America, and to be cultivated in both Indies, as also along the Gambia in Africa. *I. cœrulea* is a new Indian species described by Dr. Roxburgh, who states that from the leaves he had often extracted a most beautiful light indigo, more so than he ever could from the common indigo plant. It flowers during the wet and cold seasons. *I. argentea* is the species cultivated in Egypt and Barbary for the sake of its indigo, and, according to Humboldt, also in America. *I. disperma*, according to Humboldt, is also one of the species cultivated in America, and seen among the most ancient hieroglyphical paintings of the Mexicans. Dr. Bancroft considers it as the species called Guatemala indigo, which yields fine pulp, but is less productive than other species.

Plants of other genera are also employed for obtaining indigo; as *Wrightia tinctoria*, *Marsdenia tinctoria*, *Galega tinctoria*, but especially the two first. Dr. Bancroft also adduces *Spilanthes tinctoria*, *Scabiosa succisa*, *Cheiranthus fenestralis*, and several others, as all yielding a blue dye, or coarse sort of indigo.

INDORE, a city of Hindustan, and the capital of the principality of the same name, is in 22° 42' N. lat., and 75° 50' E. long. It is a modern city, the old city on the same site having been wholly destroyed by fire by Scindia, in 1801, during the war between that chief and Holkar. The population is now about 15,000. The streets are spacious and paved; a great proportion of the houses are of two stories, and built of masonry, but there are many mud dwellings interspersed. There is a British residency here; and in the mutiny of 1857 the place acquired considerable notoriety. Though Holkar, the rajah, remained faithful to the British government, his troops mutinied, and, holding their prince as a prisoner in his own palace, butchered many Europeans, men, women, and children, in cold blood. *Indore*, the principality, consists of several detached tracts lying along the river Nerbudda, and on the northern side of the Vindhya mountains. It is ruled by the descendant of a famous Mahratta dynasty, under the title of Maharajah.

INDRE, a department in France formed out of the western portion of the old province of Berri, is bounded N. by the department of Loir-et-Cher, E. by that of Cher, S. by those of Creuse and Haute-Vienne, and W. by those of Vienne and Indre-et-Loire. It lies between 46° 21' and 47° 16' N. lat., 0° 53' and 2° 12' E. long., and measures 64 miles in its greatest length, with a mean breadth of 54 miles. The area is 2624 miles, and the population in 1863 was 270,054.

Surface.—The department is generally very flat; the only hills of any considerable size are the granitic swells on the southern border, and the gentle slopes that diversify the valleys of the Creuse and the Indre. The surface presents three marked and distinct divisions. The first, called *Bois-Chaud*, comprises seven-tenths of the whole department, including the arrondissement of La-Châtre, a great portion of

those of Châteauroux and Le-Blanc, and a third of that of Issoudun; it is divided, where arable, into a great number of small farms, and presents a very varied appearance, from the number of its hedges, ditches, and woods. The second division, distinguished by the name of *Champagne*, is a flat treeless country, without hedge or inclosure of any kind, divided into large farms, and comprising two-thirds of the arrondissement of Issoudun and a part of that of Châteauroux. The third division, called *La Brenne*, comprises parts of the arrondissements of Châteauroux and Le-Blanc, and presents a flat surface, without inclination, and covered with shallow ponds, which rest on a bottom of compact clay, and which, by their pestilential exhalations, are very injurious to health. The land varies greatly in quality, from light moss or barren sand to stiff clay, and from the vegetable mould, half covered with flints, to the rich homogeneous soil called *terre de Beauce*, which is considered the most productive, and covers 194,790 acres. The flinty soils, amounting to 111,626 acres, are best adapted for vine culture. All the land capable of cultivation is tilled, but agriculture is in a backward state.

The department takes its name from the river *Indre*, which rises just within the department of Creuse, and entering that of Indre flows N.W. past Sainte-Sévère, La-Châtre, Châteauroux, and Châtillon, below which it enters the department of Indre-et-Loire; here passing Loches, where it becomes navigable, it continues in the same direction as far as Montbazou, and then turning W. passes Azay-le-Rideau, below which it enters the Loire between the embouchures of the Creuse and the Vienne. Its whole length is 124 miles, of which 44 are navigable; its mean width 98 feet, and its ordinary depth from 5 to 6 feet. It is subject to floods, which rise from 10 to 11 feet at their highest, and spreading beyond the banks sometimes do great damage, but add largely to the fertility of the soil. The number of mills along the banks of this river is considerable. The south and south-west of the department is drained by the Creuse and its feeder, the Anglin, which is itself increased by the Abloux. [CREUSE.] The west of the department is drained by the *Claise*, a feeder of the Creuse, which flows through the marshy district of Brenne; and the east and north are drained by feeders of the Cher, namely, the *Aron*, which receives the Théols, and the *Fouzon*, fed by the Nahon.

The department is crossed by a railroad, which branches off from the Orléans-Bourges line at Vierzon, and runs through Issoudun to Châteauroux.

Products.—Wine and corn are produced in quantity more than enough for the consumption; buck-wheat, hemp, flax, chestnuts, and fruits are also grown. The annual produce of wine is 6,600,000 gallons, about one-half of which is exported. Although the pasture land is of no great extent, yet considerable numbers of horned cattle are kept; hay is saved for their winter food, and in summer the scantiness of the pasture is eked out with the leaves of trees, especially with those of the elm. Sheep are a source of great profit to the farmer, on account of the fineness of their wool; the quality of the wool of the *Champagne* district especially is very superior. The sheep are very carefully tended; ewes, lamb-hogs,

and wethers, are kept in separate flocks, each under its own shepherd: they are never folded; when the winter is severe, they get a mixture of hay and straw three times a day. Great numbers of geese and turkeys are reared, and also of mules, pigs, and horses. The climate is mild and healthy, except in the Brenne district, where the atmosphere is almost always charged with pestilential fogs.

Several iron mines are worked; marble, millstone, limestone, mica, flint, lithographic stones (the best in France), granite, quartz, spar, marl, potter's clay, variegated marbles, &c., are found.

The cloth manufactures of Châteauroux and some other places are important; linen, hosiery, scythes, paper, porcelain, and earthenware are made. There are also numerous establishments for the manufacture of woollen yarn, leather, beer, parchment, &c. There are important iron-works at Clavières. The commerce of the department is composed of the various agricultural and industrial products named. About 340 fairs are held in the year, principally for the sale of sheep.

Divisions and Chief Towns.—There are four arrondissements, which, with their subdivisions and population, we here enumerate:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Châteauroux,	8	81	102,212
Le-Blanc, .	6	56	59,086
Issoudun, .	4	49	51,836
La-Châtre, .	5	59	56,920
Total, .	23	245	270,054

Of the arrondissement of Châteauroux and of the whole department, the capital is CHATEAUX-ROUX. *Argenton-sur-Creuse*, 16 miles S. by W. from Châteauroux, is built on both banks of the Creuse, and consists of an upper town, which grew up round an ancient castle now in ruins, and of a lower town, joined to the former by a stone bridge. The most remarkable structures now remaining in the upper town, which is entered by four gates, are the Gate of Auditory, now used as a prison, and the desecrated church of St. Benoît, now used as the corn market, on the roof of which are still seen the arms of Louis de Bourbon, count of Vendôme. Linen, cloth, tiles, bricks, woollen yarn, paper, leather, &c., are manufactured in the town, which has 4765 inhabitants. *Ardentes-St.-Martin*, on the left bank of the Indre, has 2561 inhabitants, who manufacture scythes and tools. *Bourg-Dieu* or *Déols*, formerly a large town, and the capital of Lower Berri, now a village of 2415 inhabitants, stands about a mile N. of Châteauroux. It was celebrated for its Benedictine Abbey, whose suppression by Gregory XV., in 1623, caused the decay of the town. Of the vast buildings of the abbey, only a single tower is now standing; the magnificent ruins which remained till 1830 were then sold and removed as materials for building. *Buzançais*, prettily situated 13 miles W. of Châteauroux on a hill on the right bank of the river Indre, which is here crossed by five bridges, is an ill-built town with 5016 inhabitants. It possesses extensive cloth manufactories. There are several flour mills

in the town, and in the environs large iron-works. *Châtillon-sur-Indre*, formerly an important fortress on the frontiers of Berri, is built on a height crowned by the ruins of an ancient castle, near the left bank of the Indre, 26 miles N.W. from Châteauroux, and has 2869 inhabitants. The church is a large and handsome structure, which dates from the tenth century, and contains some remarkable sculptures. In the principal street stands an ancient house, on whose front are figures of Momus and a player on the pipe. From the market-place there is a fine view of the valley of the Indre. *Levroux*, the ancient *Gabatum*, stands on the Nahon, 12 miles N. from Châteauroux, and has 3867 inhabitants, who manufacture cloth and leather, and deal in corn, wine, wool, and cattle. The parish church of Levroux is considered the finest in all Lower Berri. Several Roman remains and Celtic coins have been found in and near this town, some of the fortifications of which still remain. *Valençay*, farther N. on the left bank of the Nahon, has a population of 3587, and manufactures of hosiery, cloth, cutlery, and fine woollen yarn. The great ornament of Valençay is the magnificent château, or rather palace, built in the reign of Francis I. by the family of Etampes; it is surrounded by a large park, diversified by beautiful gardens and waterworks. This château was the prison of Ferdinand VII., king of Spain, from 1808 to 1814; it was the property of Talleyrand, who for some time made it his residence.

In the arrondissement of Le-Blanc, the chief town, *Le-Blanc*, is beautifully situated on the Creuse, here crossed by a handsome bridge, above which the river expands so as to form a lake, and below it breaks into cascades, generating force to drive the machinery of several factories. The town is improving, and has considerable cloth factories, vinegar works, potteries, a linen-yarn mill, a large brewery, and several iron forges and smelting furnaces. It is the seat of a tribunal of first instance, and has a savings' bank, and 5882 inhabitants, who trade in wine, fish, timber staves, and the articles named before. *Bélâbre*, S. by E. of Le-Blanc, on the right bank of the Anglin, has 2221 inhabitants, and some remains of an ancient castle. *Mezières-en-Brenne* has 1681 inhabitants; it stands N. by E. of Le-Blanc, on the right bank of the Claise, in a district not long ago an unapproachable marsh, but now drained, planted, and well cultivated. There is a remarkable church here, which was dedicated in 1339 to Sainte-Marie-Madeleine, and contains many mementos of the family of Anjou. *St.-Gualtier*, E. of Le-Blanc, on the Creuse, which is here passed on a suspension bridge, has an ecclesiastical college, and a population of 1902.

In the arrondissement of Issoudun, the chief town, *Issoudun*, is situated partly on the slope, and partly at the foot of a hill above the river Théols, which is here crossed by three bridges, leading to as many suburbs, in $46^{\circ} 56' 54''$ N. lat., $2^{\circ} 0' 49''$ E. long., at a distance of 17 miles by railway N.E. from Châteauroux, and has 14,282 inhabitants. The older part of the town, called Le Château, has very good houses, but the streets are dirty, narrow, and tortuous; the rest of the town is better built, having

been constructed since the terrible conflagration of 1651, which broke out at a time when the city was assaulted by the army of the Fronde, and by which 1200 houses were destroyed. The town has tribunals of first instance and of commerce; a consultative chamber of manufactures, and a communal college. Woollen cloth and yarn, calico, hosiery, parchment, leather, and beer are the principal industrial products; there are some bleaching establishments also, and a good business is done in the articles enumerated, and in corn, wine, wool, cattle, wood, timber, iron of superior quality, &c. There are four churches, two hospitals, and a town-hall. *Vatan*, which stands 13 miles N.W. of Issoudun, has an ancient church dedicated to St.-Laurian, and rebuilt in 1005: population, 3047. *Reuilly*, 9 miles N. by railway from Issoudun, stands near the Théols, and has 2568 inhabitants. In the town stands a remarkable structure in the Renaissance style, which is called La Grande-Maison; and in the environs is the splendid residence of Ferté-Reuilly, built by Mansard in 1659 for Jacques de la Fond. An ancient Gothic church stands half a mile S. of the town, on the hill of Vergy, the summit of which was formerly crowned by a strong fortress.

In the arrondissement of La-Châtre, the chief town is *La-Châtre*, which stands in the most fertile and picturesque part of Berri, on a hill that skirts the Indre on one side, and overlooks on the other a deep narrow valley laid out in gardens and orchards. It is situated in $46^{\circ} 34' 53''$ N. lat., $1^{\circ} 59' 4''$ E. long., 19 miles S.E. from Châteauroux, and has a tribunal of first instance, a college, and 5038 inhabitants. The streets are well but not regularly built, yet the town makes an agreeable impression from the charming scenery which is presented to view from almost every point. The most remarkable structures are the church and two ancient wooden houses. Woollen cloth and leather are manufactured; there is also a considerable trade in wool, goat skins, feathers, cattle, and chestnuts (of which large quantities are grown in the neighbourhood). *Aigurande*, S. of La-Châtre, has a population of 2146. *Neuwy-St.-Sépulchre*, said to occupy the site of the ancient *Noviiodunum*, is 8 miles W. of La-Châtre, and has a population of 2175. *Sainte-Sévère*, formerly a strong fortress, now a village of about 1000 inhabitants, stands near the Indre, 6 miles S.S.E. from La-Châtre. Of its formidable defences, which, when in the possession of the English, were with great difficulty mastered by Du Guesclin, only a single tower remains.

The department forms, together with that of Cher, the see of the archbishop of Bourges; it is comprised in the jurisdiction of the Cour Royale and University Academy of Bourges, and belongs to the fifteenth Military Division, of which Bourges is head-quarters. It returns two members to the Chamber of Deputies.

(*Dictionnaire de la France; Statistique de la France; Richard, Guide Classique du Voyageur en France; Annuaire pour l'An 1866; Malte Brun and Lavallée, Géographie Universelle.*)

INDRE-ET-LOIRE, a department in France, formed out of the old province of Touraine, is bounded N. and N.E. by the departments of Sarthe

and Loir-et-Cher, E. and S.E. by those of Loir-et-Cher and Indre, S. by those of Indre and Vienne, and W. by those of Vienne and Maine-et-Loire. It lies between 46° 43' and 47° 42' N. lat., 0° 5' and 1° 18' E. long.; its greatest length from N. to S. is 68 miles, from E. to W. 55 miles. The area is 236 square miles, and the population in 1863 was 323,572.

The department takes its name from the INDRE, noticed in the preceding article, and the LOIRE, which crosses it from E. to W. The other rivers which ultimately or directly enter the Loire on the left bank are the CHER, which throws off several arms to the Loire, forming islands before its main stream enters that river; the Claise, which crosses the southern angle of the department [INDRE]; the CREUSE, which forms part of the south-western boundary; and the VIENNE, which enters this department at the point where it is joined by the Creuse, and, flowing in a north-western course past Chinon, enters the Loire on the extreme western boundary of the department. On the right bank, the feeders of the Loire in this department are the Brenne and the Doit. The Doit rises in a pond W. of Savigné; flowing S. past Bourgueil, it turns W., and, under the name of Authion, runs for the distance of forty miles parallel to the Loire, which it enters in the centre of the department of Maine-et-Loire at St.-Aubin-des-Ponts-de-Cé, S. of Angers. Except the Brenne, the Doit, and the Claise, all the rivers mentioned are navigable. The department is traversed by the Orléans-Tours Railway and its branches.

The Loire and its principal feeders are subject to great inundations, which frequently do incalculable damage to property on their banks. One of the most disastrous overflows of this kind on record occurred in October 1846, when in one night the Loire rose 20 feet, and continued to rise for two days, sweeping away bridges and viaducts, and destroying many lives, and property to the amount of about 2,000,000*l.* sterling. On ordinary occasions such disasters are prevented by the enormous dykes that line both banks of this great river from the neighbourhood of Blois to the mouth of the Authion before mentioned, a distance of ninety-three miles. The dykes are 22 feet wide on the top, and so high as to intercept the view of the low grounds from passengers by the steamers that ply on the river; the parts most exposed to the flood are faced with uncemented masonry. The high road runs along the summit of the dyke on the right bank, and presents one of the finest drives in the world, curtained with poplars and diversified by the views of villas, towns, populous villages, and those curious dwellings hollowed out in the sides of the rocky hills that now and then approach the right shore.

Surface.—To the north of the Loire the surface of the department is hilly, and presents three extensive forests and several vast and barren wastes. The cultivation here is still rude, and the population scanty. Along the banks of the Loire, however, a very different landscape is presented; well-cultivated fields, luxuriant pastures and meadows, vineyards and orchards, attesting equally the fertility of the deep alluvial soil and the industry of the inhabitants. Between the Indre and the Vienne occurs a re-

markable table-land, containing an immense deposit of fossil shells, which are used as manure. The great forests south of the Loire are those of Amboise, Loches, and Chinon. On the slopes surrounding the forest of Amboise grow the vineyards that yield the rich Cher wines. In general, the surface in this portion of the department presents strong deep wheat soils, rich pastures, vineyards, and orchards; there are, however, some barren wastes here as well as north of the Loire, but they are comparatively of small extent. Large tracts are covered with heath and broom (*genêt*), the latter the plant which, it is said, originated the name of our great English dynasty of Plantagenet. The inundations of the rivers add greatly to the fertility of the soil. The climate generally is mild.

Products.—The valleys of the Loire and the other principal rivers in this department contain some of the most productive and best cultivated land in France. All kinds of breadstuffs are produced in quantity more than enough for the consumption. One of the most important products is wine, of which 14,000,000 gallons are made in ordinary years; next come hemp, walnuts for making oil, plums, beans, leguminous plants, liquorice, anise, and coriander; citrons, melons, almonds, apples, pears, truffles, &c. Bees and silkworms are carefully tended: game and fish are abundant.

Iron mines are worked; stone, especially a tuffaceous sandstone, of which most of the houses are built, is quarried out of the hills near the Loire, and excavations thus formed are occupied as dwelling-places by the poorer inhabitants. Millstone grit, marl, lithographic stones, pipe and potter's clay, and brick-earth are found. Copper ore is met with, but no mines are worked.

The chief industrial products are bar iron, powder, and files; woollen cloth, of which manufacture Tours is the centre; silk, leather, paper, and pottery are also made, but the manufacture of the three latter articles is not so important as formerly. The culture of silk is increasing, as are the silk, linen, and woollen manufactures of Tours. There is a national gunpowder factory and nitre refinery at Montbazou. About ninety fairs for the sale of cattle and agricultural produce are held. Druidical or Celtic remains are numerous in this part of France.

Divisions and Chief Towns.—The department contains three arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Tours, . .	11	126	169,232
Chinon, .	7	87	89,407
Loches, .	6	68	64,933
Total, .	24	281	323,572

In the arrondissement of Tours, the chief town, *Tours*, which is also the capital of the department, stands on the south bank of the Loire, in a plain that lies between that river and the Cher, in 47° 23' 46" N. lat., 0° 41' 24" E. long., sixty-five miles by railway S.W. from Orléans, and in 1861 had 41,061

inhabitants. Tours, as well as Touraine, takes its name from the *Turones*, a Celtic tribe, of whose capital, *Cæsarodunum* or *Cæsaromagus*, it occupies the site. The entrance to the city from the Paris road is striking; a magnificent stone bridge of fifteen arches, 475 yards in length, and sixteen yards wide, leads across the Loire into a spacious square, formed by the wide river on the northern side, the fine buildings of the town-hall and the museum on the south, while the east and west sides are formed by two terraces planted with trees. Passing through the square, a straight wide street (*Rue Royale*) is entered, consisting of houses built in good taste and on a uniform plan; this street, which is furnished with foot-pavements, runs right across the town in its widest part, and terminates in the avenue of Grammont, at the end of which a bridge crosses the Cher into the Poitiers road. The other streets are, with few exceptions, ill-built, narrow, and crooked. There are several suburbs, but these can scarcely be distinguished from the town itself, as it has no ramparts except on the side next the Cher, and these are laid out so as to form the fine promenade called *Le-Mail*. The wide quays along the Loire, which is joined to the Cher by a canal, are a great ornament to the town; they extend on each side of the bridge, are planted with trees, and backed by large buildings. Tours is the terminus of railways from Paris, Bordeaux, and Nantes. The most remarkable structures are—the cathedral, in the Gothic style of architecture, built by Henry V., of England, and dedicated to St.-Gratien, the first bishop of Tours, the portal of which contains a magnificent rose window, and is surmounted by two towers 263 feet in height, and terminating in domes; the cavalry barracks, built on the site of the English Henry II.'s castle, of which only a single tower now remains; two lofty towers in the *Rue St.-Martin* (one containing a clock, and hence called *Tour d'Horloge*, and the other called *La Tour de Charlemagne*, from the belief that Charlemagne's queen was buried beneath it), which are the only remains of the great cathedral of St.-Martin-de-Tours, founded by St.-Martin; the churches of St. Clement and De-la-Riche; the fountain of Beaune, which stands in the market-place, and consists of an octagonal basin filled with water, gushing in four jets from a central pyramid adorned with sculptures and arabesques; the episcopal palace; the court-house; the college buildings; the general hospital; and the residence of the prefect, which also contains a public library of 40,000 volumes and several valuable manuscripts. Tours has a tribunal of first instance, a tribunal and chamber of commerce, one communal and two ecclesiastical colleges, a botanic garden, and several literary and scientific societies. The chief manufactures are woollen cloth, silk stuffs (in which an important trade is carried on), ribands, serge, carpets, small wares, wax candles, woollen yarn, leather; the commerce is composed of these articles and of corn, wine, brandy, plums and dried fruit, hemp, wool, &c. Tours had in the middle ages one of the most important mints in France, in which were coined the *livres tournoises*, often named in history, and each worth a franc. There is here a large printing establishment, which has produced some very fine works—especially Gustave

Doré's 'Illustrated Bible.' In one of the suburbs, called Riche, stood the castle of *Plessis-les-Tours*, in which Louis XI. died, and which has been rendered famous by Sir Walter Scott's novel of 'Quentin Durward'; the keep is the only part of the edifice now standing. The intolerance of Louis XIV. greatly diminished the population of Tours, by driving most of the Huguenots away. Many of them were silk-weavers, who emigrated to England and settled in Spitalfields. At Mettray, near the town, is a voluntary establishment for the reformation of juvenile offenders, which has deservedly acquired great repute. The city of Tours has always been a favourite abode with the English, and contains a large number of good houses. The other towns are AMBOISE, the castle of which was the prison residence of Abd-el-Kader; *Bléré*, a busy little town of 3477 inhabitants, on the left bank of the Cher, which is here crossed by a bridge built by Henry II., of England; *Château-la-Vallière*, in the N.W. of the department, which has iron forges and 1309 inhabitants; *Château-Renault*, which stands on the slope and at the foot of a hill in a pretty country on the Brenne, and has 3562 inhabitants, who manufacture cloth, flannel, leather, and tiles; the town is named from an old castle built in the year 981, and still standing; *Montbazon*, a small place on the right bank of the Indre, with a population of only 1074, but important for the great powder-mills and saltpetre-works near it; and *Vouvray*, which is situated seven miles E. from Tours on the railway to Orleans, and on the Loire, in a district famous for its white wine, and has 2438 inhabitants.

In the arrondissement of Chinon, the chief town, *Chinon*, is built on the Vienne, at the foot of a hill, the summit of which is covered with the ruins of the ancient fortress of Chinon, where Henry II. died, and Joan of Arc had her first interview with Charles VII. It is twenty-five miles S.W. from Tours, and has a tribunal of first instance, a college, savings' bank, and 6905 inhabitants, who manufacture serge, drugget, haircloth, earthenware, saltpetre, &c., and trade in cattle, corn, wine, brandy, plums, nut-oil, honey, wax, &c. Chinon is an improving town; the old ramparts are now replaced by quays. Rabelais was born here in 1483. *Azay-le-Rideau*, prettily situated on the Indre, about five miles above its junction with the Loire, is remarkable for a fine structure called *Château-d'Azay*, built on an island in the Indre; the town has 2073 inhabitants. *Bourgueil*, situated in a very fertile district on the right bank of the Doit, at a distance of ten miles N. from Chinon, has a college, and 3416 inhabitants, and a trade in wine. *Cinq-Mars*, on the left bank of the Loire, near Langeais, is a small place of only 1999 inhabitants. It deserves notice on account of its ancient square tower, which is built of bricks, perfectly solid, ninety feet high, thirteen feet wide on each face, and surmounted at the angles by four pinnacles, each eleven feet high; a central pinnacle was thrown down by a storm in 1571. The purpose and date of its erection are unknown. *Langeais*, eighteen miles N.N.E. from Chinon, stands on the right bank of the Loire, and has 3381 inhabitants, who trade in agricultural produce and manufacture linen, tiles, bricks, and earthenware. The castle in

which Charles VIII. espoused Anne of Brittany is still in tolerable preservation. *Sainte-Maure* stands on the right bank of the Manse, eighteen miles E. from Chinon, and has 2595 inhabitants, who manufacture linen, printed calicoes, and haircloth. The church of Sainte-Maure is one of the finest in Touraine; it dates from the twelfth century, and beneath it there is a crypt still more ancient. *Richelieu*, a well-built town, consisting of several wide straight streets that terminate in a handsome square in the centre of the town, stands 11 miles S. from Chinon on the Mable, and has 2601 inhabitants, who manufacture beet-root sugar and brandy, and have a considerable trade in wine and fruits, and other agricultural produce. Cardinal Richelieu erected a residence in this (his native) town in 1637, and the place was then built on a regular plan; the cardinal's palace is now a heap of ruins.

In the arrondissement of Loches, the chief town, *Loches*, stands on the left bank of the Indre, at a little distance from *Beaulieu*, a suburb of about 1800 inhabitants, to which it is joined by several bridges thrown across the arms of the river. The town is 24 miles S. by E. from Tours; it is built round the base of a hill, the summit of which is crowned by the remains of its ancient castle. The situation of Loches, in the rich and beautiful valley of the Indre, and the historical associations connected with it, render it one of the most interesting towns in Touraine. A great part of the castle, in which several of the kings of France resided, and which also served as a state prison for illustrious political offenders, is now in ruins. The keep is still used as a prison, and in a more modern portion the sub-prefect resides. Between the keep and the residence of the sub-prefect is the church of St.-Ours, which has a stone roof surmounted by two lofty pyramidal spires; the tomb of Agnes Sorel, mistress of Charles VII., is in this church. At a short distance from the town, and near the forest of Loches, which supplies mast timber to the French navy, are the ruins of the Carthusian convent of *Liget*, founded by Henry II. in expiation of the murder of Becket. The town of Loches presents narrow streets and ancient houses; it has a tribunal of first instance, a college, and 5267 inhabitants, who manufacture linen, coarse cloth, woollen yarn, leather, and paper. *La-Haye-Descartes*, the birth-place of Descartes, is prettily situated on the right bank of the Creuse, and has 1620 inhabitants. *Ligueil*, W. of Loches, stands on the Estrigneuil, a feeder of the Creuse, and has 1992 inhabitants, who grow great quantities of plums. *Le-Grand-Pressigny*, on the right bank of the Claise, with a population of 1809, and the ruins of a castle of the thirteenth century; and *Preuilly*, further south on the same bank, which has iron forges and 2194 inhabitants, give names to cantons.

The department forms the see of the archbishop of Tours, is included in the jurisdiction of the Cour Royale and University Academy of Orléans, and belongs to the eighteenth Military Division, of which Tours is head-quarters. It returns three members to the Chamber of Deputies.

(*Dictionnaire de la France; Statistique de France; Annuaire pour l'An 1866*; Malte Brun, *Géographie Universelle*; *The Tourist on the Loire*, by Roscoe, &c.

INDUCTION (Mathematics). The method of induction, in the sense in which the word is used in natural philosophy, is not known in pure mathematics. There certainly are instances in which a general proposition is proved by a collection of the demonstrations of different cases, which may remind the investigator of the inductive process, or the collection of the general from the particular. Such instances, however, must not be taken as permanent, for it usually happens that a general demonstration is discovered as soon as attention is turned to the subject.

There is, however, one particular method of proceeding which is extremely common in mathematical reasoning, and to which we propose to give the name of *successive induction*. It has the main character of induction as defined by the logicians, because it is really the collection of a general truth from a demonstration which implies the examination of every particular case; but it differs from the process of physics inasmuch as each case depends upon one which precedes. Substituting, however, demonstration for observation, the mathematical process bears an analogy to the experimental one, which, in our opinion, is a sufficient justification of the term 'successive induction.' An instance of the method will enable the mathematical reader to recognize a mode of investigation with which he is already familiar.

Example.—The sum of any number of successive odd numbers, beginning from unity, is a square number, namely, the square of half the even number which follows the last odd number. Let this proposition be true in any one single instance; that is, n being some whole number, let $1, 3, 5, \dots$ up to $2n + 1$ put together give $(n + 1)^2$. Then the next odd number being $2n + 3$, the sum of all the odd numbers up to $2n + 3$ will be $(n + 1)^2 + 2n + 3$, or $n^2 + 4n + 4$, or $(n + 2)^2$. But $n + 2$ is the half of the even number next following $2n + 3$: consequently, if the proposition be true of any one set of odd numbers, it is true of one more. But it is true of the first odd number 1, for this is the square of half the even number next following. Consequently, being true of 1, it is true of $1 + 3$; being true of $1 + 3$, it is true of $1 + 3 + 5$; being true of $1 + 3 + 5$, it is true of $1 + 3 + 5 + 7$, and so on, *ad infinitum*.

INDUCTION (Gr. *epagoge*), as defined by the late Archbishop Whately, 'is a kind of argument which infers respecting a whole class what has been ascertained respecting one or more individuals of that class.' According to Sir William Hamilton, the word has been employed to designate three very different operations:—1. The objective process of investigating particular facts, as preparatory to Induction, which he observes is manifestly not a process of reasoning of any kind; 2. A material illation of a universal from a singular, as warranted either by the general analogy of nature or the special presumptions afforded by the object matter of any real science; 3. A formal illation of a universal from the individual, as legitimated solely by the laws of thought and abstracted from the conditions of any particular matter. The second of these operations is the inductive method of Bacon, which proceeds by means of rejections and conclusions, so as to

arrive at those axioms or general laws from which we may infer by way of synthesis other particulars unknown to us, and perhaps placed beyond reach of direct examination. ('Nov. Org.,' 'Aph.,' c. iii. c. v.) Aristotle's definition coincides with the third, and induction 'is an inference drawn from all the particulars.' ('Prior. Anal.,' ii. c. xxiii.) The third alone is properly an induction of logic; for logic does not consider things, but the general forms of thought under which the mind conceives them; and the logical inference is not determined by any relation of causality between the premiss and conclusion, but by the subjective relation of reason and consequence as involved in the thought. The inductive process is exactly the reverse of the deductive; for while the latter proceeds from the whole to the part, the former ascends from the part to the whole: since it is only under the character of a constituted or containing whole, or as a constituent and contained part, that anything can become the term of logical argumentation. Of these two processes Professor Hamilton gives the following figures:—

Induction.	Deduction.
X Y Z are A.	B is A.
X Y Z are whole B.	X Y Z are under B.
∴ whole B is A.	∴ X Y Z are A.
Or,	Or,
A contains X Y Z.	A contains B.
X Y Z contains B.	B contains X Y Z.
∴ A contains B.	∴ A contains X Y Z.

INDUCTION. [ADWOWSON; BENEFICE.]

INDULGENCE is a power claimed by the Roman Catholic Church of granting to contrite and confessed sinners 'a remission of the temporal punishment which often remains due to sin after its guilt has been remitted.' According to their catechism, it is not in any sense a pardon of the guilt of sin, whether past, present, or future; but it always supposes that the guilt has already been removed before its benefit can be applied to the soul. There are two kinds of indulgences—plenary and partial. By a plenary indulgence is meant the remission of the whole debt of temporal punishment due to sins, and by a partial indulgence a part of that debt. If, for instance, a man had gained for his own benefit a plenary indulgence, he would go straight to heaven without passing through purgatory; but if he had only gained a partial indulgence, he would have to expiate the rest of his debt in purgatory. We may observe that indulgences are granted in some cases to those who give money for the building of churches and other pious purposes, but that the sale of or traffic in indulgences has been severely reprobated by many councils. 'An indulgence,' say they, 'being the remission of the temporal punishment which remains *after* the guilt has been remitted, necessarily presupposes a state of grace. Nay, so perfect must be this condition in the case of a plenary indulgence, that it requires a freedom from the guilt not only of mortal but also of venial sin. For so long as there remains on the soul the least venial sin unforgiven, the temporal punishment due to that sin cannot be remitted, and consequently the full benefit of a plenary indulgence cannot be obtained.' Protestants generally regard the doctrine of indulgences as being founded not only on an

unwarranted assumption of power given to the church, but also on a doctrine of human works and merits inconsistent with what scripture teaches as to the office of Christ as a Saviour. The wholesale disposal of indulgences in the papacy of Leo X. excited the indignation of Luther, and was one of the primary causes of the Reformation.

INDUS (the Indian), a constellation of Bayer, situated between Sagittarius and the South Pole.

INDUS. [HINDUSTAN.]

INDUSTRIAL EXHIBITIONS. Since the great International Exhibition of London, 1862, various efforts have been made to gather together the productions of amateur artists, whose daily life is spent in business or manual labour, and to exhibit these collections to the public, at such a price as will pay the expenses, and leave a surplus for distribution in prizes to the exhibitors. The objects aimed at have been to bring to light the latent talent of the industrial classes, to give them opportunities of wider culture and loftier aims, and to stimulate them to make the best use of their leisure hours. Industrial Exhibitions were held in various parts of the metropolis during the years 1864–65, and at Birmingham, Glasgow, Bristol, Nottingham, and many other provincial towns, in 1865, all of which were attended with complete success. All classes of society, from the queen to the poorest operative, have taken an interest in them, which has resulted in the cordial co-operation of different classes one with another, and offered great inducements to working men to exert themselves in raising their social position.

INEQUALITY. (Astronomy.) For the sake of convenience, the average motion of a planet or satellite, supposed to be made in a circle which has the average distance of the body from the sun or primary for its radius, is the first object of calculation when the place of the body at some future time is to be predicted. All the alterations which are rendered necessary by the unequal motion of the planet are called inequalities.

INERTIA. This word means something equivalent to the modern English sense of inactivity, and expresses that universal property of matter by which it does not change its state either of rest or motion, unless acted upon by some external force. The former part of this principle was known to the ancients, but Galileo demonstrated that the latter was equally true and general. This property of matter has been called by Kepler *vis inertiae*.

INFALLIBILITY OF THE CHURCH. The church of Rome claims to be infallible in her teaching as to faith and morals, asserting that she is assisted by the Holy Spirit in understanding the extent and meaning of the revealed truth of God, so that she cannot propose any doctrine as true which is false, nor condemn any doctrine as evil which is in reality good. Roman Catholics base this claim on several passages of scripture, but most especially on those which occur in Matt. xvi. 18; xxviii. 20; and John xiv. 16. They also argue that it is absolutely necessary for the church to be infallible, or otherwise there could be no safety as to the truth or falsehood of any new doctrine which might be proposed. They do not consider the pope infallible as a private person, and some not even as regards his official capacity as an individual; but all agree

that the power resides in the collective decisions of the bishops of the church, acting with the pope, when assembled as a general council. The infallibility claimed only extends, as above stated, to questions of faith and morals, and does not embrace questions of science, or matters of fact, or abstract opinions, unconnected with religion.

The Greek church claims infallibility for the decrees of the councils which she looks upon as œcumenical, and inerrancy, or actual exemption from error, for her teaching up to the present time.

The principal Protestant objections to the doctrine of infallibility are—that the texts quoted by Catholics only teach the permanence of the church and the continuance of God's grace towards it, and have no relation to the special subject of infallibility; that the doctrine invalidates any argument from scripture; and that it is nothing less than reasoning in a circle to first attempt to prove the infallibility of the church from the Bible, and then the authority of the Bible by the infallibility of the church. It is also argued that the advocates of the doctrine have never yet even been able to agree as to whether the pope is infallible.

INFAMY (from the Roman *infamia*), in English law, is not easily defined. Conviction and sentence for certain offences formerly rendered a person infamous, and incompetent to be either a juror or a witness. But endurance of the punishment, or reversal of the sentence, restored his competency. This principle, though once among the most settled peculiarities of English law, has been modified by recent Acts of Parliament. The 9 Geo. IV., c. 23, s. 3, enacts that where a man convicted of a felony shall have undergone the legal punishment for it, the effect shall be the same as a pardon under the Great Seal; and by s. 4, no misdemeanour, except perjury or subornation of perjury, shall render a man an incompetent witness after he has undergone his punishment. The 6 & 7 Vict., c. 85, enacts that no man shall be excluded from giving evidence, either in person or by deposition, on any issue or inquiry, civil or criminal, though he may have been previously convicted of any crime or offence; and by 14 & 15 Vict., c. 99, even the parties to a cause shall be competent and compellable to give evidence on behalf of either or any of the parties, unless the question tends to criminate the person examined. (Stephens' *Commentaries*, 5th ed. III. 634.)

Certain offences enumerated in 7 & 8 Geo. IV., c. 29, s. 9, are infamous crimes with reference to the provisions of that Act.

Infamy, though it does not disqualify, may still be urged as an argument against the credibility of a witness. But the infamy must be that proceeding upon conviction, not that resulting from general bad character.

The only satisfactory definition of infamy would be a permanent legal incapacity to which a man is subjected in consequence of conviction for an offence, and which is not removed by suffering the punishment annexed to it. By 2 Geo. II., c. 24, s. 6, persons who have been legally convicted of perjury, or subornation of perjury, or of taking and asking any bribe, are for ever incapacitated from voting at the election of members of Parliament. Having thus lost part of their political rights, they are regarded as infamous in the eye of the law.

The law of Scotland has been assimilated to that of England by the Acts 1 Will. IV., c. 37, s. 9, and 15 Vict., c. 27, s. 1; and the objection of infamy as a ground of excluding a witness is thus altogether abolished. But as in England, infamy may be inferred by the commission of certain offences, such as falsehood, forgery, perjury, theft and reset, and all capital crimes.

Infamia, in Roman law, was the consequence of any serious diminution of a man's *existimatio* or reputation. It was either *infamia juris*, infamy resulting from condemnation for certain heinous crimes, or from an infamous action or trade; or *infamia facti*, arising from an immoral course of life. What was called *levis nota* was a lesser degree of infamy, and attached to freedmen and the children of actors. Its only consequence, however, was to induce certain civil disabilities. The law on the subject is chiefly contained in the Digest III., tit. 2; Savigny, 'System des Heut. Röm. Rechts,' II., s. 76-83; Mackeldy, 'Comp. of Modern Civil Law,' II. 3, s. 123.

INFANT, a person under the age of twenty-one. He has various privileges and disabilities. An infant cannot be sued as a general rule save under the protection and joining the name of his guardian, that is, his guardian *ad litem*, appointed by the court for the purpose of the particular suit; and on the other hand they may sue by their next friend. The exception to this rule is made by the County Courts Act, where an infant may sue for wages not exceeding 20*l.*; he may bind himself to pay for his necessary meat, drink, apparel, physic, and such other necessities, and for his good teaching and instruction; and in determining what are necessities, regard is had to the infant's degree or station in life. He is also liable for such necessities as are supplied to his wife and family, but not for goods supplied to him while living unmarried under the roof of his parent. Infants lose nothing during their minority by non-claim or neglect of demanding their rights. They cannot make any conveyance or purchase that will bind them, nor enter into a binding contract, nor do any legal act, nor hold any public office of pecuniary trust, or any office of a judicial kind; but a contract entered into during infancy is voidable rather than void, because it may be confirmed by the infant when he becomes of age; and again, he may always act as the agent for another person, and may bind himself apprentice, and he may present, having an advowson, to the benefice when it becomes void.

In criminal cases, a person of the age of fourteen years may be capitally punished for a capital offence, but under the age of seven he cannot. At fourteen he may enter into a binding marriage, and a female may do so at twelve years of age. An infant is also answerable in an action brought against him for slander, battery, or trespass on land. Infants cannot be members of Parliament.

INFANT SCHOOLS. [SCHOOLS.]

INFANTA, INFANTÉ, the titles of the princesses and princes of the royal houses of Spain and Portugal. The latter is seldom used, as the heir-apparent to the throne in Spain is styled Prince of Asturias, and the heir-apparent in Portugal was styled the Prince of Brazil, till the separation of that country from Portugal in 1822.

INFANTICIDE, the practice of putting infants to death, or exposing them, has existed from the earliest ages. The exposure of infants was common to all the Grecian states, with the exception of Thebes; and amongst the Romans prevailed from the time of Romulus to that of Valentinian I. We have proof of the existence of the practice of putting infants to death among the Persians, Phoenicians, Carthaginians, Peruvians, and Mexicans. In China, throughout almost every part of the empire, a large proportion of the female population are put to death as soon as they are born. One traveller, Mr. Abeel, states that in some provinces not one female infant out of three is suffered to live; and that in others the difference between the male and female population is one to ten. Lord Macartney estimated the annual mortality in Peking at 20,000; while Gibbon, on the authority of Le Comte, limited it to 3000. Amongst the Hindus, from the difficulty of providing marriage portions for their daughters, the custom, which has existed for two thousand years, prevailed to a very great extent, till the Marquis of Wellesley, when Governor-general of India, used every possible exertion to put a stop to it. His efforts, however, appear to have been only temporarily successful, and female infanticide is still practised in the Sooradah and Jeypore districts of Khordistan, while the murder of male children still lingers among the remote hills of Chinnah Kimedry. During the middle ages, it is stated by the Jesuit Gaspar Vilela to have existed in Japan, but at the present day it is much decreased, the peculiar legislation of that country in regard to prostitution rendering it no longer necessary. Among the Mohammedans the practice is not discountenanced, though greatly lessened by the habit of producing abortion. Strabo tells us that it was unknown to the ancient Egyptians, and Tacitus says the same of the Germans. No traces of it have as yet been discovered among any of the early British tribes. It has been found among the native septa of Brazil, in Otaheite, the South Sea and Sandwich Islands, to a fearful extent; also in New Zealand, New South Wales, South Africa, and even in Hudson's Bay, Labrador, and Iceland.

Among the ancient and heathen nations infanticide appears as a *practice*, not as a *crime*. In the countries again where Christianity prevails, child-murder has ever been regarded with the deepest abhorrence, and visited with the extreme severity of the law. Amongst the Germanic nations of the Middle Ages the punishment of death was appended to the murder of a new-born child, and the same rule held good in Lombardy and Saxony. In France a well-known Act of Henry II., passed in 1556, punished with death, as presumably guilty of the murder of her child, every woman convicted of concealment of pregnancy. This law prevailed till 1791, when this very unjust presumption was repealed; but the punishment of death still continued for the murder of the child. The statute of Henry II. was adopted in England by the 21 Jac. I., c. 27, and by 6 Anne, c. 4, was extended to Ireland. Both of these were afterwards rescinded, and the law is now fixed by 24 & 25 Vict., c. 100, s. 60. The alterations which this Act made on the law may be said to consist in this: that whilst the old law from an accusation of concealment of birth could deduce a charge of murder, the modern law can only deduce the charge of concealment of

birth from an accusation of murder. In Scotland the law, after passing through variations similar to that of England, may now, with certain technical differences, be said to be the same as in the sister country. The Act 1690, c. 21, was in all respects identical with the 21 Jac. I., c. 27. The existing statute is 49 Geo. III., c. 14, by which concealment of pregnancy is punishable with imprisonment for a period not exceeding two years, whilst the putting to death of an infant child still remains murder at common law. A large proportion of the murders committed in England falls under this head; and much the same must be said of other modern nations. A recent traveller relates that in the penitentiary for women at Prague, of the 400 women confined there, 180, or thirty-two and a half per cent., had been convicted of child murder. It is one of the most difficult questions of medical jurisprudence, from the ease with which infant life may be destroyed, to establish the murder of a child lately born. An exhaustive consideration of this will be found in Dr. Wm. Hunter's celebrated essay 'On the Uncertainty of the Signs of Murder in the case of Bastard Children,' written in 1783, and published in the 'Medical Observations by a Society of Physicians in London.' The chief points for decision are—1st, whether the infant, the subject of inquiry, was born dead or alive; and 2nd, whether its death was the result of violence or of natural causes. If the result of the evidence be that the child was born alive, and that it was destroyed, the offence is murder. There are institutions in this country, as well as many other European countries, which have been founded with the view of restraining infanticide.

INFANTRY is a name given to the soldiers who serve on foot. Among the ancient nations of Europe the foot soldiers constituted the chief strength of the armies. In the best days of the Grecian and Roman states battles were mainly won by the force and discipline of the phalanges and legions, and the number of the infantry in the field far exceeded that of the cavalry. The ancient Franks fought on foot; and, in this country, the greater part of the Anglo-Saxon forces consisted of infantry. But soon after the time of Charlemagne the institutions of chivalry began to be generally adopted in the kingdoms of Europe; and, by degrees, the cavalry, which was composed of persons possessing rank and property, and completely armed, acquired the reputation of being the principal force in war; the foot soldiers, ill-armed and disciplined, were held in comparatively small estimation.

The infantry of this country, for some time after the Conquest, consisted of the yeomanry, vassals, and dependents of the feudal tenants; and occasionally foot soldiers were engaged by the kings, under indentures, to serve in the wars. Louis XI. of France formed a standing army of 10,000 French infantry, to which were joined 6000 Swiss; and subsequently Charles VIII. added a large body of Lansquenets, or German infantry. The reputation of the native troops in France was then at a low ebb, but the Swiss soldiers were inured to discipline; they were protected by defensive armour and formed into deep battalions, in which state they were able to render the shock of cavalry entirely unavailing.

The Spanish soldiery, probably from being almost constantly engaged in warfare with the Moors, had

early acquired considerable reputation; and, subsequently, the great share which it had in the wars carried on both in Italy and Flanders, its steady discipline, and the success which resulted from the association of musketeers with pikemen in the battalions, caused the infantry of Spain to be considered, during many years, as the best in Europe. To this state of excellence it was mainly brought by the labour and genius of Gonzalo de Cordova, styled the 'Great Captain.' England, France, and Germany soon adopted the improvements introduced by the Spaniards; and it may be added that the practice of keeping up standing armies composed of men trained in the art of war under a rigid system of discipline, together with the universal adoption of the musket, has now brought all the infantry of Europe to nearly the same degree of perfection. In the United Kingdom great attention has, of late years, been paid to the improvement of this arm of the service; and by the establishment of schools of musketry at Hythe, Fleetwood, and elsewhere, the British infantry have been rendered superior marksmen. Their social condition has also been ameliorated; their barracks and clothing improved; and educational advantages are now placed within the reach of every private. The superiority of this class of troops consists in their being able to act in positions where cavalry cannot move, and it is obvious that the latter must at all times have been nearly useless in the attack and defence of towns. Even when cavalry was held in highest estimation, it was sometimes found convenient for the knights to dismount and act as infantry; and as war has become a science, the principal strength of armies is found to lie in their infantry. For the number of infantry in the British army, see GREAT BRITAIN.

INFECTION is the contamination of the atmosphere or other inert substances by the deleterious or offensive qualities of malaria, the matter of contagion, effluvia from putrid animal or vegetable substances, &c. Some of these are at once recognized by the smell, or by chemical analysis, but the presence of others is known only by the diseases which they produce. The same means, however, may be applied for preventing the injurious effects of both classes.

The most important and valuable method of disinfection is ventilation; and, whatever others may be added to it, this should never be neglected. The reputation of chlorine, acids, lime, charcoal, &c., as disinfectants, depends on their property of decomposing the offensive gases which are so often mixed in the atmosphere with the matter of infection, but it is questionable whether they have any influence on the infectious particles themselves. However, as the emanations from putrid substances render the body peculiarly liable to the reception of infection, some of these means should be employed where any offensive smell is present. The best of these is chlorine, which may be applied in the form of chloride of lime, which should be poured over anything from which odour is emitted: it should be sprinkled about the floor and on the walls; or shallow vessels containing it should be exposed to evaporate in the air: or pure chlorine should be disengaged in the form of gas from the materials from which it is manufactured. Mr. Herapath, the

distinguished chemist, has recommended the following simple formula for the preparation of chlorine. Take a mixture of three parts of common salt and one part of black oxide of manganese, finely powdered and well mixed. This can be carried in a bottle, and when a person desires to render himself non-infectious, he will put a little into a plate or saucer, and pour upon it from ten to twenty drops of oil of vitriol, when chlorine gas will be instantly liberated. Let him pass the plate two or three times round him, and he will be rendered innocuous.

INFETMENT, in the law of Scotland, from the same origin as the English term feoffment, expresses the ceremony by which a person succeeding to another by descent, settlement, or conveyance, is invested in any heritable or real property. The cumbrous ceremony of infetment was rendered no longer necessary by the 8 & 9 Vict., c. 35, passed 21st of July, 1845, and called 'An Act to simplify the form and diminish the expense of obtaining infetment in heritable property in Scotland.'

INFEROBANCHIATA, the third order of *Gastropods* in the system of Cuvier, who describes them as having nearly the form and organization of *Doris* and *Tritonia*, but remarks that their branchiæ, instead of being placed on the back, are arranged in the form of two long suites of leaflets on the two sides of the body under the advanced border of the mantle. He records two genera, *Phyllidia* and *Diphyllidia*.

INFINITE, INFINITY, INFINITESIMAL CALCULUS. The word infinite means literally 'without bounds,' and when applied in an absolute sense to magnitude means that its quantity is utterly unlimited, so that there is no conceivable and determinable magnitude but what is less than the infinite magnitude.

The notion of infinity is therefore at first purely negative, but it does not long remain so: for we are forced upon what we take the liberty of calling a definite notion of infinity by our consideration of time, space, and number. We cannot, if we would, annihilate our conception of space, or confine it within certain limits; nor can we suppose duration to have an end. Even if we imagine our own annihilation, we cannot rid ourselves of the idea of something else existing, with the permanent conception of unbounded space and time. If we try to conceive all sentient existence at an end, we know from reasoning that we ought to suppose also the annihilation of space and time: but the constitution of our minds will not permit it, and as long as we exist to think, even about our own non-existence, the reality of space and time will prevent our conceiving their destruction.

The other extreme in the scale of quantity is the perfect absence of all magnitude, expressed in the word 'nothing,' or the technical term 'zero.' It is necessary to treat the two together in mathematical reasoning, since all difficulties which belong to the one term belong equally to the other. We have also to consider the words 'infinitely small' as well as 'infinitely great.'

There are three distinct methods of proceeding in regard to the employment of these terms in mathematical reasoning. Firstly, we have those who would use the words 'infinite' or 'nothing' in their

absolute sense, relying upon the reality of the conception which they have of the things signified by them. Secondly, there are others who would entirely banish the use of the words, because in their absolute sense they do not represent assignable magnitudes. Thirdly, others admit the use of the words, guarding them by definitions which point out the processes in the expression of the results of which they may be employed.

To the first it is answered that the absolute use of ∞ and 0 (the mathematical symbols of infinite magnitude and absence of all magnitude) in the same manner as symbols of definite quantity, is extremely liable to lead to error; which was never avoided by the advocates of this system, except by abandoning their theory, and applying in practice the maxims alluded to under the third of the preceding heads.

To the second of the three sects above mentioned it may readily be conceded that they have a right to refuse any branch of mathematical reasoning, so far as themselves only are concerned. But we deny that the code of mathematical controversy contains any such axiom as that 'mathematics is the science of assignable magnitudes only,' by which to claim the submission of an opponent. The general rule is, that mathematical demonstration exists wherever there is logical deduction from universally obvious maxims with respect to magnitude. Nor does the word 'universally' here mean that such maxims must have been obvious to every individual of the human race. If so, there would be no such thing as mathematical demonstration, for there have been found instances in which persons have denied that the sum of all the parts makes up the whole.

We proceed to enunciate the method followed by the third of the sects mentioned. If we look at the manner in which we derive the notion of infinity, we shall not find any one who imagines that he absolutely grasps infinite space, time, or number, by one single and independent conception of his mind. To space, space may be added; to this again space may be added; and so on without limit, until the space thus accumulated is greater than any definite space which was named at the outset of the process. From thence comes the notion of infinite: we cannot imagine the greatest possible space, because any space, however great, being distinctly conceived, we can as distinctly conceive a greater. Consequently the phrase 'space is infinite,' whatever more it may imply, certainly may be allowed to stand for an abbreviation of the preceding two sentences. And in like manner, if we see a conclusion which we can nearly attain by the use of a large magnitude, more nearly by the use of a larger, and so on without limit, that is to say, as nearly as you please, if we may use a magnitude as large as we please, but which is never absolutely attained by any magnitude however great—then such conclusion may be said, for abbreviation, to be absolutely true when the magnitude is infinite. It may appear to some as if the conclusion, under the preceding circumstances, is really true when the magnitude is infinite: this may or may not be the case, but the mathematical use of the word infinite does not require the question to be raised. The convention under which that term is introduced demands that the preceding con-

ditions shall be fulfilled, and excludes the word whenever they are not fulfilled: those who think that the fulfilment of the conditions makes that which we call a convention a necessary consequence, meet on common ground with those who would reject the absolute notion of infinity. The former are allowed their own words, and their own result, together with their own method of arriving at it; the latter are not required to use the word infinite, except as an abbreviation; to the mere collocation of the letters which compose that word they can hardly object, and the conditions of its introduction are precise and intelligible.

Our explanation of the term infinite will readily show the meaning of the following assertion: Two infinitely great quantities may have a finite ratio, as follows:—When A and B are great, their ratio may be nearly, say, that of 10 to 7; when they are still greater, they may be still more nearly in that ratio, and so on; and their increase may be so regulated that the greater they become the more nearly is their ratio that of 10 to 7; or as nearly as you please, if they may be as great as we please. Similarly:—Two nothings may have a finite ratio. This means that A and B, both diminishing together, may diminish in such a way that when both are small their ratio may be nearly, say, that of 5 to 3; when they are still smaller, they may be still more nearly in that ratio, and so on: and their diminution may be so regulated that the smaller they become the more nearly is their ratio that of 5 to 3; or as nearly as you please, if they may be as small as we please.

But the idea of two nothings which have a finite ratio, however strictly defined in accordance with the preceding conditions, shocks even many of those who can grasp the method of using the word 'infinity.' The absolute nothing of subtraction has possession of the field, and it is not worth while to contest it for the use of a word. The term 'infinitely small' therefore supplies the place of 'nothing' whenever the latter is introduced under the conditions correlative to the conditions under which the use of infinitely great is allowed.

INFLAMMATION (from *inflammo*, 'to burn'). When any part of the body is preternaturally hot, red, swollen, and painful, such a part is said to be inflamed, or in a state of inflammation; and when these symptoms prevail to a certain extent, or affect very sensible parts, that general constitutional disturbance called fever is excited.

Inflammation is said to terminate in three ways—by resolution, suppuration, and mortification. By the first, which is the most frequent mode of termination, is meant a gradual subsidence of the swelling, a diminution of the heat, pain, and redness, and an abatement of the fever; the parts return to their natural size and colour, and no pus or matter is formed. Suppuration is said to have taken place when the inflammation goes on to the formation of pus; the swelling then becomes more prominent, of a shining red colour, and soft in the centre; if now no artificial opening be made, the matter obtains exit through one or more orifices produced by the absorption of the walls of the cavity in which it is contained, and the abscess, in popular language, is said to have burst. Mortification is the least frequent but most severe mode in which inflammation

can terminate, and usually is productive of great constitutional disturbance; when it is the result of a high degree of inflammation, the attendant pain is exceedingly severe, the bright red colour of the part becomes livid, and vesicles form on its surface; complete death of the part then takes place, and the pain abates.

The treatment of inflammation consists in the removal of all exciting causes, the abstraction of blood generally and locally, the administration of such medicines as act either by lowering the circulation generally or increasing particular secretions, and in the employment of local emollient or sedative applications.

INFLEXION (Lat. *inflexio*, 'a bending'), in grammar, is that process by which declinable words are modified in languages where the pronominal and predicative roots are capable of combination into one word. This chiefly takes place in languages of Semitic and Aryan origin.

INFLEXION, in optics, corresponds to diffraction; that is, the property of light to turn from its direct course when it passes near the edge of an opaque body.

INFLEXION, POINT OF, in Geometry, the point of contact of a stationary tangent; namely, the point at which the curve passes from one to the other side of its tangent, and towards which it always turns its convexity. It is sometimes called a point of contrary flexure.

INFLORESCENCE, in plants, is the manner in which their flowers are arranged.

Inflorescence may be considered as regular or centripetal, and irregular or centrifugal: in the former all the parts are formed successively without interruption; in the latter the parts are subject to various derangements in the progress of their formation. As examples of centrifugal inflorescence we may take the Elder, Laurustinus, &c.

The centripetal inflorescence, in its simplest state, is merely a branch bearing flowers instead of leaf-buds, as in the Hyacinth and the Ornithogalum: if the flowers are sessile, it is then called a *spike*; if stalked, a *raceme*. If the branch of the spike or its axis is so much contracted as to become a broad disc, as in the Dandelion, or Daisy, or common Artichoke, the inflorescence is called a *head* or *capitulum*; if the same thing happens to a raceme, the *umbel* of Astrantia, Fennel, Parsley, &c., is the result. Let the flower-stalks of the raceme be branched or racemose, and the *panicle* is produced. To these primary forms of inflorescence all others are referable, as simple and generally unimportant varieties. See Plates 'Inflorescence' for examples of the modes of flowering of the plants belonging to the different natural orders.

INFLUENZA (i.e., owing to the influence of the stars), is the name given by the Italians to an epidemic catarrh, which has spread more extensively than any other epidemic; and this universality of its attacks, together with the greater severity of its symptoms, principally distinguishes it from common catarrh. It attacks all ages and conditions of life; but it seldom proves fatal except to the aged, or to those previously suffering from or having a tendency to pulmonary disease. Notwithstanding the great frequency of this epidemic, it is remark-

able how little variety there has been in its symptoms, and the records of cases which occurred in 1510 nearly resemble those which have been observed during its latest visitations. Another epidemic occurred in 1557, and spread not only over Europe, but also over the whole of the northern hemisphere. Beginning in Asia, it extended westward over the European continent, and reached to America, where it terminated. Numerous outbreaks have since occurred at widely different intervals. Its progress is not checked by oceans or rivers, and it attacks the sailor on the sea, as well as the dwellers on the land. It has frequently visited London with great severity. In September, 1729, it carried off 1000 persons weekly, and in 1847 the mortality arising from it was nearly as terrible. Its causes are still obscure, though there can be no doubt that its increase and diminution are closely connected with atmospheric changes. Dr. Cullen regarded it as contagious. Dr. Prout suggests that it originates in the existence in the atmosphere of some noxious and irritant vapour, though in very minute quantity. It may probably be of volcanic origin, and contains, perhaps, sulphuretted hydrogen. It always travels from east to west. The following are the symptoms which most generally characterize it:—The person is seized with slight chills; weight and pain, sometimes severe, are felt over the eyebrows; there is increase of the lachrymal and nasal secretions, with loss of appetite, prostration of strength, a weak, frequent pulse, dyspnoea, hoarseness, sore throat, and cough. The duration of the disease varies from one or two days to a fortnight, but great debility often remains behind for many weeks, and in some epidemics relapses have been frequent. In the aged it is very apt to prove fatal.

These epidemic visitations have taken place most frequently in the spring and autumn.

Mild aperients administered with caution, the exhibition of antimonial and saline medicines, and a cool temperature, constitute the means which experience has found to be most efficacious in the treatment of this disease.

IN FORMA PAUPERIS. [**FORMA PAUPERIS.**]

INFORMATION (Criminal), a complaint exhibited before the Court of King's Bench against a person for some misdemeanour. It differs from an indictment [**INDICTMENT**] principally in this, that an indictment is an accusation found by the oath of a grand jury, whereas an information is simply the allegation of the person who exhibits it. Informations are of two sorts: those which are partly at the suit of the king, and partly at that of a subject; and, secondly, such as are in the name of the king only. Informations which are partly at the suit of the king and partly at that of a subject, are generally exhibited upon penal statutes, which impose a penalty on the offender if he is convicted, one part of which is for the king and the other part for the informer.

Informations exhibited in the name of the king alone are either filed ex officio by the king's attorney-general at his own discretion, when they are called ex officio informations; or they are exhibited in the name of the king by some private person or informer, and are filed by the master of the crown office. Ex officio informations are filed in the case of great misdemeanours which disturb the king's government,

or interfere with the discharge of his kingly office. Those filed by the master of the crown office relate to riots, batteries, libels, which disturb the public peace, but do not directly tend to disturb the king's government. When any information is filed, it must be tried in the usual way by a petit jury in the county in which the offence was committed. An information on behalf of the Crown filed in the Court of Exchequer by the attorney-general, is a method of suit for recovering money or other chattels, or for obtaining damages for any personal wrong. The most usual informations are those of *intrusion* and *debt*.

When it is necessary for the Court of Chancery to interfere with the regulation or management of any charity, the attorney-general as informant, on the relation of some person (who is called the relator), files an information in the Court of Chancery for the purpose of bringing the case before the court. This is simply called an information.

INFORMER, in English law, is a person who lays an information or prosecutes any person for some offence against the law, or a penal statute. Such a person is generally called a common informer, because he is supposed to make a business of laying informations for the purpose of obtaining his share of the penalty. Persons are induced to take the trouble of discovering offences, for which a pecuniary penalty is inflicted on the offender, by the promise of the reward; and if the penalty is imposed for the public interest, he who makes the offender known does the public a service. Of late years, since the establishment of the police force, the common informer's vocation has almost fallen into desuetude.

In Scotland an informer is the party who sets the Lord-Advocate in motion in criminal prosecutions, and he is liable to action-at-law in case of a malicious prosecution.

INFRA LAPSA'RIANS (*infra*, 'below,' *lapsus*, 'a fall'), a sect of predestinarians, who held that a certain number of men had been born to be damned, without the means of saving themselves if they would.

INFUSIONS are solutions of some of the principles of vegetables, generally in water, but occasionally in other vehicles. When water is employed, it may either be hot or cold. It is customary to use warm water, but in many instances cold is preferable. Sometimes alcohol is added, after straining, to assist in keeping the infusion, or to increase its powers. Hard water should, if possible, be avoided in the preparation of infusions.

INFUSORIA. (Lat. *infundo*, 'I pour in.') a title applied by Otto Muller to the numerous minute animals found in water (and especially in water in which vegetable matters are contained), and to which the term *Animalcules* is commonly given. From the invention of the microscope by Hooke may be dated the discovery of a new world of aquatic organic beings of such inconceivable minuteness, that, in the space of one cubic inch of water, more than 800,000 millions may revel in the enjoyment of their existence. There is not a drop of the ocean, of lakes, ponds, or rivers that does not teem with life, each drop perhaps containing nearly as many tenants as there are human beings on the surface of the globe. To Linnæus and the naturalists

of his time the structure of these minute animals was not well understood, and they were placed at the end of the class *Vermes*, in a genus denominated *Chaos*; but from the recent improvements of the microscope and the diligent investigations of zoologists, among whom Hemprich, Ehrenberg, Rymer Jones, and Gosse claim a foremost place, our knowledge of these atoms of life is greatly improved, and little remains for elucidation.

Cuvier divided the Infusoria into *Rotifera* and *Homogenia*; but the former are now placed by Professor Owen among the *Radiata*. For the latter (*Homogenia*) Ehrenberg substituted the appellation *Polygastrica*.

The *Rotifera* derive their name from the appearance of wheels turning round and round near the mouth, or at the upper part of the body, with great velocity. This appearance is deceptive, and is found to arise from circlets consisting of minute cilia, which in rapid succession bend and unbend, producing the effect sometimes of waves chasing each other in a ring, at other times of wheels in rapid whirl. These cilia are sometimes quiescent, sometimes only partially agitated. They propel the microscopic beings through the water, and moreover serve for the acquisition of food. Fixing itself by means of caudal forceps to any object, the animal throws its cilia into violent action, producing a whirlpool in the contiguous water, whereby minute particles of animal or vegetable matter are drawn to the mouth. Some of the *Rotifera* (*Nuda*) are naked, others (*Loricata*) are covered with a delicate transparent horny or calcareous tunic, through which the internal viscera may be seen. The *Rotifera* are oviparous, possess a distinct digestive apparatus, and are very active and alert.

The *Polygastrica*, or 'many-stomached' animalcules, abound in the sea and fresh waters. They are divisible into two groups; one distinguished by the soft or shell-less condition of the body; the other by the body being more or less protected by an extremely fine and transparent shell, varying greatly in form in different species. Some of the *Polygastrica* present wonderful changes of form, and seem as if they had no definite or settled configuration. They are evidently endowed with instinct; they know how to pursue their food, what to take, what to reject, and how to avoid danger: the larger make the smaller their prey. The minutest of these animalcules which the finest microscopes have brought within our vision are termed *Monads*. With respect to organs of locomotion, some make for themselves at will arms or paddles by shooting forth portions of their body; others are furnished with vibratile cilia; but in some no special organs of locomotion can be discerned. According to Ehrenberg the digestive apparatus consists of a mouth leading to a number of internal sacculi, or stomachs, variously arranged in different species.

Reproduction is by buds, by spontaneous division, and by eggs.

This arrangement was hailed by working naturalists, at the time it was published, as one which had carried light into a department of natural science then little understood. But it is now (1866) wholly superseded. The *Infusoria* are ranked as a class, whose limits are pretty well defined, under the sub-

kingdom PROTOZOA, the lowest group of the Animal Kingdom, the Cœlenterata being the second lowest. The following is a correct definition of the class;— 'Infusoria are animals belonging to the department Protozoa, provided with a mouth and rudimentary digestive apparatus; their bodies usually consisting of three distinct layers, the outer of which is, in most cases, furnished with a variable number of cilia.' They are microscopic. It is customary in many works to describe fossil Infusoria, but there are no true fossil forms of this group, the organisms so called being *Foraminifera*, *Diatomacea*, &c. The reader will find a full description of the true place of *Infusoria* in the zoologic scale under PROTOZOA, which see. The Plates 'Infusoria' contain the figures and names of many forms which have long been ranked by naturalists under this class.— (See Rymer Jones, *Structure of Animal Kingdom*; Gosse, *The Aquarium*; Darwin, *Origin of Species*; and Lewes, *Sea-side Studies*.)

INGA, (the South American name for one of the species), a genus of plants of the natural family of *Leguminosæ*, which, though it has been separated from *Mimosa*, still contains upwards of one hundred species. These are found in the tropical parts of America. A few of the useful species have been further separated into the genus *Parkia*; but many still remain which are important in the countries where they are indigenous, either for astringent properties, like many *Mimosas* and *Acacias*, or for the edible nature of the fecula or pulp which surrounds their seeds.

INGENHOUSZ, JOHAN, a distinguished natural philosopher, was born in 1730 at Breda, and for some years practised medicine in that city. He afterwards came to London, where his discoveries in chemistry and electricity led to his being elected a fellow of the Royal Society in 1769. He practised as a physician in London, and his reputation was such that he was sent for to Vienna by the Empress Maria Theresa, in 1772. After an absence of several years he returned to England, and continued to prosecute experiments in electricity, chemistry, &c. An account of an electrophorus, which he had invented, appears in the 'Philosophical Transactions' for 1778. This probably led to the invention of the plate electrical machine, which is generally ascribed to Ingenhousz. About the same time he made the discovery that growing plants exposed to the light discharge oxygen gas from their leaves into the atmosphere; and his researches relating to this subject were published in London in 1779, under the title of 'Experiments upon Vegetables, discovering the power of purifying the Air in the Sunshine, and of injuring it in the Shade,' &c. Died September 7, 1779.

INGFANGTHEF, among the Anglo-Saxons, a privilege granted to lords of manors, to try and bring to judgment any thief taken within their boundaries. (Bracton.)

INGLIS, SIR ROBERT, formerly chairman of the East India Company, and many years M.P. for the University of Oxford, was born in London in 1786. He was educated at Winchester College, under the late venerable Bishop Huntingford, and at Christ Church, Oxford, under Dr. Cyril Jackson. In 1818 he was called to the bar, and subsequently

elected Recorder of Devizes. In 1812 he was appointed one of the Commissioners for the settlement of the affairs in the Carnatic, which office he held for many years. He first entered Parliament in 1824, as member for Dundalk, and in 1826 was elected for Ripon; but on the change of policy on the part of Sir Robert Peel, with regard to the Catholic question, Sir Robert Inglis was selected by the Protestant party as his substitute, and returned for the University of Oxford. He was not only an active member of the House of Commons, many of his speeches having been published, but he took an active part in numerous religious and educational societies connected with the Established Church; and was president, vice-president, or trustee, of most of the learned or scientific bodies of the great metropolis. He was the second baronet of the name, but with him the title became extinct. He died in 1855.

INGOLSTADT. [REGEN.]

INGOUVILLE. [HAVRE.]

INGRAM, REV. DR. JAMES, President of Trinity College, Oxford, and Rector of Garsington, was born at East Codford in 1774. After graduating at Oxford, in 1800, as M.A., he was, in 1803, unanimously elected Anglo-Saxon Professor, on the foundation of Dr. Rawlinson. In 1807 he published an 'Inaugural Lecture on the Utility of Anglo-Saxon Literature;' and in 1809 he superintended a new edition of 'Quintilian de Institutione Oratoria.' In 1824 he was elected President of his college, to which office the rectory of Garsington is annexed. In 1823 he brought out a new edition of the 'Saxon Chronicle,' with an English translation. His 'Memorials of Oxford,' with plates prepared by Mr. Parker, is a work held in much estimation. He died in 1850.

INGULPHUS, the author, or supposed author, of a work entitled 'Historia Monasterii Croylandensis' (the History of the Monastery of Croyland, or Crowland, in Lincolnshire), was born in London about the year 1030, and was educated, first at Westminster, and afterwards at Oxford. He was introduced to Duke William of Normandy when that prince visited the court of Edward the Confessor in 1051, and made himself so acceptable as to be appointed his chief minister. After some years he relinquished this situation to accompany Sigfrid, duke of Mentz, on a pilgrimage to the Holy Land. On his return, he became a monk in the abbey of Fontenelle in Normandy. Here he remained till 1076, when he came over to England on the invitation of William the Conqueror, and was appointed abbot of Croyland. Here he resided till his death, December 17, 1109. The history of Croyland, the only work claiming to be his now extant, was first printed entire, along with the continuation by Peter of Blois, in the 'Rerum Anglicarum Scriptorum Veterum,' tomus primus, folio, Oxon., 1684. A very formidable attack was made upon its claims to be regarded as anything better than 'an historical novel,' a mere monkish invention or forgery of a later age, by Sir Francis Palgrave, in an article in the *Quarterly Review* for June, 1826 (No. 67).

INHIBITION, in the law of Scotland, is a proceeding by which a creditor may prevent his debtor from alienating property either to favoured creditors

or other persons until the debt of the creditor is paid: nominally it affects all property, but it is only in the case of real property that, from its being put on the register, it is efficacious.

INIS (from Latin *Insula*), an Irish word, signifying island, used as a prefix (*Inisfallen*), and apparently corresponding with the Scottish *inch*.

INJECTIONS. [CLYSTERS.]

INJUNCTION. An injunction is a writ which issues by the order and under the seal of a court of equity, and is of two kinds, remedial and judicial.

The remedial writ is used for the following purposes among many others: to restrain parties from proceeding in other courts, from negotiating notes or bills of exchange, to prevent the sailing of a ship, the alienation of a specific chattel, to prevent waste by felling timber or pulling down buildings, the infringement of patents or copyright, to repress nuisances, and to put an end to vexatious litigation. The writ of injunction is useful in stopping or preventing wrongs for which the ordinary legal remedy is too slow.

The judicial writ of injunction is virtually abolished by the Statute 11 Geo. IV. & 1 Will. IV., c. 36, s. 11.

INK (Dutch *inkt*; French *encre*, from the Greek *ἐγκαιστος*) consists of several varieties, the most important being writing and printing ink.

Writing Ink.—The writing ink of the ancients was essentially different from that which is now employed. Its basis was finely divided charcoal, mixed with some mucilaginous or adhesive fluid: it was much less destructible than modern writing ink, and somewhat more resembled printers' ink. Writing ink is now a chemical compound, and not a mere mechanical mixture. Its basis is proto-gallate and proto-tannate of iron, which by oxidizement become per-gallate and per-tannate; and it is owing to the oxygen of the air effecting this change gradually that recent writing is of a comparatively light colour, and that it subsequently becomes of a deeper black.

Many processes have been given for preparing writing ink. The common ingredients are galls and sulphate of iron; in fact, while printers' ink may be considered as a black paint, writing ink may be regarded as a black dye. We shall not copy the different modes which have been adopted. The following, which is recommended by Professor Brande, gives, he says, an excellent ink, and it possesses the merit of greater simplicity than most others:—Aleppo galls, bruised, six ounces; sulphate of iron, four ounces; gum arabic, four ounces; water, six pints. Boil the galls in the water, then add the other ingredients, and keep the whole in a well-stopped bottle, occasionally shaking it. In two months strain and pour off the ink into glass bottles, to be well corked. To prevent mould, add one grain of corrosive sublimate, or three drops of creosote, to each pint of ink.

Stephens' Ink—a blue fluid, which shortly after use becomes an intense black—mainly consists of gallo-tannate of iron, dissolved in sulphate of indigo. Runge's black writing fluid is prepared from chromate of potash and a solution of logwood, and is not affected by exposure to water or acids, and does not corrode on steel pens like ordinary ink.

Red Ink is of two kinds—one made from Brazil-wood, and the other from cochineal or carmine. The latter is prepared as follows:—'Add to a quantity of common carbonate of potash, soda, or ammonia, twice its weight of crude argol in powder. When the effervescence has ceased, decant or filter the solution from the insoluble matter. To this fluid add by measure half its quantity of oxalate of alumina. The mixture thus prepared is next coloured, when cold, with bruised or powdered cochineal, and after standing for forty-eight hours, is strained, when it is fit for use.' (Musprratt's *Chemistry*.)

Blue Ink is made sometimes from indigo, and sometimes from Prussian blue as a basis. Stephens' method is to dissolve the latter in an aqueous solution of oxalic acid.

Other fancy-coloured inks, as purple, green, and yellow, have been made by various chemists, but have not come into general use.

Printers' Ink is of two kinds: for letter-press printing and for copper-plate printing. Printers' ink is prepared by boiling linseed or nut oil in an iron pot; and if it does not take fire of itself it is kindled, and suffered to burn for about half an hour; the flame is then extinguished by closely covering the vessel, and the oil is by this operation found to have acquired the necessary drying quality, after being again boiled. It is then mixed with a proper quantity of lamp-black, when black ink is required; carmine, lake, vermilion, for red ink; indigo or Prussian blue for blue ink; lemon and orange chrome, or gamboge, for yellow ink; and the whole is drawn off, and finally ground into a smooth uniform paste. Copper-plate printers' ink is made with oil which is less boiled, and the charcoal used is stated to be Frankfort black, made from vine twigs.

Indian Ink.—The cakes of this ink are made of lamp-black and size, or animal glue, with the addition of perfumes or other substances not essential to its quality as an ink. It is used in China with a brush, both for writing and for painting upon paper of Chinese manufacture. It is used in Europe for designs in black and white, in which it possesses the advantage of affording various depths of shade, according to the degree of dilution with water.

Marking ink is employed for marking linen; it is a solution of nitrate of silver, (one drachm in half an ounce of water, previously thickened with a little sap green), written with a pen upon the fabric to be marked, after it has been moistened with an alkaline solution, as potash or soda. By this process oxide of silver is precipitated upon and combines with the cloth so as to be scarcely removable by any re-agent which does not also destroy its texture.

Sympathetic Inks are such as are invisible until heat is applied, and then, by the chemical change induced, the writing becomes visible. The most remarkable of these is that prepared from cobalt, called Hellot's Sympathetic Ink, which is a chloride of the metal. When the written paper is held to the fire so as to evaporate the water, the letters become green. The inks used in Lithography are described under **LITHOGRAPHY**.

The value of the different kinds of ink imported into the United Kingdom in 1864 was as follows:—writing ink, 268*l*.; printing ink, 2184*l*.; and Indian

ink, 593*l*. The total value of the three kinds exported in the same year was 980*l*.

INKERMANN, a ruined Russian village in the Crimea, near the eastern extremity of the harbour of Sebastopol, and 37 miles S.W. from Simpheropol. It is memorable as the scene of a great battle between the allied Anglo-French army and the Russians, on Sunday, November the 5th, 1854, in which the latter were repulsed with great loss. From the little generalship displayed on the occasion, and the brilliant valour with which our troops behaved, it has been termed 'the Soldiers' Battle.'

INLAND BONDING TOWNS are places approved under the provisions of 22 & 23 Vict., c. 36, for the warehousing of goods under bond for the security of duties of customs. By the first section of the said act, power is given to the lords of the treasury to appoint Manchester, Birmingham, Leeds, and Sheffield, or any of them, and such other towns as they may see fit, to be warehousing places. By the second section, the powers and authorities conferred by the Customs' Consolidation Act, 1853, upon the commissioners of the treasury, for the appointment of warehousing ports, and upon the commissioners of the customs for the approval of warehouses in such ports, shall extend to and be applicable to the said inland bonding towns, or to any other places in the United Kingdom having a sufficient consumption of articles paying customs duties to justify the expense of a customs establishment. The only towns as yet enjoying the privilege of the 'Customs' Inland Bonding Act, 1860,' are Bradford, Halifax, Leeds, and Manchester.

INLAND REVENUE. The inland revenue is that portion of the revenue of a country which is raised on articles produced or taxed within it, as distinguished from the customs, or the duties upon articles imported from abroad. The three great sources of the inland revenue of the United Kingdom are the excise and stamp duties, and the land, income, and assessed taxes.

The excise duties had their origin in the reign of Charles I., when a tax was laid upon beer, cider, and perry of home production. The Act by which these duties were authorized was passed by the Long Parliament in 1643. It was adopted and enforced by Oliver Cromwell; and in the reign of Charles II. they were granted as a part of the revenue of the Crown. For a long time duties of this class were viewed with great dislike by the people, on account of their inquisitorial interference with various industrial pursuits; and it certainly formed a very strong ground of objection against excise duties, that the security of the revenue they yielded was held to be incompatible with the perfect freedom of the manufacturer as to the processes which he might apply in his works. In every highly taxed country it would, however, seem to be hardly possible to avoid their adoption; much indeed may be said in their favour, as compared with other taxes, when they serve to extract money for national purposes from personal expenditure on luxuries, especially when, as in the case of alcoholic liquors, their excessive use becomes a vice.

In 1797 the number of articles subject to excise duties was 28, including such an indispensable necessary of life as salt. In 1833 the number had been

reduced to 15; in 1835 to 10; and in 1845 there were only 9. In the latter year the late Sir Robert Peel commenced a reform in the excise laws by repealing the duty on glass, and by substituting a license for auctioneers, instead of the excise duties on the sale. Bricks and soap were subsequently relieved from the impost; and in 1861, after a long struggle, that on paper was removed. In 1862 an increased brewer's license was substituted for the excise duty on hops; and the only articles now subject to this tax are spirits, malt, and chicory—a duty being imposed on the latter rather with the view of preventing its too extensive use in the adulteration of coffee than of adding very materially to the revenue.

It is therefore manifest that in this country the real objections made to excise duties have been almost entirely invalidated; for although complaints are sometimes made respecting the imposition of the malt duty in relation to the growth of barley, it cannot be said that a slight tax on beer and a heavy one on spirits at all interferes with important branches of trade, or sensibly diminishes the comfort and well-being of the population at large. There are still, it is true, certain duties to which the name of excise is applied, which can hardly be called duties on consumption, although they are accessory to it, such as the sums charged for licenses to carry on certain trades and professions.

The chief danger to guard against in the imposition of excise, as well as customs duties, is fixing the rate so high as to almost offer a premium on smuggling and illicit distillation, and thus defeat the very object sought to be attained—the realization of as large an amount of revenue as possible.

Prior to 1823 there were separate and independent Boards of Excise for England, Scotland, and Ireland, and the total number of commissioners was twenty-one. The business was then transferred to one board of seven commissioners in London, who, in addition to their other duties, held courts and decided summarily in cases of the infraction of the excise laws. In 1849 the Board of Excise was incorporated with that of the Stamps and Taxes, under the name of the Board of Inland Revenue: and breaches against their revenue laws must now be decided by the ordinary legal tribunals. The salaries of the persons employed in the Excise department, at the head office in London, range from 90*l*. to 550*l*. per annum. For the management of the country business of the department the whole of the United Kingdom is divided into collections, and these are subdivided into districts, rides, and divisions. There are about sixty collections in England and Wales, and at the head of each is a collector, who visits the principal towns in his circuit eight times a year, to receive the duties and transact other business connected with the department; besides which he is required to have an eye generally upon the discipline and efficiency of the service. The number of officers in a collection varies from forty to ninety. The next subdivision of a collection is the district, at the head of which is a supervisor. Next come the subdivisions of the districts into divisions, or foot-walks and rides. Where the traders are scattered, the officer is obliged to keep a horse, and his circuit is called a ride; but if a large number of traders reside in a smaller circuit, they are visited by the officer on foot, and then the subdivision is termed

a division, or foot-walk. Before going out each day, the officer leaves a memorandum at his home which states the places he intends to survey, and the order in which he will visit them; and the exact time at which he commences each must be entered in his journal. The supervisor re-surveys some of the officer's surveys, but which they will be the officer is of course ignorant; and if errors are discovered they must be entered in the supervisor's diary. These diaries are regularly transmitted to the chief office, and no officer is promoted unless the diaries show him to be efficient. The removal of officers from one part of the country to another was Mr. Pitt's suggestion, and is still acted upon to a certain extent, but, unless in case of promotion, is now generally optional with the officer. At the chief office in London there is a department of Surveying-General Examiners, who are despatched to any district without previous intimation, as a check upon the accuracy and integrity of the supervisors. Promotions take place in the excise department as vacancies occur, but only

when the officer has petitioned for advancement. This involves a rigid examination into his qualifications, which is termed 'taking out a character.' The number of excise officers at present employed in the United Kingdom is about 2300, and of late years their pay and prospects have been slightly improved. Second-class assistants (the lowest grade) now commence at 60*l.* per annum, and 2*s.* per day extra when employed; first-class assistants receive 95*l.* a year; ride officers, 110*l.*, with 20*l.* additional for keeping a horse; division officers, 130*l.* to 150*l.*; and supervisors, 210*l.* to 250*l.* per annum.

The principle on which revenue is derived from stamps and taxes is noticed in the articles STAMPS, TAX, and TAXATION.

In the following elaborate tables full particulars will be found of the various sources of national income, under the supervision of the Board of Inland Revenue, and the amount derived from each during the last seven years. Details as to the income tax will be found in the article INCOME TAX.

EXCISE.

UNITED KINGDOM.	1858. Ended March 31, 1859.	1859. Ended March 31, 1860.	1860. Ended March 31, 1861.	1861. Ended March 31, 1862.	1862. Ended March 31, 1863.	1863. Ended March 31, 1864.	1864. Ended March 31, 1865.
Chicory, ...	—	—	357	2,317	3,010	7,211	10,463
Game Certificates and Licenses,	12,228	13,047	129,906	140,984	128,445	135,462	—
Hackney Carriages, ...	82,129	86,203	87,812	91,375	97,692	98,290	102,767
Licenses, ...	1,436,892	1,464,575	1,493,931	1,501,904	1,779,688	1,862,194	2,159,900
Malt, ...	5,592,624	6,852,458	6,382,972	6,029,788	5,580,681	6,306,975	6,597,641
Race Horses, ...	5,771	6,235	6,245	6,957	6,422	7,288	7,746
Railways, ...	339,569	359,212	366,288	372,178	383,057	403,626	439,344
Stage Carriages, ...	125,016	127,673	127,969	125,557	132,598	128,589	129,237
Spirits, Home-made,*	9,188,842	10,000,191	9,456,711	9,965,376	9,876,281	10,133,355	10,640,067
Sugar, ditto	—	—	—	—	89	—	39
Sugar used in Brewing, ...	—	—	52	—	—	—	4,544
	16,783,071	18,909,592	18,082,243	18,236,436	17,987,963	19,082,990	20,091,748
Hops, ...	416,478	462,851	588,658	223,296	3,099	—	—
Paper, ...	1,281,023	1,451,254	1,463,088	799,918	—	—	—
The amounts contributed by each country were:—							
ENGLAND, ...	12,259,898	13,897,320	13,867,744	12,630,732	11,696,859	12,443,386	13,058,151
SCOTLAND, ...	3,290,352	3,699,190	3,470,426	3,657,262	3,569,201	3,823,634	4,062,196
IRELAND, ...	2,830,322	3,227,217	2,795,519	2,971,686	2,725,002	2,813,970	2,971,400
TOTAL,†	18,480,572	20,823,727	20,133,989	19,259,650	17,991,062	19,082,990	20,091,748

* Those who take alarm at the large consumption of intoxicating liquors must remember that, notwithstanding the increase of population, the quantity consumed is now very considerably less than it was some years ago—before the duties were raised. The year 1852 was the last before those alterations in the rates of duty commenced, which terminated in 1860 in a uniform rate of 10*s.* throughout the kingdom. The consumption in 1852 was nine-tenths of a gallon per head of population, but the present consumption is little more than six-tenths of a gallon per head, and yet there is an increase of nearly 4,000,000*l.* in the revenue. If we include the foreign and colonial spirits consumed the quantity was still almost a gallon and one-tenth per head in 1852, and not quite nine-tenths of a gallon in 1864. Of wine the consumption has risen in the same period from '23 of a gallon per head to '38, and of beer from '6 of a barrel to '7. These facts show the tendency towards the substitution of milder stimulants for ardent spirits. Comparing still the years 1852 and 1864, the consumption of beer in England will be found to have increased nearly 12 per cent.—viz., from '85 of a barrel per head to '95; in Scotland, 60 per cent.—viz., from '20 of a barrel to '32; in Ireland, 122 per cent.—viz., from '09 of a barrel to '20.

† From the amounts in this column a deduction must be made for drawbacks and other allowances (chiefly on malt and spirits), which in each of the two last years amounted to about 650,000*l.*

The following were the principal alterations in the rates of Duties, &c., in the above period:—

1860:—Licenses—England and Ireland—to keep Refreshment Houses, and to Retail Foreign Wine, at various rates, imposed from July 1, 1860. Spirits—United Kingdom—Duty increased to 10*s.* per gallon, from July 17, 1860. Chicory—United Kingdom—Duty of 3*s.* per cwt., imposed from August 28, 1860. Licenses—United Kingdom—To Dealers

in Sweets or made Wines, 5*l.* 5*s.*, imposed from August 28, 1860. The revival of the duty on Sugar used in brewing further deferred.

1861:—Paper duty repealed from September 30, 1861. Chicory duty increased on April 1, 1861, 2*s.* 6*d.* per cwt., and on June 12, 3*s.* per cwt.

1862:—Hop duty repealed from June 3, 1862. Chicory duty increased on April 1, 1862, from 8*s.* 6*d.* to 11*s.* per cwt. Brewers' Licenses increased

STAMPS.

UNITED KINGDOM.	1858. Ended March 31, 1859.	1859. Ended March 31, 1860.	1860. Ended March 31, 1861.	1861. Ended March 31, 1862.	1862. Ended March 31, 1863.	1863. Ended March 31, 1864.	1864. Ended March 31, 1865.
Deeds and other Instruments, . .	1,270,081	1,288,508	1,336,185	1,344,848	1,405,966	1,516,450	1,653,086
Probates of Wills and Letters of Administration, ...	1,338,089	1,333,206	1,394,814	1,419,166	1,443,023	1,582,173	1,642,872
Bills of Exchange, ...	475,185	521,329	590,023	564,494	583,609	673,826	779,334
Bankers' Notes and Composition for Bankers' Bills and Notes,	67,773	72,820	72,213	69,890	129,185	130,069	131,160
Receipts and Drafts, ...	443,574	411,435	462,554	439,445	470,723	495,853	519,289
Marine Insurances, ...	287,071	325,708	328,735	339,043	370,647	411,241	409,199
Licenses and Certificates, . . .	218,500	220,456	219,399	246,787	237,970	243,425	231,431
Newspapers and Supplements, . .	151,190	147,249	139,403	133,386	128,963	124,759	122,073
Medicine, ...	43,091	45,624	46,773	46,237	50,117	62,075	55,333
Legacies and Succession Tax, . .	2,211,822	2,130,021	2,169,580	2,277,724	2,388,507	2,263,964	2,347,084
Fire Insurances, ...	1,472,443	1,503,738	1,559,837	1,611,681	1,639,676	1,715,123	1,651,335
Gold and Silver Plate, ...	67,721	74,152	78,879	65,519	67,354	69,458	73,204
Cards, ...	15,046	15,256	14,533	13,637	9,269	8,315	8,926
Probate Court Fee Stamps, . . .	57,409	56,997	57,811	110,031	119,555	128,915	135,801
Divorce and Matrimonial Causes Fee Stamps, ...	2,221	2,557	2,619	2,664	2,440	2,677	2,960
Admiralty Court Fee Stamps, . .	6,096	6,578	9,025	9,616	9,862	9,267	9,808
Patents for Inventions, ...	83,794	102,437	104,758	102,052	111,331	110,592	113,579
Land Registry Fee Stamps, . . .	—	—	—	—	64	133	411
Registration of Deeds Fee Stamps	—	—	—	—	—	—	3,503
Law, Equity, Exchequer, and Chancery Fund, ...	36,236	34,658	38,873	44,177	46,785	42,242	36,512
The sums received in each coun- try were:—							
ENGLAND, ...	7,032,453	7,030,080	7,357,227	7,537,271	7,881,564	8,185,253	8,431,002
SCOTLAND, ...	659,188	696,181	721,405	757,726	776,467	802,927	809,669
IRELAND, ...	555,701	566,488	547,382	545,390	577,015	592,377	580,229
TOTAL, ...	8,247,342	8,292,749	8,626,014	8,840,387	9,235,046	9,580,557	9,820,900

TAXES.

GREAT BRITAIN.							
Land Tax on Lands & Tenements	1,135,677	1,141,486	1,149,324	1,139,132	1,128,139	1,135,624	1,134,304
Schedule. Assessed Taxes.							
B. Inhabited Houses, . .	763,941	796,910	822,984	826,730	844,757	898,438	917,001
C. Servants, ...	193,397	198,297	202,150	201,451	203,991	208,906	211,487
D. Carriages, ...	306,762	319,334	330,290	332,892	340,233	350,973	358,976
E. Horses for Riding, &c., .	230,617	236,989	242,488	241,176	243,662	248,627	251,472
F. Other Horses & Mules, .	117,819	121,697	125,823	127,751	130,157	134,324	138,022
G. Dogs, ...	191,769	193,671	197,538	196,616	199,995	205,359	210,410
H. Horse Dealers, ...	13,757	14,139	14,124	14,317	14,153	13,626	13,590
I. Hair Powder, ...	1,199	1,191	1,157	1,116	1,072	1,052	1,028
K. Armorial Bearings, . . .	53,583	55,411	57,138	57,010	58,390	60,208	61,561
L. Game Duties, ...	139,242	145,971	3,752	—	—	—	—
Admittl. 10l. p. Ct. by 3 Vict. c. 17	15,299	16,011	1,986	1,431	1,415	1,363	1,360
Land and Assessed Taxes, . .	3,163,062	3,241,107	3,148,754	3,139,622	3,165,964	3,258,500	3,299,211
UNITED KINGDOM.							
Property and Income Tax, . .	6,812,232	9,789,483	11,158,883	10,688,001	10,709,878	9,315,245	8,188,878
TOTAL, ...	9,975,294	13,030,590	14,307,637	13,827,623	13,875,842	12,573,745	11,488,089
Of the total amount the three countries contributed in the following proportions:—							
ENGLAND.							
Land and Assessed Taxes, . .	2,963,792	3,036,105	2,954,586	2,943,029	2,965,520	3,054,967	3,092,156
Property and Income Taxes, . .	5,818,659	8,216,494	9,492,563	9,071,428	9,111,943	7,975,364	6,955,258
TOTAL, ...	8,782,451	11,282,599	12,447,549	12,014,457	12,077,463	11,030,331	10,047,414
SCOTLAND.							
Land and Assessed Taxes, . .	199,270	205,002	194,168	196,593	200,444	203,533	207,055
Property and Income Tax, . .	456,698	810,718	912,238	876,074	894,613	690,670	698,845
TOTAL, ...	655,968	1,015,720	1,106,406	1,072,667	1,095,057	894,203	905,900
IRELAND.							
Property and Income Tax, . .	536,875	732,271	753,682	740,499	703,322	649,211	534,775

from October, 1862, and mode of rating altered. Victuallers' Occasional Licenses imposed, 5s., June 3, 1862.

1863:—Chicory duty increased from 11s. to 17. 1s. 9d. per cwt., from June 8, 1863. State Carriages used occasionally only—Daily Licenses granted at various rates, and the License and Duty on Stage Carriages to convey not more than eight persons, reduced from 3*l.* and 1*d.* per mile respectively to 10s. and ½*d.* per mile, from June 29, 1863. Victuallers' Occasional Licenses—Rates altered to 2s. 6*d.* per day, and 10s. for any number of days not less than four nor exceeding six after the first six days, from June 29, 1863.

1864:—Chicory duty increased from 17. 1s. 9d. to 17. 4s. 3*d.* per cwt., from April 1, 1864. Licenses to sell Tea, &c., duty reduced to 2s. 6*d.* where house is rated to the Relief of the Poor at less than 8*l.* Occasional Licenses to sell Wine, Beer, and Tobacco, not exceeding three days. Wine or Beer, 1s. per day. Tobacco, 4*d.* per day. Licenses to Hawkers, Dealers in Plate, Appraisers, House Agents, Pawnbrokers, Sellers of Playing Cards and of Patent Medicines, transferred from the Stamps to the Excise.

INLAYING is the art of inserting pieces of one substance in cavities cut in the surface of another, as a means of ornament. The substances may be various kinds of metal, or wood, pearl, ivory, tortoise-shell, &c.; and the product may either be regarded as a work of art, or as an ornamental article of furniture. Two kinds which had much celebrity in their day, but are perhaps less practised at present, are *buhl* and *reisner* work, so named from two cabinet-makers, Buhl, an Italian, and Reisner, a German, who settled in Paris in the reign of Louis XIV. Buhl mostly used a brass inlay on a tortoise-shell ground; Reisner, a dark wood inlay on a tulip-wood ground; but it is obvious that the varieties admit of almost interminable change. Where the substances are not too hard to be easily cut, the devices are produced by counterpart sawing; that is, two thin plates are laid one on another, and a very fine saw is worked through both of them, in lines marked out by a pencil device. If we suppose that two veneers or thin layers of wood, one black and one white, were thus treated, there might be two pieces of inlaying produced, the one a black inlay on a white ground, and the other a white inlay on a black ground, for one veneer would exactly fit the holes cut in the other. The saws for this work are mounted in bow or arched handles; they are very narrow and thin, and are worked in short quick movements. In buhl work the patterns generally consist of continuous lines; this does not require the actual separation into small pieces, and thereby marks one point of difference between inlaying and mosaics.

The ornamental stone-work called *pietra dura* bears more resemblance to inlaying than to mosaic, for the holes are not cut through the ground, but only to a certain depth, in slabs of black marble; and small bits of other coloured marble are inserted to this limited depth. The inlaying of knife and fork handles with studs of gold and silver is similarly effected by drilling holes to a certain depth, and inserting fragments of gold or silver wire. The inlaying of *papier-maché* with pieces of mother-of-pearl, or other iridescent substances, is not strictly

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inlaying in the sense here employed; for the decorative substance, cut into the forms of leaves, flowers, or other devices, is laid on the *papier-maché*, and a general level produced by many thicknesses of varnish, in the way described under *PAPIER-MACHÉ*. See also *MOAIC*.

INN. An innkeeper is responsible for the safety of the goods of persons who use his house; but he may be released from his liability either by inattention on the part of the guest to such reasonable rules as the innkeeper may lay down for the protection of the property of his guests; by any act of negligence on the part of the guest himself; or by his making use of the house not *causâ hospitandi*, that is, not for the purpose of using it as an inn. Thus, if an innkeeper requires his guest to put his goods under lock and key, and the guest leaves them in a passage, whereby they are lost; or the goods are stolen by the guest's own servant; or the guest uses his room in the inn as a show-room, into which a number of people are allowed to have access, and not as a lodging-room, the responsibility of the innkeeper ceases. By the 26 and 27 Vict., c. 41, 'No innkeeper shall be liable for any loss or injury to a guest's property, not being a horse or other animal, or a carriage, to a greater amount than 30*l.*, except where such goods shall have been lost, injured, or stolen, through the wilful act, default, or neglect of the innkeeper, or any servant in his employ, or where the property has been deposited expressly for safe custody with such innkeeper.' The innkeeper may require the property to be sealed. If he refuses to take care of any article, or if he neglects to put up in a conspicuous place a copy of this Act of Parliament, the innkeeper cannot have the benefit of the Act. An 'inn' is defined to be 'any hotel, inn, tavern, public house, or other place of refreshment.'

An innkeeper is bound to open his house to all travellers, and provide them with such accommodation as he has, if the person applying is a traveller, able and willing to pay the customary hire, and is not drunk or disorderly, or tainted with infectious disease. In return for this compulsory hospitality, the innkeeper has a lien on the goods of his guest for payment of his bill, but he cannot detain the person himself.

The law relating to the licensing of inns is fully described in the article *ALHOUSE*.

The word 'Inn' was formerly used to designate the town-house of a great noble, as Lincoln's Inn. In France the word *Hôtel* was employed in the same sense.

INN, River. [AUSTRIA.]

INNISKIL/LINERS, or ENNISKILLINERS, a term in military language applied to the officers and soldiers of the 6th Dragoons and 27th Foot, on account of those two regiments having been originally raised at Inniskilling, a town of Ulster, where the inhabitants distinguished themselves in favour of William III. in his contests with James II.

INNOCENT I. and II. [POPE.]

INNOCENT III., Cardinal Lotharius, son of Trasimund, count of Segni, was unanimously elected in 1198, after the death of Celestine III. He ascended the papal throne at the age of thirty-seven. He had distinguished himself while at the universities of Paris and Bologna in the studies of philo-

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sophy, theology, and the canon law, and also by several written compositions, especially by his treatise 'De Miseria Conditionis Humanæ.' The object at which Innocent aimed was universal supremacy. External circumstances favoured his views. In Sicily he assumed the regency during the minority of Frederick II. At Rome, availing himself of the vacancy of the imperial throne, he bestowed the investiture on the prefect of Rome, whom he made to swear allegiance to himself; he drove away the imperial feudatories, took possession of those provinces in the name of the Roman see, and formed a league with Tuscany against the empire. In Germany he first deposed, and then excommunicated Otho, and secured the crown for his own ward Frederick of Sicily. Calo Johannes, prince of the Bulgarians, acknowledged his allegiance to the Roman see, and Leo, king of Armenia, received Innocent's legates, who bestowed upon him the investiture of his kingdom. Innocent excommunicated Sverecum, who had usurped the kingdom of Norway, and also Philip Augustus of France, because he had repudiated his wife Ingerburga of Denmark, and had married Agnes de Meranie. The King of Leon having married his cousin, the daughter of the king of Portugal, was likewise excommunicated, and as he would not submit, Innocent laid both kingdoms under an interdict.

He also laid the kingdom of England under an interdict in consequence of a dispute with King John, who eventually not only declared allegiance and paid him tribute, but surrendered the kingdoms of England and Ireland to the Pope and his heirs for ever. Against those who separated themselves from the body of the Roman Church, Innocent was stern and uncompromising. His persecution of the Albigenes is memorable for its malignity. He died in 1216. His pontificate must be considered as the period of the highest power of the Roman see. For various successors of the same name, see Article POPE.

INNS OF COURT AND OF CHANCERY. When the houses of law were first established seems very doubtful; but the fixing of the Court of Common Pleas at the palace at Westminster brought together a number of persons who (as Spelman says) addicted themselves wholly to the study of the laws of the land, and no longer considering it as a mere subordinate science, soon improved the law, and brought it to that condition which it attained under King Edward I. They purchased at various times certain houses between the city of London and the palace of Westminster, for the combined advantage of ready access to Westminster, and of obtaining provisions from London.

The inns of court, as they are now called, are Lincoln's Inn, the Inner Temple, the Middle Temple, and Gray's Inn.

The Inner Temple, as well as the Middle Temple, owes its name to the Knights Templars. After the dissolution of that order, it was granted to the Knights of St. John of Jerusalem by King Edward III., and was soon after, according to Dugdale, demised by them to 'divers professors of the common law that came from Thavie's Inn, in Holburne.' The church, which is common to both societies, was founded by the Templars, upon the model of that of

the Holy Sepulchre at Jerusalem, and was consecrated in 1185, and dedicated to the Virgin Mary. This church has been recently restored and beautified.

Lincoln's Inn is distinguished by its new *Hall and Library*, built by Mr. Hardwick in 1845, and justly regarded as one of the finest modern examples of the Tudor style. The chapel was built by Inigo Jones.

Besides these four inns of court there are nine inns of chancery, which are now only used as chambers, and are principally inhabited by solicitors and attorneys. Two belong to Lincoln's Inn, namely, Furnival's Inn and Thavie's Inn. Four belong to the Temple, Clifford's Inn, Clement's Inn, New Inn, and Lyon's Inn. Staple Inn and Barnard's Inn belong to Gray's Inn. There is also Serjeant's Inn.

Each inn of court is governed by its own benchers, who fill up the vacancies of their own body. The benchers of each inn exercise the power of calling to the bar the members of their own inn. [BARRISTER.] They also exercise the power of disbarring a barrister, that is, depriving him of his degree of barrister, if they see sufficient reason for such a proceeding.

INNSBRUCK, or *Innsbruck*, the capital of the Tyrol, is situated on the Inn, near the point where that river is joined by the Sill, in 47° 16' N. lat., 11° 23½' E. long., 245 miles W. by S. from Vienna, and has 14,500 inhabitants. The town is built in a most beautiful situation, in the middle of the valley of the Inn, which is hemmed in on both sides by mountains varying from 6000 to 9000 feet high. It takes its name of Innsbruck (Inn's Bridge) from the wooden bridge which spans the river, and on and near which the Tyrolese, under Hofer, during a fierce action, succeeded in repulsing the French after the war of independence. A handsome chain suspension bridge has also been recently erected. The town is in general well built; many of the houses are in the Italian style, the basement story consisting of arcades, which are occupied as shops. The street of Neustadt is the finest; here are the Landhaus or Tyrolese parliament house, the post-office, and, at its southern extremity, a triumphal arch erected by the Empress Maria Theresa. Among the public buildings, the most interesting is the Franciscan church, which contains the tomb (but not the remains) of Maximilian I., the most splendid monument of the kind in Europe, and the Silver Lady-chapel; the twenty-eight bronze statues that form part of its plan and represent some of the worthies of Europe, including the most distinguished personages of the house of Austria, were cast by Tyrolese artists; the bas-reliefs on the tomb, and in the Lady-chapel, which are masterpieces of art, were the work of Collin de Mecklin. On the left of the entrance to this church is the grave of Hofer, who so nobly defended his country against the French in 1809, until betrayed by one of his associates, and shot at Mantua by order of Napoleon. It is surmounted by a statue of the hero in Tyrolese white marble. The other remarkable buildings are—the Maria Theresa's palace, built in 1770, in whose court-yard stands an equestrian statue of Leopold V.; the university, in which is the Museum Ferdinandeum, rich in Tyrolese minerals, fossils, and works of art; the Capuchin church, containing the

penitential cell of Maximilian II.; the richly decorated church of St. James (Jacob's Kirche); the old palace of the counts of Tyrol; and the Fürstenburg, with its famous golden roof (goldene dach), a sort of oriel window, covered with a roof of gilt copper, which projects in front of the building. The public cemetery (Gottes-acker) contains some fine monuments. The Schiesstadt, where the Tyrolese practise rifle-shooting, is in a very pretty situation on the left bank of the Inn, on a slope of the Berg-Isel, and is well worth visiting. The market-place of Innsbruck presents a very interesting appearance, from the great variety of picturesque costumes worn by the inhabitants of the different valleys, who frequent it. The chief manufactures of the town are silks, gloves, calico, ribands, glass, sealing-wax, and wood and horn carved work; there is also an important transit trade. The neighbourhood abounds with beautiful scenery and charming promenades.

INOCULATION is the insertion of a morbid fluid formed in the body of one person into that of another. It has, however, been more particularly applied to the practice of producing small-pox by removing a small quantity of the fluid formed in the pustular eruption on the skin of one person, and inserting it beneath that of another. The disease is much mitigated by this process. The practice was introduced into this country by Lady Mary Wortley Montagu, about the year 1721, her son having thus received the disease during her residence in Constantinople. It had long been practised in Turkey and other Eastern countries. It was very slowly adopted in this country, and it was not until it had been practised on six criminals (whose liberty was promised to them if they recovered, as they fortunately did) that it was generally received. It was then almost universally had recourse to, till the introduction of vaccination, by which it has been superseded.

INOCULATION, in Horticulture, is only another name for the operation called budding. [BUDDING.] The season for performing the operation is, generally speaking, from the beginning of July to the middle of August, the particular time varying according to the season. The best criterion is the state of the buds and the degree of cohesion between the bark and alburnum of the stock. If the buds on the young shoots have become so far perfectly formed outside as to bear separation from the branch, and if the bark of the stock can be freely raised, and exhibits an abundance of cambium in a fluid state, the operation may be proceeded with. If, on the contrary, the bark adheres rigidly to the alburnum, or is *set*, as it is technically expressed, there is little chance of success. The operation of budding, or inoculation, is performed in various ways; but the best and most general is that called shield-budding or T-budding, from the resemblance of the two cuts made in the bark of the stock to the two principal bars of the Roman letter T.

IN PARTIBUS INFIDELIUM (Latin, 'in the regions of the unbelievers'). This is the title given to those Roman Catholic bishops who, residing in countries not under papal jurisdiction, have no diocese, nor any bishop's see. It has been the policy of the Romish Church to continue to appoint and consecrate bishops to Protestant and other countries where the Catholic religion has lost its sway, as a

continual protest against the power which had prevailed over its alleged right, and to signify its hope of restitution. Up to the year 1850 all the Roman Catholic bishops in Britain derived their titles from places abroad, it being illegal to assume territorial titles here. Since that date they have been allowed to take their titles from their actual sees; and the Ecclesiastical Titles Bill, which was expressly passed to prevent them, has remained a dead letter.

INQUEST, INQUISITION. [CORONER.]

INQUIRY, COURT OF. This is a court on some occasions directed by the Crown to be held, the object of which is to ascertain the propriety of resorting to ulterior proceedings against any party charged under the Mutiny Act.

INQUISITION, THE, (Lat. *inquisitio*, 'a seeking for'), of which the more correct title is the *Holy Office*, is the name of an ecclesiastical tribunal established in the thirteenth century, after the conquest of the Albigens by Popes Honorius III., Gregory IX., and Innocent IV., to try heretics, blasphemers, apostates, witches, wizards, and other persons charged with infractions of the canons of the Roman Catholic Church. The judges of this court were called 'Inquisitors,' whence the tribunal itself has been commonly called the 'Holy Inquisition.' From the time of Theodosius I., 382, heresy, or dissent from the creed of the national church, had been treated as an ecclesiastical offence in the Roman empire. In the eleventh and twelfth centuries persecutions were directed against the Waldenses, Albigenses, and other sects; but no special court distinct from the bishops existed till about the year 1233, when Pope Gregory IX. laid down the rules and defined the jurisdiction of the Inquisitors' courts, which he sent to various countries, under the name of Inquisitorial Missions. The Inquisition in Rome and other parts of Italy was intrusted to the Dominicans, and the principal characteristics of it as it existed from the thirteenth century to the latter part of the fifteenth were as follows:—The inquisitor visited the various provinces and towns, proclaiming to all persons the obligation he was under of informing against those whom he knew or suspected of being heretics, under pain of excommunication. At the same time he also made it known that all persons guilty of heresy who came of themselves before the inquisitor within a certain fixed period, and accused themselves and professed repentance, should receive absolution, and be only subject to a canonical penance. These penances were public, humiliating, and very severe. After the expiration of the period of grace, the inquisitor proceeded *ex officio* against those who were denounced, the name of the informer being kept secret. He examined witnesses privately in presence of a notary and two priests, and took down the evidence in writing. If there appeared sufficient evidence for proceeding against the accused, the inquisitor ordered his arrest by the municipal officers. He was then interrogated by the inquisitor, and his answers might be used afterwards as evidence against him. If the accused denied the charge of heresy, the inquisitor, together with the bishop of the diocese, or his delegate, if they thought proper, ordered him to be put to the torture in order to obtain his confession. The torture might be repeated three times. If in the end there were not sufficient grounds for the conviction

of the prisoner, he was declared to be 'suspected of heresy,' was obliged to make a public abjuration of all heresies, and was subject to certain penalties, according to the nature of the case. If he was convicted of heresy, but professed his repentance, he was condemned to prison for life—a penalty which, however, might be mitigated by the inquisitor. But if he was a *relapsed*—that is to say, had been tried before, and found guilty, or only strongly suspected—there was no mercy for him: he was '*relaxatus*,' given over to the lay magistrate, who, according to the civil and canon laws, was bound to put him to death upon the sentence of the inquisitor which declared him a heretic. The only favour shown to the relapsed heretic who confessed and abjured his guilt was, to be strangled before he was burnt. If the convicted heretic was not relapsed, but impenitent, a respite of the sentence was granted in order to effect his conversion; and if he at last abjured, his life was spared, and he was sentenced to perpetual imprisonment. If he persisted in his impenitence, he was publicly burned alive.

The Inquisition, thus constituted, was introduced in succession into Italy, Spain, Germany, and France. So long, moreover, as this constitution remained, it must be regarded as a strictly papal tribunal. Accordingly, over the French and German inquisition of the following century the popes exercised full authority, receiving appeals against the rigour of local tribunals, and censuring or even depriving the inquisitor for undue severity. In France the Inquisition was soon discontinued; and though an attempt was made under Henry II. to revive it against the Huguenots, the effort was unsuccessful. It fell into disuse in Germany at the Reformation. In England it was never received, all proceedings against heresy being carried on in the ordinary tribunals. In Poland it was established in 1327, but had only a brief existence. In Rome and the Papal States it has never ceased, though its history presents few cases of extreme rigour and cruelty.

It was in Spain and Portugal that the terrors of the Inquisition exercised the greatest sway. The Holy Office had existed in these countries from an early period, but was introduced in 1478 under a new and more appalling form, and became consolidated and permanent, and more absolute and independent than in any other country in Europe. A papal bull authorised Ferdinand and Isabella to appoint inquisitors, the execution of which they suspended for two years, in order to warn heretics of their error and danger. In 1480 two Dominicans were appointed, who established their court in a convent at Seville, ordered the arrest of several suspected persons, and the sequestration of their property. The number of prisoners soon became so great, that the court was removed to the castle of Triana, whence another edict was issued ordering every person, under pain of mortal sin and excommunication, to inform against those who had relapsed into the Jewish faith or other heresies, or who gave reason for suspecting them to be relapsed—specifying numerous indications by which they might be known. Sentences of death soon followed; and in the course of that year (1481) 298 persons were burnt alive in the city of Seville, 2000 in other parts of Andalusia, and 17,000 were subjected to various penalties. The property of those

who were executed was confiscated. Many appeals were made to Pope Sixtus IV., who protested against the arbitrary conduct of the inquisitors, and reserved to himself the right of appointing future inquisitors. In 1483 he appointed Thomas de Torquemada to the presidency of the new court, and made him likewise inquisitor-general of the kingdom of Arragon, with full jurisdiction over all other inquisitors in Spain and its dependencies. Llorente, the popular historian of the Inquisition, affirms that during the eighteen years of Torquemada's tenure of office no less than 8800 persons were burnt in Spain alone. The same author also gives an approximate estimate of the number executed under each inquisitor-general during the three centuries (from 1481 to 1808) of the existence of the Spanish Inquisition, from which it results that the total number in Spain is about 32,000 persons burnt, either alive or after being strangled, 17,000 burnt in effigy, and 291,000 condemned to various terms of imprisonment, to the galleys, or subjected to other penalties. These calculations may be exaggerated, but after making all deductions, the working of the Inquisition in Spain and in its dependencies even of the New World involves an amount of cruelty which it is impossible to contemplate without horror. The inquisitor was appointed for life, and was a distinct power between the king and the pope, and in reality independent of both; and though the rules were based upon those already noticed as being in practice by the old Inquisition, they were much more unfavourable to the accused. The rigours of the Spanish Inquisition abated in the latter part of the seventeenth century. It was abrogated by Napoleon in 1808. Ferdinand VII., after his restoration, re-established it in 1814; it was suppressed by the Cortes in 1820, partially restored in 1825, and finally abolished in 1835, and its property applied to the liquidation of the national debt. It was abolished in Portugal during the reign of John VI., about the year 1821. The inquisition which exists at Rome consists of twelve cardinals, several prelates, monks, and lawyers; but its action is confined to the censorship of the press, the trial of ecclesiastical offences, and questions of church law. The territory subject to the dominion of the pope is now the only country in which the tribunal of the Holy Office still remains.

INSANITY. The term insanity has been applied to all the forms of mental disorder. It is not possible to define it with precision. Nor can any good result follow from refining on the differences which it is said exist between lunacy, insanity, and unsoundness of mind. The legal significations attached to these terms have given rise to much confusion. Any division of insanity must of necessity be more or less artificial, but by common consent medical jurists describe five different forms—mania, monomania, dementia, amnesia or idiosyncrasy, and moral insanity. The last of these, however, is not recognized by the law.

Mania is a general insanity, marked by mental excitement, and by delusion on all kinds of subjects. There are varying degrees of the affection, depending on constitutional peculiarities. The attack is often preceded by premonitory symptoms, such as uneasiness in the head with confusion of ideas, or uneasy sensations in the stomach. Then succeed mental

agitation, sleeplessness, and paroxysms of fury alternating with calms. The sensations are frequently deranged; the appetite lost, depraved, or voracious. The abatement of the disease is evidenced by the disappearance of the hallucinations under which the patient laboured. The result of a case will depend on whether it has its origin in organic disease of the brain, or merely in functional derangement.

Monomania is characterized by the predominance of one morbid idea or a limited class of ideas, and there are great varieties in the nature of these. Sometimes there is excessive pride: the monomaniac fancies himself a god or king, possessed of boundless wealth, and having the power to scatter gifts and honours. The morbid desire to kill is one form; the fear of damnation another; and so terrible are the suffering and remorse, that the impulse to commit suicide becomes irresistible. A curious fact among this class of the insane is, that they are often unusually acute on subjects apart from their own delusions, and can reason with subtlety and ingenuity.

In dementia we have a rapid succession of ideas without connection. The patient expresses himself with untiring volubility, and passes from one subject to another. He is at one moment kind and gentle; at another furious and angry. He will for hours together repeat the same sentence or word. The reasoning and judgment are lost.

Amentia or idiocy is either congenital or accidental. The most remarkable instance of the first of these is to be found in the Cretins of the Valais, with whom it is associated with bodily ailments and malformations. Idiocy may arise accidentally from injuries of the head, the effects of violent emotions, or organic diseases of the brain.

Idiots as a rule speak little, and amentia constitutes the most hopeless form of insanity.

In moral insanity there is disorder or loss of moral principle without any delusion. There are a great many varieties and degrees of this. In some there is the irresistible desire or impulse to commit theft; in others to drink to excess; in others to acts of incendiarism. In fact, moral insanity is closely allied to crime, and it is exceedingly difficult to draw the line of demarcation between the two. The most fruitful source of this affection is a neglected or injurious education.

There are in insanity various changes in the state of the mental powers. Sensation and perception are often deranged. Morbid states of the former are insensibility to cold and fatigue; of the latter, the seeing of what does not actually exist. The attention and memory are also affected, especially in dementia, while imagination and the association of ideas, which are suspended in amentia, may be exuberantly active in the other forms of mental disorder.

Derangements of reasoning and judgment occur in insanity, but often the conclusions of maniacs are very logically deduced, if the premises be granted; at other times we find the reasoning erroneous, as well as the judgment founded on it. Sometimes both faculties are suspended or annihilated in insanity.

The change, however, which occurs in the moral faculty is the cause why the insane are not considered as responsible agents; and the rapidity with which this change occurs when insanity has manifested itself is sometimes very rapid, persons of the most

correct and virtuous habits suddenly becoming vicious in the extreme.

The causes of insanity are numerous; some of them easily traceable and others obscure. The hereditary predisposition is often very well marked, and may depend on faulty structure of the brain. Persons of a melancholy temperament, and who suffer from disorder of the digestive functions, are predisposed to the disease, and the tendency in such is greatly increased by fanatical views of religious matters. Every revival of religion has been attended with an increase of the number of the insane, and this was clearly evidenced during the last occurrence of such a revival in the north of Ireland. Further, insanity follows on indulgence in vice or debauchery; may be produced by exciting passions or violent mental exertions; by the state of pregnancy, and other physical conditions of the system. But perhaps intemperance is in this country the most frequent exciting cause.

The treatment of the insane is now conducted upon the most humane and philosophic principles. All experience goes to prove the desirability, nay necessity, of seclusion, and many of the objections which formerly existed against lunatic asylums have been removed. In a well regulated establishment restraint is very seldom resorted to, and every means are used to employ and gratify the inmates. The moral treatment is of more efficiency than the medical, and hence it is that the heads of lunatic asylums require to be men of mental vigour and capacity.

It is beyond our province in this mere sketch of the subject to dwell upon the numerous and weighty points which occur in medical jurisprudence relative to insanity. These have principally reference to the responsibility of criminals, and are attended often with great difficulty, and cause no little perplexity. The true difficulty lies in determining where eccentricity ends and insanity begins, and we cannot hope to lay down general rules which will apply to every individual case. Then there are instances in which the succession to property is disputed on the ground of mental incapacity of the testator. In the records of the law many curious cases will be found, and all the great English lawyers have endeavoured, but fruitlessly, to lay down a test by which insanity can be tried.

It only remains to add, that of late years there seems good reason to believe that, owing partially to the excitement of life, the wear and tear of business, the hurry of railway travelling, and such like causes, insanity is increasing; and as these will in all likelihood be augmented and aggravated with the progress of the times, the increase of this disease must be looked upon as one of the penalties we have to pay for our advancing civilization.

The laws relating to the insane are fully explained in the article LUNACY, and statistics, mode of treatment, &c., in LUNATIC ASYLUMS.

INSECTA, or INSECTS, invertebrate animals of the homangliate or articulate sub-kingdom, having the body divided into three portions, whence their title. [ENTOMOLOGY.] Insects are in general covered with a horny or coriaceous integument, serving as an external skeleton; they possess, when mature, three pair of legs; they are capable, for the most part, of flight, having two or four wings. The sexes are distinct, the females oviparous; they

undergo, as a common rule, three transformations from the egg to maturity. Eyes compound, with additional simple eyes or stemmata in certain groups. Circulation is effected by a pulsating dorsal vessel, provided with numerous valves, and respiration by tracheæ, which form two lateral trunks, and ramify through the body.

Insects fly, walk, leap, swim, dive, mine into the earth, bore into wood, build structures which fill our minds with astonishment, and in various ways exhibit the possession of marvellous instinctive faculties, inasmuch that many of their proceedings appear to be the result of profound reasoning. They furnish us with silk, wax, honey, lac, cochineal, and gall-nuts. Some are eaten by various tribes of men; and they furnish food to mammalia, birds, reptiles, and fishes, and to the carnivorous of their own class.

Some are remarkable for beauty, for splendour of colouring, for gracefulness and delicacy; others surprise us by the strange singularity of their forms, and others again by their natural lantern, which gleams brilliantly in the hours of darkness.

If we place an insect before us, we shall find that it is divided into three distinct parts; the head (*caput*), the thorax, and the abdomen.

The principal parts of the head are termed respectively the *clypeus* or *nasus*; the *vertex*; the *occiput*; the *genæ* or *cheeks*; the *canthus*; the *gula*. To the head belong the two compound eyes, the simple eyes, or *stemmata*, when present; the antennæ, and seven portions of the mouth called *trophæ*.

The mouths of insects are either mandibulate, formed for biting, or haustellate, formed for suction.

In a mandibulate mouth, the seven portions, collectively termed *trophæ*, consist of a *labrum*, or upper lip; a *labium*, or under lip; two *mandibulæ*, or jaws; two *maxillæ*, or under jaws; and a *lingua*, or tongue. To the maxillæ are attached a pair of feeders called *maxillary palpi*; and a similar pair are also attached to the labium, or under lip; these are the *labial palpi*. The *labrum* is usually movable, and articulated to the clypeus, terminating the head anteriorly; it is opposed to the *labium*, and their joint use appears to be to keep the food in its proper place, while the jaws work upon it. The *labium* is divided into three portions; the *palpiger*, the *mentum*, and *stipes*. The labial palpi generally consist of two articulations, exclusive of their basal attachment. The *mandibulæ* or mandibles are used for seizing and biting; when viewed from above beneath, they generally represent a figure more or less approaching to a triangle; are externally convex, but internally concave, the concave surface being furnished with serrations, or tooth-like processes. As mandibulate insects vary in their food, some being frugivorous, others granivorous, others herbivorous, others lignivorous, and others again carnivorous, there is great variation in the form and development of the *mandibulæ*.

With respect to the *maxillæ*, or under jaws, it may be observed that, exclusive of the maxillary *palpus*, each *maxilla*, besides its true and effective part, or *lobus inferior*, has an appendage sometimes rudimentary, sometimes wanting, but often composed of two or three joints, and resembling an additional *palpus*. The *maxillæ* appear to assist in turning

the food about during the operation of the mandibles. The basal joint of the *maxillæ*, on which it moves, is called the *cardo*, or hinge. The tongue is situated within the *labium*, or lower lip, and sometimes emerges from it. In many cases it constitutes an organ for the collecting of food, which it transmits to the gullet. For an account of the antennæ of insects see ANTENNÆ.

Now, however different the mouths of haustellate insects may be from the mouths of mandibulate insects, still the difference is one of modification only. The parts are the same, but newly fashioned and proportioned. Indeed, among the *mandibulata* we find a remarkable modulation in the mouth of some insects, as the bee, which laps the honey of flowers. In the bee and its allies, the mandibles are large and powerful; the *labrum* varies in shape, but is distinct. The maxillæ are elongated, and modified into a sheath for the tongue, and are affixed to the mentum, or base of the labium, with small palpi. The labium is elongated, and articulates with the tongue, which is carried from it. The tongue, which in most mandibulate insects is short, is long and slender in haustellate insects. The labial palpi have four joints, the most which these organs ever have, and they are remarkable for exceeding in length the maxillary palpi, which are ordinarily the longest. The first two joints are compressed, and set on below the apex of the second joint. The tongue, moreover, is sheathed at its base with two membranous appendages, found also in predaceous beetles, and termed *paraglossæ*. The upper part of the tongue is cartilaginous, and remarkable for a number of transverse rings; it is moved by numerous muscles. Below the middle is a membrane longitudinally folded when not in use, but capable of being distended to a considerable size; this membranous bag receives the honey which the tongue laps from the flowers.

As examples of the haustellate insects, in which the mouth is modified for suction, we may mention the Butterfly, the Aphid, the *Cimex lectularius*, the Flea, the Fly, the Tabanus, the Gnat, Mosquito, &c. The vast variety of modifications presented by the suctorial mouth of haustellate insects are fully detailed in Kirby and Spence's 'Entomology.'

The thorax is composed of three segments consolidated together, respectively named *prothorax*, *mesothorax*, and *metathorax*; these terms, however, rather apply to the upper than the under surface, for the under part of the *prothorax* is called *prosternum*, of the *mesothorax*, *mesosternum*, and of the *metathorax*, *metasternum*. The prothorax carries the first pair of legs, the mesothorax the second pair, and the first pair of wings, or in their place the wing-cases (*elytra*); the metathorax supports the third pair of legs and the second pair of wings. Dipterous insects, which have only two wings, are furnished with *halteres*, or poisers, and above them a little scale or winglet (*alula*), the use of which is not very clear.

The *limbs*, variously modified for running, leaping, swimming, burrowing, and even for adhesion, by means of suckers, to panes of glass, the ceilings of rooms, &c. (as we see in the common fly), consist of five principal parts, viz., the *coxa*, or hip, next to the body; the *trochanter*; the *femur*, or thigh;

the *tibia*, or shank; and, lastly, the *tarsus*, or foot, never composed of more than five joints, and often ending in two hooked claws, called *unguiculi*, in addition to suckers.

The abdomen consists of nine segments. The respiratory spiracles, or *stigmata*, are disposed in regular succession along the sides of the thorax and abdomen; the aerating tubes ramify throughout the body, and run along the nervures of the wings.

The digestive system of insects is well developed, and consists of an intestinal canal, in which a crop, gizzard, stomach, and small intestine are generally distinct; and, as in the higher orders of animals, these parts vary according to the nature of the food.

Insects are either *ametabolous*, or *metabolous*. In the former the larva resembles the perfect insect, yet it wants wings if the perfect insect be winged; the pupa in this case has their rudiments; it runs about and eats. The Cockroach is a familiar example of an *ametabolous* insect; so is the Water-boatman (*Notonecta*), and so are Crickets, Grasshoppers, Locusts, &c. Under this section Burmeister places three orders, viz., *Hemiptera*, *Orthoptera*, and *Dictyoptera*, which latter might be incorporated with the preceding.

In *metabolous* insects the larva consists of thirteen segments, either with or without legs; the pupa is inactive, or if it moves, it takes no food. To this section belong Beetles, Butterflies, Moths, Flies, Gnats, &c.

The larvæ of many insects, as the Gnat, the Dragon Fly, &c., are aquatic in their habits, but furnished with an apparatus which enables them to respire air. Some weave cocoons of silk, some bury themselves in the earth, and some suspend themselves in order to pass through the pupa state.

The legs of larvæ, or caterpillars, are divided into two series, viz., the *true* or *persistent*, and the *prolegs*, which are temporary. The true legs consist of three pairs attached respectively to the first three segments of the body, which constitute the future thorax. The prolegs are soft, short, and conical; they vary in number in different species. The caterpillar of the common cabbage butterfly has five pairs; and it is to be observed that, when five pairs are present, none are found on the fourth, fifth, tenth, or eleventh segments, but a pair respectively on the sixth, seventh, ninth, and twelfth segments, the twelfth being the last.

With respect to the various systems upon which insects have been classified, the student must consult the works of Linnaeus, Fabricius, Burmeister; Latreille, in 'Règne Animal'; Kirby, Spence, and Rymer Jones, 'Structure of the Animal Kingdom'; and the productions of the Entomological Society. [BOMBYCIDÆ; COLEOPTERA; DIPTERA; HEMIPTERA; ORTHOPTERA, &c.]

INSECTA, FOSSIL. Until within a few years the occurrence of insects in a fossil state could only be substantiated by reference to a small number of localities, situated (as at Aix in Provence) among lacustrine tertiary strata, or (as at Stonesfield in Oxfordshire, and Solenhofen in Franconia) among marine oolitic beds. But Mr. Prestwich has added traces of coleoptera from the coal formation of Coalbrook Dale, and Mr. Strickland parts of neuroptera from the lias of Warwickshire, Dr. Buckland ob-

tained neuroptera from the oolite of Stonesfield, and Mr. Brodie portions of insects belonging to various natural orders from the lias of Somersetshire, Gloucestershire, and in the Wealden deposits of the Vale of Wardour in Wilts, and the Vale of Aylesbury.

Still the number of fossil insects, whether we estimate individuals or species, is very small compared to the probable number of anciently existing races; a circumstance quite explicable by reference to the phenomena which are now taking place in nature; for of upwards of 12,000 British species of insects there is reason to believe that but a very minute proportion is buried and preserved in lacustrine, estuary, or marine deposits now in progress.

No doubt vast numbers of insects pass from the shore and fall in the sea, as we learn from the first voyage of Cook, who sailed through myriads of insects, some on the wing and others in the water, even thirty leagues from land off the coast of South America; but few of these escape the watchful finny races, or ever reach the bottom of the sea.

In like manner we find land insects heaped in profusion by winds on certain tracts of fresh water, and borne down the course of rivers by inundations: and these cases, by the aid of particular suppositions, such as evaporation or slow draining off of the water, may offer the nearest analogy to the facts actually observed in the greater number of insect deposits.

INSECTIVORA, a group or order of lissencephalous mammalia, feeding chiefly upon insects and their larvæ. The Shrew, the Hedgehog, and the Mole are familiar examples. [CARNIVORA.] Also, an order of birds in the ornithological system of Temminck.

INSESSORES, the name given by Mr. Vigors to the *Perchers*, the second order of Birds in his system; and as the families of which it is composed are very numerous, he classes them in comprehensive sections or tribes, which he thus denominates:—*Fissirostres* (Cuvier), *Dentirostres* (Cuvier), *Conirostres* (Cuvier), *Scansores* (Auct.), *Tenuirostres* (Cuvier).

The *Fissirostres*, according to Mr. Vigors, include the *Meropidae*, the *Hirundinidae*, the *Caprimulgidae*, the *Todidae*, and the *Halcyonidae*.

The *Dentirostres* include the *Muscicapidae*, the *Laniidae*, the *Merulidae*, the *Sylviidae*, and the *Pipridae*.

The *Conirostres* comprise the *Fringillidae*, the *Sturnidae*, the *Corvidae*, the *Buceridae*, and the *Loxiidae*.

The *Scansores* consist of the *Ramphastidae*, the *Psittacidae*, the *Picidae*, the *Certhiidae*, and the *Cuculidae*.

The *Tenuirostres* are composed of the *Nectariniidae*? *Cinnyridae*, *Trochilidae*, *Promeropidae*? and *Meliphagidae*?

INSOLVENT is, literally, a man who cannot pay his debts. The term in England was formerly confined to non-traders; persons in business who could not meet their liabilities being called **BANKRUPTS**. But a man is not properly called insolvent till he has been found to be so by the process to which he is liable under the insolvent acts, if he does not pay his creditors. The law as to insolvency formerly applied to those who did not come within the operations of the law relating to Bankruptcy.

The Insolvent Law of England was administered

by commissioners appointed by the Crown, in a court called the Insolvent Debtors' Court, and three of the commissioners from time to time made circuits, and gave their attendance at the assize towns or places where prisoners might be ordered to appear.

The general object of the law as to insolvency was to release the debtor from prison, to free his person from liability as to debts contracted previous to his discharge, but to make all his present and future acquired property available for the benefit of his creditors. Where new creditors had a claim on the insolvent's subsequently acquired property, which was of such a nature that it could not be taken in execution, it was necessary to apply to a court of equity, which, in administering such estate of a deceased insolvent, would pay the creditors subsequent to the insolvency first, and then the creditors prior to the insolvency. Of course this law is still applicable to cases under the Insolvent Acts.

The Act 7 & 8 Vict., c. 70, which came into operation the 1st September, 1844, and is entitled 'An Act for facilitating arrangements between Debtors and Creditors,' is of the nature of an insolvent act. Under this act a debtor who was not subject to the Bankrupt Laws might apply by petition to a court of bankruptcy, and obtain protection from arrest, provided his petition be signed by one-third in number and value of his creditors. Under Lord Westbury's Act of 1861 the distinction between insolvency and bankruptcy no longer prevails; but the whole Bankruptcy Law will be revised and modified in the present session (1866).

The law of debtor and creditor has been a difficulty in all countries. In England an insolvent debtor might, in certain cases, be subjected to the operation of the Bankrupt Laws. [BANKRUPT.] If he could not claim the benefit of the Bankrupt Laws, he was subject to the law that related to insolvent debtors.

Formerly there were two kinds of arrest in civil cases—that which took place before trial, and was called arrest on mesne process; and that which takes place after trial and judgment, and is called arrest on final process. In the arrest on mesne process it was only necessary for the plaintiff to make an affidavit that the cause of action amounted to 20*l*. (7 & 8 Geo. IV. c. 71), upon which he could sue out a writ called a *capias*, which was directed to the sheriff, who thereupon gave his officers a warrant for seizing the alleged debtor. The Statute 1 & 2 Vict., c. 110, ss. 2, 3, 4, 5, 6, enacted that no person can be arrested for alleged debt before a judgment has been obtained against him, unless it can be shown to the satisfaction of a judge of one of the superior courts that the plaintiff has a cause of action against such person to the amount of 20*l*. or upwards, and that there is probable cause to believe that the defendant is about to quit England. A defendant might also be arrested upon mesne process when he has received an unfavourable judgment in the court for the relief of insolvent debtors (1 & 2 Vict., c. 110, s. 85).

Arrest in execution is therefore now the only arrest that is of any practical importance: it means the arresting of a man after a court of justice has decided that he owes a debt. On this subject there has been difference of opinion.

The whole jurisdiction of the Insolvent Court was, by the Bankruptcy Act of 1861, transferred to the Court of Bankruptcy, and there is now no distinction between bankrupts and insolvents; but this Act having failed in operation, considerable changes will probably be introduced during the present session (1866). [BANKRUPTCY.]

In Scotland the being in a state of insolvency has the same effect in regard to questions of stoppage in transitu, and others connected with sale and delivery, as it has in England. The word is often used in connection with the bankrupt law, because being insolvent is one of the ingredients of Notour Bankruptcy. *Cessio Bonorum* is the name of the procedure that in Scotland stands in place of the old insolvency relief system in England.

INSPECTOR OF FACTORIES. [FACTORIES.]

INSPECTOR OF SCHOOLS. [SCHOOLS.]

INSPECTOR-GENERAL, a military office, the duties of which are the periodical inspection of the corps in their districts, and the pointing out of deficiencies in their arms, dress, drill, or deportment; the corps being under the command of its own officers, and not of the inspector-general. In the army estimates for 1865-66 the pay of the Inspector-general of Engineers and Director of Works is 1874*l*. per annum, of the Inspectors-general of Cavalry, of Infantry, of Artillery, each 691*l*. 19*s*. 7*d*., and of Volunteers 691*l*., in addition to regimental, unattached, or half-pay. There are also two Inspectors-general of Militia at 347*l*. per annum, with allowances for servants, forage, and lodgings; and six Inspectors-general of Medical Establishments, who constitute the highest grade of surgeons, at 821*l*. a year each.

There are also inspecting field officers, inspectors of musketry, eleven inspectors of volunteers, five inspectors of military schools, and inspectors of fortifications.

INSTALLATION, in church law, means the process by which a clergyman is formally put in possession of his office, and by which he is empowered to exercise its functions, and enjoy its honours and emoluments. The ceremony is called 'enthronization' when a bishop is installed in his office; 'induction' for a rector. Installation in its strictest sense only refers to the office of a canon or prebendary; but the word is also used generally for a formal introduction to any office.

INSTANCE, COURT OF. [ADMIRALTY COURTS.]

INSTINCT is a natural impulse to certain actions which animals perform without deliberation, and without having any end in view, and without knowing why they do it. That the spontaneity of instinct operates unconsciously is fully established by observation. A calf butts with its head before its horns are grown; and the hen broods over the eggs of another species, or even simulated eggs, as patiently as over its own. Lastly, children in certain states of the body are observed to devour eagerly chalk and other earths which are the proper remedies for the disease, although they can have no knowledge of their beneficial nature.

Instinct differs from intellect by the unerring certainty of the means it employs, the uniformity of its results, and the perfection of its works prior to and independent of all instruction or experience; and

lastly, by the pursuit of nothing beyond what conduces directly either to the welfare of the individual or the propagation of the kind. But the arts of rational creatures proceed slowly through diversified and oft-repeated experiments, while the means they employ are always various and seldom the best.

INSTITUT NATIONAL, or *Institute of France*. The various academies of learning in France having been dispersed during the first storms of the Revolution, a decree of the Republic, dated October, 1795, established a national academy, for the promotion of the arts and sciences, called the *Institut National*. It was at first divided into three classes—viz., physical and mathematical sciences, moral and political sciences, and literature and the fine arts. Each class consisted of a certain number of members residing at Paris, and a number of associates in different parts of France, with a small number of foreign honorary members. Napoleon I., when he was made first consul, reorganized the *Institut*, suppressing the class of moral and political sciences, and forming the four classes of—I., physical and mathematical sciences, divided into eleven sections, viz.: geometry, mechanics, astronomy, geography and navigation, general physics, chemistry, mineralogy, botany, veterinary surgery, anatomy and zoology, and medicine and surgery. This class consisted of sixty-two resident members, who could appoint one hundred correspondents, including foreigners. II. French language and literature, consisting of forty members, like the old *Académie Française*. III. Ancient history and literature, corresponding to the old *Académie des Inscriptions et Belles Lettres*, and consisting of forty members, eight foreign associates, and sixty correspondents. IV. Fine arts, divided into five sections, painting, sculpture, architecture, engraving, and music. This class consisted of twenty-eight members, eight foreign associates, and thirty-six correspondents, native and foreign. An annual allowance of 1500 francs was fixed for each resident member, and a salary of 6000 francs to each of the perpetual secretaries, of whom there were two for the first class, and one for each of the other three. Annual prizes were also awarded. This arrangement continued during the Empire, except that the *Institut* took the name of Imperial. After the Restoration, Louis XVIII., by an ordinance, 21st March, 1816, without changing the arrangements of the departments of each class, restored the old names of *Académie des Sciences*, *Académie Française*, *Académie des Inscriptions et Belles Lettres*, and *Académie des Beaux Arts*, giving to each a more independent organization, but still keeping them united in one academical body called the *Institut*. Louis Philippe, by a royal ordinance, October 26, 1832, added a fifth class, or *Académie des Sciences Morales et Politiques*. This constitution has been continued under the Emperor Napoleon III. These various classes or academies have published numerous valuable memoirs and reports. Each year a sum is voted by the French government for the general fund of the *Institut*, and from this fund are paid the allowances of members, salaries of secretaries and other officials, several prizes, and the expense of experiments and printing. Many eminent Englishmen are foreign associates, and a still greater number are correspondents of the Institute.

INSTITUTES, the title of a book, in the old

civil law of the Romans, which contained the elements or principles of their law. They constituted the great body of the *corpus juris civilis*, and were compiled by order of the Emperor Justinian for the use of students, and as a book of reference on law questions.

INSTITUTION. [ADVOWSON; BENEFICE.]

INSTRUMENTS, MUSICAL, may be divided into four sorts. 1. *Keyed*, as the organ, pianoforte, harmonium, &c.; 2. *Stringed*, as the violin, harp, guitar, &c.; 3. *Wind*, as the flute, clarinet, horn, &c.; 4. *Percussion*, as the drum, triangle, cymbals, &c. There are only two ways of producing musical sounds, one by the vibrations of a fixed elastic body, such as the string of the violin or pianoforte, the reed of the hautboy, &c., or by the vibrations of a confined column of air put in motion by a stream of compressed air, as in the flute, and all kinds of organ pipes. The various instruments are described under their respective names.

In the year 1864 the exports of musical instruments from the United Kingdom—chiefly to Australia and India—were valued at 167,851*l.* The value of the imports in the same year was 224,249*l.*, nearly two-thirds coming from France.

INSULATORS. When a body containing an amount of electric fluid or free caloric is surrounded by non-conductors, and its contact with other bodies thereby prevented, it is said to be *insulated*, and the non-conducting bodies are called *insulators*. The most effectual of these are, caoutchouc, silk, glass, dry fur, gutta-percha, sulphur, shellac, and dry air.

INSURANCE, FIRE. Associations for securing individuals from the ruinous consequences of accidents beyond their own control now form almost a necessary part of our social institutions. Among such combinations for the security of individuals, companies for assuring the owners of property from loss arising from fire are among those of most obvious utility, and have long been established in this country.

It might have been expected that the great advantage to society of individuals providing against loss, by means of trifling annual payments, would have been so far acknowledged by the British legislature as to prevent the imposing of a tax upon prudence. Such, however, is not the fact, and a duty is still levied at the rate of 1*s.* 6*d.* per cent. per annum upon the amount of property insured against destruction by fire, which rate is, in most cases, equal to 100 per cent. upon the premium (1*s.* 6*d.* per 100*l.*) demanded by the insurance offices for non-hazardous property, such as ordinary dwelling-houses; which premium is found sufficient to cover all losses, as well as to defray the expenses of management, and to afford an adequate return to capitalists who embark their property in the undertaking. For property considered hazardous, such as cotton mills, sugar refineries, and theatres, higher premiums are, of course, charged; and some kinds, such as powder mills, are entirely declined.

Till last year (1865) the tax was 3*s.* per cent., but as such an impost undoubtedly prevented many persons from insuring who would otherwise have done so, it was, after persistent efforts in the House of Commons on the part of Mr. Hubbard, reduced to 1*s.* 6*d.*, and it is probable that it will eventually be repealed.

The amount of revenue derived from the fire insurance duty of late years has averaged 1,550,000*l.* per annum—the property insured being valued at about 1,100,000,000*l.* There can be no doubt that the reduction of the duty will have the effect of rapidly increasing the latter amount.

During a period of distress experienced by the agriculturists, the landowners and farmers of Great Britain obtained in 1833 an advantage over other classes of the community by the repeal of the duty upon insurance of farm produce, farming stock, and implements of husbandry (3 & 4 Will. IV., c. 23.)

Cases occur in which frauds are practised by parties insuring for more than their property is worth; and there are also cases in which property has been burnt by insolvent persons in order to obtain the insurance money.

Fire insurance policies are too well known to require description here, but insurers cannot be too careful in filling them up, for an apparently unimportant misstatement or reservation is quite sufficient to render it void if the company chooses to be at all arbitrary.

INSURANCE, LIFE, OR REVERSION. By a reversion, in the widest sense, is meant a right of property the enjoyment of which is to commence at some future period, fixed or depending on contingencies, and is to continue either for ever or during a term either fixed or depending on a contingency: anything, in fact, which is to be entered upon, or which may be entered on, at a future time, is a reversion in books which treat on the value of property. The legal sense of the word is more restricted.

Thus an assurance of 100*l.*, or a contract to pay 100*l.* at the death of a given individual, is 100*l.* in reversion to the executors of that individual. Our object in this article is to treat of this most common species of reversionary contract, life insurance, or assurance.

The value of a reversion depends in a very easy manner upon the value of the corresponding annuity; that is, any given sum, say 100*l.*, to be received when a given event arrives, depends for its value upon that of 100*l.* a year to be received till the event arrives. Suppose, for example, that money makes five per cent., and that an annuity, say upon a life, is worth fourteen years' purchase: that is, 100*l.* paid a year hence, and again two years hence, and so on as long as the life lasts, is now worth 1400*l.* Required the value of 100*l.* to be paid at the end of the year* in which the life drops. We must now reason as follows:—Suppose a perpetual annuity of 100*l.* a year is to be enjoyed by A during his life and by his legatees after him. By hypothesis A's portion is now worth 1400*l.*, and (money making five per cent.) the annuity for ever is worth twenty years' purchase, or 2000*l.*; consequently the legatee's interest is now worth 2000*l.* — 1400*l.*, or 600*l.* But at the end of the year of death the legatee will come into 100*l.* current payment, and a perpetual annuity worth 2000*l.*; for the remainder of a perpetual annuity is also a perpetual annuity: his interest will then be worth 2100*l.* Hence we have ascer-

tained that 2100*l.* at the end of the year of death is now worth 600*l.*: and the rule of three then gives the value of any other sum: thus 100*l.* at the end of the year of death is now worth $600 \div 21$, or 28*l.* 11*s.* 5½*d.* Hence the following easy

Rule.—To find the value of a given reversion, subtract the value of the same annuity from that of a perpetual annuity, and divide the difference by one more than the number of years' purchase in a perpetual annuity: or multiply the excess of the number of years' purchase in a perpetual annuity over that in the life annuity by the reversionary sum, and divide as before.

Next, to find what premium should be paid for the reversion. A premium differs from an annuity in that a sum is paid down, and also at the end of every year: consequently it is worth one year's purchase more than an annuity. In the preceding question, the annuity was worth fourteen years' purchase; consequently the premium now is worth fifteen years' purchase. But the present value of all the premiums is to be also the present value of the reversion, or 28*l.* 11*s.* 5½*d.*, whence the premium should be the fifteenth part of this, or 1*l.* 18*s.* 1*d.* Hence to find the premium, divide the present value of the reversion by one more than the number of years' purchase in the life annuity. But when, as most commonly happens, the premium is wanted without the present value, the following is an easier

Rule.—Divide the reversionary sum separately by one more than the number of years' purchase in the perpetual annuity, and one more than the number of years' purchase in the life annuity: the difference of the quotients is the premium required. Thus, if in the preceding example we divide 100*l.* by 20 + 1 and by 14 + 1, or by 21 and 15, we find 4*l.* 15*s.* 3*d.* and 6*l.* 13*s.* 4*d.*, which differ by 1*l.* 18*s.* 1*d.*, the same as before.

The life we have been tacitly considering, when we talked of an annuity being worth fourteen years' purchase, at five per cent., is one of about thirty-six years of age. The first impression must be, that the proposed premium is ridiculously small. Make it up to 2*l.*, and it will be fifty years before the premiums reach 100*l.* Some such consideration must have moved the law officers of the crown in 1760, when they refused a charter to the Equitable Society, then charging a premium of about 4*l.* at the age of thirty-six, on account of the lowness of their terms. But it is to be remembered that those who receive the premiums are to invest them immediately at five per cent., and are to invest the interest, thus making compound interest; persons aged thirty-six live, one with another, about thirty years, which is sufficient time for the premiums, with their interest, to realize 100*l.* for each person, one with another.

We now show the manner in which a simple result of calculation answers its end. To simplify the case, suppose an office starts with 5642 individual subscribers, each aged thirty years, the mortality among them being that of the Carlisle Table. The bargain is for a short assurance, as it is called, of twenty years, and of 1000*l.*; that is to say, the executors of each one who dies within twenty years are to receive 1000*l.* at the end of the year of death. Money makes three per cent. once a year. According to the table, then, there are 57, 57, 56,

* Assurance Companies usually pay in a few months after proof of death, which gives a trifling advantage to the assured, not worth considering in a very elementary statement of the question.

&c., deaths in the successive years, and the following is the result, the proper premium being calculated at 11*l.* 12*s.* 3½*d.* each person, or more exactly 11,614*l.* 16*s.* for 1000 persons. It is supposed that there are no expenses of management. At the outset the office receives 65,530*l.* from the 5642 persons assured: this is immediately invested at three per cent., and yields 1966*l.* by the end of the year, making 67,496*l.* But at the end of the year the claims of the executors of fifty-seven persons who have died during the year are to be satisfied, which requires a disbursement of 57,000*l.*, reducing the society's accumulation to 10,496*l.* The contributors who are left, 5585 in number, now pay their second premiums, 64,869*l.*, so that, these being immediately invested, the company has 75,365*l.* at interest during the second year. This yields 2261*l.*, so that by the end of the year 77,626*l.* is accumulated. Then comes the demand of 57,000*l.* on behalf of fifty-seven contributors deceased during the year, which reduces the accumulation to 20,626*l.* This is more than it was at the same time last year. In this way the company goes on, accumulating to an amount which would lead a person unacquainted with the subject to conclude that the premium must be too large; in fact, ten years give an accumulation of 91,809*l.* But now the state of affairs begins to change; the contributors have been diminishing, while the claims have been increasing, until the yearly incomes no longer equal the outgoings. The accumulations then come in to make good the difference, in such manner that by the time the remaining contributors come to be fifty years of age, and the claims of sixty-one who died in their fiftieth year have been satisfied, there only remains 8*l.* of the 91,809*l.*; and this 8*l.* is merely the error arising from omitting shillings, &c., in the calculation. Something of the same kind must take place in every office which dies a natural and solvent death; the only difference being that, when new business ceases, instead of a number of contributors all of the same age, and under similar contracts, both ages and contracts vary considerably.

Life Assurance Companies are divided into three classes—Mutual, Proprietary, and Mixed.

A Mutual Company is one in which the members stand bound to each other, and constitute the company themselves. In such a company no capital is, generally speaking, raised at the outset, except a small sum for necessary expenses at starting. This, however, is not necessarily the feature of a mutual company; for if its members choose to constitute themselves an investment company as well as an assurance company, they may, without losing their mutual character, require every assurer to be also a shareholder. In a mutual company the profits, of course, are divided among the assured.

A Proprietary Company is one in which a body of proprietors raise a capital and pledge it for the payment of claims, in case the premiums are not sufficient: for this security they receive, in addition to the interest of their own capital, the profits of the assurance business. It has long been proved that, with proper tables of premiums, and a fair amount of business at starting, this capital is an unnecessary security; and the only reason which could now make such an office desirable would be the lowness of its

premiums. Of course it matters nothing to the assured how they are paid, as long as they are paid; the capital may be diminished, but the assurer dreads nothing except its exhaustion before his turn comes. This must be the sole consideration with a person who is tempted by low premiums to a purely proprietary office: the nominal capital signifies nothing; it is upon the amount of assurance to which it (with the premiums) is pledged that the solvency of the office depends. Generally speaking, however, we believe it will be found that the purely proprietary offices have not allowed themselves to run much risk.

A Mixed Office is one in which there is a proprietary company, which does not take all the profits, but a share, the rest being divided among the assured. The only good effect of the capital upon the condition of the assured in such a company is this—that the directors, having fixed capital as well as premiums, may justifiably seek for investments which a mutual company must avoid. Having the capital to make good purely commercial losses, they may perhaps attempt to get a higher rate of interest, and of course take more risk of loss; the assured, who are sharers in the whole of the profits, since the profits of premiums and profits of original capital are not distinguished, come in for their share of the extra profits of the capital. But no such attempt at gaining higher interest by secondary securities should be made until a sum sufficient (with future premiums) to meet all claims is invested in the very safest securities which the state of society offers.

It would, of course, be quite out of our province to attempt to define the respective merits of the three different systems; but it is an unquestionable fact that well-established mutual offices have, of late years, enjoyed the largest share of public support. It is estimated that the sum for which existing life assurance offices of all kinds in Great Britain are now liable is considerably over 200,000,000*l.*, and that the amount paid annually as premiums exceeds 6,000,000*l.*

In the construction of a table of premiums, three points must be left to the judgment of the constructor—the rate of interest, the table of mortality, and the addition to be made for expenses of management and probable fluctuation, or discrepancy between the predictions of the table and the events which actually arrive.

The rate of interest to be assumed is an element which requires the greatest caution. It must be a rate which can actually be made, and therefore prudence requires that it should be something below that which may reasonably be looked for. To show how powerful an agent it is, we shall repeat the example already given, of the 5642 insurers for twenty years, on the supposition that the office which charges as for 3 per cent. finds itself able to make 3½ per cent., and it will appear that the office leaves off with an accumulation of 15,441*l.* nearly; and, if it be lucky during the first years, it may be said to be safe against any fluctuation for which there is an even chance, by the increase of interest alone.

Take what amount of precaution we may, an office must, at first starting, depend upon something either of capital or guarantee. Even a mutual office

must raise something at the outset. Tables must be constructed with very large additions to the calculated premiums, which are to meet the very earliest contingencies alone; indeed it is difficult to say what addition would be too large. But this point it is unnecessary to insist on, since we can hardly suppose it possible that any set of men would found an office with no resource except premiums from the very commencement. Supposing proper precautions to be taken, we imagine that an addition of 25 per cent. to premiums calculated from the Carlisle Tables at 3 per cent. per annum, is sufficient to place a mutual office upon a sound footing, and to give a very great prospect of a return in the shape of what is called profit. It never has been found that an office charging at this rate has been without surplus of some kind.

This surplus has been called by the inaccurate name of profit, whereas it is really that part of the security against fluctuation of interest and mortality which has been found to be unnecessary. In mutual offices it is to be returned to the assured in an equitable manner; in purely proprietary offices it is really profit to the proprietors, whose capital has yielded them the ordinary interest, since, by hypothesis, none of it has been necessary to meet claims, and they therefore share among themselves the residue of the premiums. It is impossible to avoid this surplus in a well-constituted office; for the mathematical line which separates surplus from deficiency cannot be expected to be attained, so that those who would not have the latter must take care to have the former. It is usual among the offices to adopt a plan for increasing this surplus, which we will now describe.

Two rates of premiums are adopted, the one less than the other. Those who pay the higher rate are to have a share of the surplus: those who pay the lower rate have nothing but the nominal sum for which they assure. If the table of lower rates yield a surplus (which it is supposed it will do), that surplus goes to augment the final receipts of those who assure for profits.

The expenses of management are relatively trifling when the office has obtained a large amount of business, but they bear heavily on young offices during the first years.

The rates of mortality are generally based upon what are called 'the Carlisle Tables'—having been derived from the observations of Dr. Heysham, of Carlisle, from the nine years 1779 to 1787 inclusive, which are generally admitted to be a correct representation of *healthy* life in England. There are certain tables called 'Commutation Tables,' the invention of Mr. George Barrett, which greatly facilitate the necessary calculations in connection with life assurance. They are described in the 'Treatise on Annuities,' published by the Society for the Diffusion of Useful Knowledge. Much valuable information on life assurance may also be found in the Transactions of the Institutes of Actuaries, published quarterly; but perhaps the best work on the whole subject is 'The Assurance Guide and Handbook' (London: W. S. D. Pateman, 1857), the anonymous author of which has no leaning to any particular offices or systems.

The benefits of life assurance (which is in reality

a large combination of small sums for the purpose of beneficial investment, with a contract among those who invest that the inequalities of life shall be compensated so that those who do not live their average time shall be sharers in the good fortune of those who exceed it), and the moral considerations which should induce every friend of his species to promote and extend it, are of course not the particular motives which actuate the founders of such offices, though no doubt they have them in the same degree as others. To bring business to a particular office becomes their interest and their object; and every possible mode of investment has been held out to engage the attention and suit the particular objects of the assurer. To this of course, in general, we do not object: for instance, when a company proposes twenty different kinds of assurances, it is enough for the public that the terms of each kind are sufficiently high, and not too high. But it sometimes happens that among the proposals which are held out for the assurer's acceptance are to be found some which altogether militate against the moral principles of assurance; these are prudence, foresight, and present self-denial for the attainment of ultimate prosperity and of present security against the chances of life. When an office announces that it is willing to leave a part of the premium in the assurer's hands, on his paying interest for it in advance, the office in the meanwhile holding the policy as a security—what is it but enticing a person to assure for more than he can afford to do, and to borrow money for the purpose of paying the premiums? The office may, with caution, make itself secure; but it throws upon the customer the strong probability of future disappointment. When the time comes for thinking of the repayment of the advances which the office has virtually made, the assurer will frequently find himself obliged to sell that policy to the office which he had counted upon for the benefit of his family. Now out of the purchase-money must be deducted the sums in arrear to the office (upon which interest has always been paid in advance); and when the assurer comes to put his balance against what he has actually paid, he will see that he never did a more imprudent act. The office is not to blame for anything but having thrown the original offer in his way; they have only lent him money on the same terms as they would have lent it to others; and they may say, and truly, that it was his own fault if he engaged in an imprudent speculation. But is it not, then, a fault to entice others to imprudence, knowing how much more easily men are induced to be imprudent than to be prudent?

In 1865 the 27 and 28 Vict., c. 43, was passed, which cannot fail to greatly influence the future of life insurance among the working and lower classes. It is known as the *Government Annuities Act*, and under its provisions the postmaster-general may insure the life of any person between sixteen and sixty years of age, and guarantee them direct government security for the payment of the sums insured immediately after their death. These sums must not exceed 100*l.*, or be less than 20*l.*; but Mr. Tidd Pratt, the registrar of Friendly Societies, and therefore a first-class authority on the subject, thinks that to make the plan thoroughly useful for the humbler classes the latter sum should be reduced

to 10l. Immediate and deferred annuities, to any amount not exceeding 50l. a year, may also be granted, under the same Act, to any person not less than ten years of age. Insurances may now be effected at nearly every post-office in the kingdom, where also copies of the plainest of instructions may be obtained gratuitously, so that it is here quite unnecessary to enter into any further details of the scheme.

INSURANCE, MARINE. [SHIPS.]

INSURANCES, LAW OF. *Fire.*—In order to insure property against fire it is necessary that the insurer must have some interest in it, so that there may be no inducement to commit arson. As before stated, in the description of the premises and goods the greatest care should be taken, and the premises must not be materially altered during the risk, otherwise the policy will be void. A person in lodgings may insure his goods, and call the house his 'dwelling-house' for the purpose. When a fire happens full particulars of the damage done must be sent to the office, and it is only the *actual* loss which can be recovered. Thus if a man is insured for 1000l. and a fire takes place in which only 100l. worth of property is destroyed, he can only recover 100l. In the case of property insured in several offices the insurer can only recover the amount of damage once. He can claim it from either office, if each policy cover the whole value of the loss, and the party who pays can then recover from the other offices a proportionate part of the amount.

Life.—As in the case of fire, no person can insure another's life unless he has some pecuniary interest in it. Thus a creditor may insure the life of a debtor, a wife that of a husband, or a husband that of his wife. It is sufficient that the interest existed when the policy was first accepted; so that a creditor may recover even after the debt has been paid, if he has kept up the policy. A person may insure his life in as many offices as he thinks proper, and his executors will recover the full amount insured from each, regardless of the rest. Great care should be taken in answering the questions proposed by the company, as any material misrepresentation or reservation renders the policy void in the eye of the law. If a person commits suicide or is hanged the policy is also void, unless, in the case of suicide, he was in a state of insanity at the time.

In both fire and life insurances particular attention should be paid to the interval of from fifteen to twenty-one days which is generally allowed after the expiration of the year to pay up the premiums, as it is dangerous to run the risk of fire or death in that interval, unless the policy expressly states the insurer will be just as liable as if it had happened previously.

INTAGLIO, an Italian word, composed of *in* and *tagliare*, to cut. It is a term of art applied to small works of the gem class, in which the design is indented or engraved, to distinguish them from those in which the subject or device is raised, called *Cameos*.

The Greeks carried this branch of the fine arts to the same perfection which their genius and feeling for the beautiful enabled them to reach in all others to which they devoted their attention; but we do not trace its existence among them to a very remote date. We have no information respecting the process by which the ancient intagliatori (or sculptores)

executed works which are now justly referred to as the best examples of the art. The lathe is not described by any ancient writer; but the works themselves seem to afford evidence of its employment, and Pliny refers to the invention of an instrument which he calls 'tornum' ('Nat. Hist.,' lib. vii.), which may fairly be supposed to mean a turning machine or tool. It is certain they were acquainted with the use of diamond powder.

The modern practice of cutting stones in intaglio is by an apparatus similar in principle to the turning lathe, which gives the cutting tool, placed horizontally, a quick rotatory motion; and the stone on which the design is to be engraved being brought in contact with it, the surface is ground away or indented, till the effect required is produced. Instruments of various sizes are used, which can easily be removed and replaced; and it is usual, during the process of engraving, to supply the points of the tools with diamond-dust mixed with a little sweet oil. As the work proceeds, proofs are occasionally taken in wax.

Engraving dies is an important branch of the art of intaglio, and requires great care and skill for its perfection. The die is made of finely prepared and tempered steel. When the first intaglio, or original die, is executed, it forms a *matrix* (or mould), into which a conically formed block of softer steel is compressed, the matrix first undergoing a process by which it is hardened. An impression taken in this way is called a *punchoon*. When this is completed (and frequent annealing and restriking are necessary before it is perfected), the engraver retouches the work, now in relief, and gives it all the delicacy of the original model; the metal is then hardened, and by pressing this punchoon into other steel which is soft (by almost a repetition indeed of the before-mentioned process), it serves for the purpose of making the dies for coining.

INTEGER, a whole number, as distinguished from a fraction.

INTEGRATION, INTEGRAL CALCULUS.

The integral calculus is the inverse of the **DIFFERENTIAL CALCULUS**; that is to say, if, A being given, it be a question of the differential calculus to find B; then, B being given, it is a question of the integral calculus to find A.

The question of finding a differential coefficient requires the attainment of the limit of the ratio of two simultaneously diminishing increments of y and x , y being a function of x : and therefore the fundamental principle of the integral calculus is as follows: Knowing the limit of the ratio of the increment of y to the increment of x , required the function of x which y is. Or, having given a function of x , required that function of which the given function is the differential coefficient.

But though this view of the fundamental question is sufficient in pure mathematics, it is not calculated to connect the process of integration with those conceptions which the mind employs in application to geometry or mechanics. We are here accustomed to a rough species of integral calculus, with which the preceding seems at first to have no connection. Thus a number of small straight lines joined together appear to compose a curve with sufficient exactness: we arrive at the calculation of a body's variable

motion by supposing it uniform during small intervals, and accelerated at the end of each interval: and we obtain the area of a curve with any degree of exactness by subdividing it into a large number of small curvilinear areas, for each of which we substitute a rectangle. It should seem, then, that when, making the proper use of the terms, we say that every magnitude is made up of an infinite number of infinitely small parts, we might add that every one of the parts is of a more simple kind than the whole. Thus we appear to have a right to say that a curve is made of infinitely small *straight lines*; that *gradual* variable motion is made up of infinitely small separate *impulses*; that the area of a curve is made up of infinitely small *rectangles*. A correct understanding of this connection is the key to that of the integral calculus, and most completely so to that of its ready application.

An integral is said to be definite when its limits are given: and indefinite when they are not given.

INTEGRATION, FINITE. By this term is meant the summation of any number of terms of a series which follows a regular law.

INTELLECT (*intellectus*), that which perceives and understands, comprehending all the cognitive powers of the mind, in contradistinction to the active powers of the will. In the Aristotelian philosophy the intellect first works on the phantasms, and discerns by a spontaneous energy what in many is one, what in things dissimilar is similar and the same. By this means it attains to a new kind of perceptions more comprehensive than those of sense; and each of these general ideas subsists entire in each individual of an infinite multitude without losing its own unity and permanence. On the other hand, it is the source of those primary principles on which all science rests, as conversant about universal and demonstrable truth.

For intellect Mr. Stewart prefers the vernacular term understanding, which he employs in the same extensive signification. But the critical philosophy of Kant distinguishes the intellect into two faculties, understanding and reason. The understanding acting on experience merely compares, judges, and measures its representations, and is conversant solely with their mutual limits and relations, classifying them according to certain schemes of its own which are called categories. While, however, the understanding is thus limited, the activity of the reason is unbounded, and, as the principle of principles, it is the base and the verification of every special principle and reasoning.

INTERCALARY DAY (Lat. *intercalo*, 'I insert'), in the calendar, a day inserted out of the usual order, to maintain the full sum of time. Thus every fourth year contains 366 days, or one more than usual, and the extra day is the intercalary day. It was given to February, as that was the shortest month, and thrust in by the Romans between the 24th and 25th days. It still retains that place in the ecclesiastical calendar, but in the civil calendar it is the 29th.

INTERCOSTAL (Lat. *inter*, 'between,' and *costa*, 'a rib'), in Anatomy, the appellation bestowed upon those bloodvessels, veins, and muscles, which lie between the ribs.

INTERDICT, ECCLESIASTICAL, a mode of censure employed at times by the Roman Catholic

Church, by which, in consequence of some offence alleged to have been committed by the people or rulers of a town or country, the Pope forbade by a bull the performance of any kind of church rites within the same; the church service was suspended, the sacraments were not administered, and the funeral service was not read. The use of interdicts appears to have originated with the bishops in the ninth century. In the middle ages this measure was often resorted to by the popes in consequence of some serious dispute with the sovereigns of particular countries, and it had the effect of throwing whole kingdoms into consternation, and even into a state of rebellion, by which the refractory sovereigns were obliged to sue for pardon from the pontiff.

In the course of time an interdict was found no longer to answer its object, so that it became of rare occurrence, and has for a long period been entirely disused as a general measure, although occasionally, in very special circumstances, and to mark the horror of the church for some enormous crime, instances are still recorded in which a particular place or church has been visited with the penalty of a local interdict.

The most remarkable interdicts were those laid upon Scotland in 1180 by Alexander III.; on Poland by Gregory VII., on the occasion of the murder of Stanislaus at the altar; by Innocent III., on France, under Philip Augustus, in 1200; and on England, under John, in 1209. The last instance was the ineffectual interdict levelled against Napoleon by Pope Pius VII. in 1809.

INTERDICT, in the law of Scotland, supplies the place of an injunction from a court of equity in England. It is a prohibitory order, forbidding some act from being done, and it is obtained on the application of the party who would be injured by the performance of the act. It may be issued by the Court of Session, or by the Sheriff's Court. Interdicts in the Court of Session are frequently obtained for preventing inferior courts, or the courts of limited operation, such as the ecclesiastical courts, from going beyond their jurisdiction.

INTEREST, money which is paid for the use of other money, the lender stipulating for a fixed sum to be paid yearly, half-yearly, or quarterly, for each 100*l.* lent, until the money is returned. When this is not the case, and when the money paid for the loan depends upon the success of an undertaking, or any casualty not connected with the duration of life, it is called a *dividend*: when the money and its interest are to be returned by yearly instalments, and paid off in a certain fixed number of years, it is called an *annuity certain*: but when the payment is to depend upon the life of any person or persons, it is called a *life annuity*.

INTEREST. (Law.) [USURY.]

INTERJECTIONS have been defined to be 'words used to express some passion or emotion of the mind,' as exclamations of joy, grief, astonishment, &c. Interjections, however, can hardly be considered as a distinct part of speech, but are more properly natural sounds common to all men when laughing, in pain, &c.

INTERLACKEN ('between the lakes'), a small town in the canton of Bern, Switzerland, between the lakes Brienz and Thun—whence its name. It is most beautifully situated on the left bank of the Aar, and has a population of 1364. It consists almost

entirely of boarding houses, as within a few miles are many of the most wonderful sights in Switzerland. The inhabitants carry on an enormous trade with visitors in beautiful wood carvings. The surrounding scenery is some of the finest in Switzerland, including the snow-capt peak of the Jungfrau, and the beautiful valley of Lauterbrunnen.

INTERLOCUTORY (*inter*, 'between,' and *loquor*, 'to speak'), a term applied to those judgments, decrees, and orders of courts of law and equity which are made in the progress of a suit before final judgment. Thus, orders for the production of papers, or for taking an account of the dealings out of which the dispute arises, are interlocutory orders or decrees. Those judgments which, though they establish the right of the plaintiff, leave the amount of damages to be ascertained by a jury, are generally, but incorrectly, called interlocutory judgments.

INTERLUDE, a brief piece of church music for the organ, seldom exceeding a few bars, generally produced *extempore*, and played between the verses of the hymn or psalm, or between different parts of a service. This, being merely for the purpose of giving breathing time to the singers, should always be short and grave, and in keeping with the psalm tune. On the stage, an interlude is a short entertainment introduced between longer pieces, or between the acts of a piece. The term *intermezzo* is sometimes employed in a similar sense.

INTERMARRIAGE. [CONSANGUINITY.]

INTERMENT. [FUNERAL.]

INTERMITTENT. [AGUE; FEVER.]

INTERNAL and EXTERNAL, geometrical terms applied to the angles made by the sides of a bounded figure. The angle made by two sides is an internal angle; that made by a side and a side produced, is an external angle.

INTERNATIONAL LAW. This term was originally applied by Bentham to what is generally called 'the law of nations.' The term 'law of peace and war' has been sometimes used as synonymous with 'the law of nations,' and as indicative of the boundaries of the subject. It was thus restricted to the disputes which governments might have with each other, and did not in general apply to questions between subjects of different states, arising out of the position of the states with regard to each other, or out of the divergences in the laws of the separate states. But under the more expressive designation, International Law, the whole of these subjects can be comprehended and examined, and thus several arbitrary distinctions and exclusions are saved. The following instances may be taken:—A port is put in a state of blockade; a vessel of war of a neutral power breaks the blockade: this is distinctly a question between nations, to be provided for by the law of peace and war, in as far as there are any consuetudinary rules on the subject, and the parties will submit to them. But suppose a merchant vessel belonging to a subject of a neutral power attempts an infringement of the blockade, and is seized—here there is no question between nations in the first place. The matter is adjudicated on in the country which has made the seizure, as absolutely as if it were a question of internal smuggling; and it will depend on the extent to which just rules guide the judicature of that country, and not on any

question settled between contending powers, whether any respect will be paid to what the party can plead in his own favour, on the ground of the comity of nations, or otherwise. But there is a third class of cases most intimately linked with these latter, but which are completely independent of any treaties, declarations of war, or other acts by nations towards each other. They arise entirely out of the laws of the respective nations of the world, in as far as they differ from each other. The 'conflict of laws' is a term very generally applied to this branch of international law, and the circumstances in which it comes into operation are when the judicial settlement of the question takes place in one country, but some of the circumstances, of which cognizance had to be taken, have occurred in some other country where the law applicable to the matter is different. One of the most common illustrations of this subject is—a judicial inquiry in England whether a marriage has taken place in Scotland according to the law of that country; or an inquiry in Scotland whether a marriage has taken place according to the law of England; in either of which cases there will generally be the further and nicer question, Which country's law ought to prevail as the criterion?

Thus the three leading departments of international law are:—

1. The principles that should regulate the conduct of states to each other.

2. The principles that should regulate the rights and obligations of private parties, arising out of the conduct of states to each other.

3. The principles that should regulate the rights and obligations of private parties, when they are affected by the several codes of different nations.

The first of these has been the principal subject of the works of Grotius, Puffendorf, Vattel, and other publicists, who have derived from general principles of morality and justice a series of rules for the conduct of nations towards each other, and subsidiarily for the conduct of their subjects in relation to international questions. It has been usual to call this department the 'Law of Nature,' as well as the Law of Nations, on the supposition that it is founded on the universal principles of justice.

The Law of Nations wants one essential element of that which is entitled to the term of law—a binding authority. Nations, even the most powerful, are not without checks in the fear of raising hostile combinations and otherwise; but there can be no uniformity in these checks; and in general, when the interest is of overwhelming importance, and the nation powerful, it takes its own way. The importance of the questions which may be involved in the Law of Nations thus materially affects the question how far it is uniformly obeyed. In minor questions, such as the safety of the persons of ambassadors, and their exemption from responsibility to the laws of the country to which they are accredited, and in other matters of personal etiquette, a set of uniform rules has been established by the practice of all the civilized world, which are rarely infringed. But in the more important questions, regarding what is a justifiable ground for declaring war? what territory a nation is entitled to the sovereignty of? what is a legitimate method of conducting a war once commenced? &c., the rules of

the publicists are often precise enough, but the practice of nations has been far from regular. The later writers on this subject have from this circumstance directed their attention more to the means by which any system of international law can be enforced, than to statements of what may be just, but has little chance of being enforced.

The second department into which we have considered international law divided—the rights and obligations of individuals as affected by the conduct of states towards each other—has, like the first, been examined by the publicists in their theoretical manner; but it has never, perhaps, received so much practical illustration as it did in the British courts, particularly the Prize Admiralty Court, during the late wars.

The third division of international law is that which most properly comes under the head 'Conflict of Laws,' the principles that should regulate the rights and obligations of private parties when they are affected by the codes of different nations. The leading rule of international law in this department is, that each civilized nation is to give efficacy to the laws of another country, unless its own laws or the general principles of justice are thereby contradicted. It has also been contended that when any neutral state has municipal laws for the regulation of its own subjects, with reference to their dealings with foreign countries at war with each other, either or both of such foreign countries in amity with such state may invoke the enforcement of such provisions of her municipal laws as restrict the subjects of such neutral state from committing any acts, the doing of which may be injurious to such foreign country. This principle appears to have been admitted during the late war between the Northern and Southern States of America, in the celebrated case, 'the Attorney-General v. Sillem and others,' touching the liability to forfeiture of the vessel *Alexandra*. The question there was, whether, by the municipal statute called 'the Foreign Equipment Act,' a British subject could be restrained from building or fitting out vessels of war for foreign belligerent states in amity with the queen? Although the finding of the jury, in accordance with the direction of the judge, was that the defendants had not been guilty of any infraction of the law, the duty of the Crown to prosecute offenders under that Act against friendly states was not questioned. But as the obvious policy of the 'Foreign Equipment Act' is to guard against this country being embroiled, by the acts of her own subjects, in foreign complications, it may still be a moot point whether a foreign country could claim its enforcement as a right. As regards the actual issue of the trial referred to, the ruling of the Lord Chief Baron (Pollock) was, in effect, that although it would be illegal for the British subject to build, fit out, or equip a vessel of war with intent to use it in hostilities against either of the belligerent states in amity with the queen, it would be perfectly lawful for him to build, fit out, and equip in this country, a vessel of war for sale to either of the belligerents, subject to its liability to capture and forfeiture as contraband of war, if intercepted by one belligerent in transit to the other. This dictum was the subject of several successive appeals upon one ground or other—from the

Court of Exchequer to the Exchequer Chamber, and ultimately to the House of Lords—but chiefly on collateral issues, which did not reverse or affect the ruling of the judge and verdict of the jury given in accordance therewith.

INTERNUNCIO, a papal envoy despatched to small states and republics, inferior to the nuncio, whose mission is confined to the courts of emperors and kings.

INTERPLEADER, or ENTER PLEADER, the name of a suit or action at law, or in equity. When a person who holds goods, or owes a debt or duty, is sued by two or more claimants, the court will order them to interplead upon the application of the party sued, and upon his delivering up or offering to deliver up the matter in dispute, and disclaiming all interest therein. The claimants then try their right to the thing demanded between themselves. [FEIGNED ISSUE.]

INTERPOLATION. Every mathematical table consists of a series of values of some algebraical expression corresponding to equidistant values of the letter on which it depends. Thus, the most extensive table of logarithms in common use is a succession of values of $\log. x$, answering to $x = 10,000$, $x = 10,001$, $x = 10,002$, and so on up to $x = 99,999$. The process of interpolation is that of inserting in a table values of the tabulated function intermediate to those given in the table. For example, suppose that p, q, r, s , &c., are written in a table opposite to $a, a + b, a + 2b, a + 3b$, &c., and it is demanded what is the value of the function corresponding to $a + 2\frac{1}{2}b$: this is a question of interpolation.

Such a question can only be solved approximately, but generally speaking, the values in the table are themselves but approximations, and the interpolated values are as correct as the tabular ones. A sufficient rule for most cases is, if a and $a + 1$ have A and B in the tables, differing by D , then to $a + m$, m being a fraction less than unity, belongs $A + mD$ or $A - mD$, according as B is greater or less than A .

INTERPRETATION. [HERMENEUTICS.]

INTERPRETATION. (Mathematics.) This word has come into use as descriptive of a process which it was long customary to employ, though without any express name. When an algebraical definition is laid down, there is frequently some restriction implied in the manner of making the definition, so that the process to which it leads presents more cases than can be explained by it, or were contemplated when it was made. For example, the abbreviation of a, aa, aaa , &c., into a, a^2, a^3 , and the rules which spring from it, soon lead to such results as—

$$a^{-3}, a^0, a^{\frac{1}{2}}, a^{-\frac{1}{2}};$$

which, though they follow from algebraical processes, yet, when they first arrive, are without algebraical meaning. In such a case, the process of interpretation enters. The question is, what should such symbols mean? have they a necessary meaning? if not, is there any meaning which will be more convenient than another? A definition has been laid down, leading to results which cannot be explained by it: required the extension of the definition which will enable it to explain its own results.

Examples are found in all works which explain

the principles of algebra. The rule always is, let the interpreted meaning of the new symbols be such as will make the whole of the process true by which they were obtained. Now, as they must have been obtained by the application of those formulæ which are true of the intelligible results of the definition, the rule just mentioned leads to the following: let the meaning of the intelligible results be such as will make the formulæ of the intelligible ones true of them. Thus, in the preceding instance, the fundamental formula which connects the terms of the series, a, a^2, a^3, a^4 , &c., is—

$$a^m \times a^n = a^{m+n}$$

which is intelligible when m and n are positive whole numbers. Suppose it now required to interpret a^0 , that is, to give it a meaning which shall make the preceding formula true of it. Write 0 instead of m , and we have $a^0 \times a^n = a^0 + n = a^n$, or a^0 must stand for 1. Again, suppose it required to interpret $a^{\frac{1}{2}}$. In order that the preceding formula may be true of the meaning of $a^{\frac{1}{2}}$, we must have

$$a^{\frac{1}{2}} \times a^{\frac{1}{2}} = a^{\frac{1}{2} + \frac{1}{2}} = a^1 \text{ or } a,$$

whence $a^{\frac{1}{2}}$ must stand for $\sqrt{a}$. And similarly for other cases.

INTERREGNUM, in an elective monarchy, the period between the death of one king and the election of another, or in a republic, between the expiration of the period of office of one ruler and the appointment of another. In a hereditary monarchy no interregnum can occur: *Le roi est mort; vive le roi* ('the king is dead; long live the king').

INTERVAL, in Music, is the difference or distance between two notes of different pitch.

Intervals are Simple when confined within the octave, *Compound* when they exceed it, and are named according to the distance of the two boundary notes. Thus the interval of a whole tone (C D) is called a 2nd; of a whole tone and a semitone (C E♭), a minor 3rd; of two whole tones, a major 3rd, &c.

INTESTACY is either the dying without a will, or with a will which does not dispose of the whole of the real or personal estate of the deceased; and therefore there may be either general or partial intestacy. Real estate, not disposed of by will, descends to the heir. [HEIR; DESCENT.] Personal estate, not disposed of by will, goes to the next of kin.

INTESTINA (*Intestinaux*), the second class of the *Radiata*, or fourth division of the animal kingdom, according to the classification of Cuvier. In the 'Règne Animal' this class is divided into two orders, *Cavitaria* and *Parenchymata*, which include all the *Entozoa* of Rudolphi; but the term Intestina, if retained at all, should be applied only to the true intestinal worms, or those parasites which live in the intestines of other animals, and should exclude the *Entozoa* which are found in the cellular tissue and substance of the different viscera of the body.

The principal species of worms infesting the stomach and intestines of man are enumerated under ANTHELMINTICS. For further details see ENTOZOA.

INTESTINES are that portion of the digestive canal into which the food is received after it has been partially digested in the stomach, and in which its further assimilation, the separation and absorp-

tion of the nutritive matter, and the removal of that which is excrementitious, take place. In an adult the intestines consist of a convoluted tube of from 30 to 40 feet in length, and are, from the difference of their diameters in different parts, divided into the *small intestines*, which comprise about the first four-fifths, and the *large intestines*, which constitute the other fifth of their length. The former again are divided into the *duodenum*, into which the ducts from the liver and pancreas open, and in which the chyme from the stomach is converted into chyle; the *jejunum*, in which the absorption of the nutritive matter of the food is principally effected; and the *ileum*. The large intestines are divided into the *cæcum*, *colon*, and *rectum*.

INTONATION, in vocal music, is the tuning of the voice—the singing true or false—in tune or out of tune. Correct intonation is the first requisite in a singer; this wanting, all his other musical qualities, however good, are unavailing. *Intoning* is the peculiar style of chanting or reading adopted in certain churches for particular portions of the liturgy.

INTRENCHMENT, in military matters, is a ditch or trench dug for temporary defence, with a parapet of earth thrown up for protection. When the ground is loose or sandy, fascines, gabions, or bags filled with earth or sand are employed to consolidate or strengthen the work.

INTROIT (Lat. *introitus*, 'entry'), in church ritual, the verses chanted or repeated when the congregation first enters the church; a custom as old as the fourth century, but not retained in the Protestant form of worship.

INULA, a genus of composite plants. *Inula Helenum* (Elecampane), one of the species of this genus, is an indigenous perennial herbaceous plant, found in moist meadows, the root of which is used in medicine. It is expectorant and stimulating, and is employed in debility of the stomach, but is not much used. It contains a white amylaceous matter called *inulin*.

INVALIDES, HOTEL DES. [PARIS.]

INVERARY. [ARGYLESHIRE.]

INVERCARGILL is the name of a town in South Island, New Zealand, the capital of the province of Southland. It is situated at the mouth of the New Ross river, five days' sail from Melbourne, and 156 miles by sea from Port Chalmers, in lat. 41° 15' S. Several newspapers are published here, and in the town are two banking establishments. In 1864 its port, Bluff Harbour, was opened, and a railway has since been constructed to it. The population of the town and suburbs was about 2000 according to the last return; and 235 ships, carrying 12,758 tons, entered the port in 1862.

INVERKEITHING. [FIFESHIRE.]

INVERNESS, a seaport town and royal burgh, the capital of the county of Inverness, and the principal town of the Highlands, is beautifully situated near the extremity of the Moray Frith, and the eastern entrance of the Caledonian Canal, 255 miles by railway N.W. from Edinburgh. The town is of considerable size and well built; the houses are lofty, and many of them elegant. The streets, since 1831, have been paved with granite and hard sandstone, brought from the banks of Loch Ness. Common

sewers have been constructed, and the town is well supplied with gas and water. Lat. $57^{\circ} 28' N.$, long. $4^{\circ} 13' W.$

The main streets are built on the eastern bank of the river Ness, which is traversed by a suspension bridge, replacing a stone bridge carried away in the floods of 1849, and by a wooden bridge at the north end of the town. The principal buildings are, three Established churches; ten chapels; county hall, and prison, on the site of the old castle; town-hall; a handsome spire, which once had connection with the lock-up; two newsrooms; a Working Men's Club; the head office of the Caledonian Bank; the usual public offices; royal endowed academy; infirmary; and reformatory. The climate is much milder than might be supposed from the northern position of the town, the mean annual temperature being about 46° . Inverness unites with Fortrose, Nairn, and Forres in returning one member to Parliament. The population of the entire district in 1861 was 20,380; the number of registered electors being about 900. The parliamentary borough of Inverness contained 12,509 inhabitants; the royal burgh, 9393; and the parish, 16,162. The parish measures 14 miles in length, by 2½ miles in breadth. There are extensive railway works, shipbuilding yards, iron foundries, rope works, two breweries; and manufactures of plaidings and woollen stuffs are carried on. The chief articles imported are coal, wine, grain, and tar; oats, timber, wool, sheep, and fish are exported. The port admits vessels of 400 tons to the harbour, and larger craft at Kessock Ferry and the Caledonian Canal. Its sub-ports are Cromarty, Burgh-head, Findhorn, Lossiemouth, Portmahomack, Fortrose, Fort George, Nairn, and from Sutherland to Fort William on the west coast. The number of vessels registered as belonging to the port in 1865 was 238 (11,615 tons). The entries in 1864—principally coastwise—were 2065 (167,348 tons), and the clearances 1837 (149,296 tons). The customs revenue in the year 1865 was 4851*l*. Regular traders ply to London, Leith, and Aberdeen; and by means of the Caledonian Canal to Glasgow, Liverpool, and Ireland. Inverness is the terminus of a system of railways which connect it with Sutherland, Ross, Perth, Edinburgh, and Aberdeen. Since the introduction of these lines, the town has been much visited by tourists, and greatly improved by the building of villas, and the erection of several handsome new streets. Its environs, well cultivated and beautifully wooded, are almost surrounded by mountains and hills of various heights, forming altogether a most picturesque and interesting landscape. The islands of the Ness, within a mile of the town, have been formed into a fine promenade, connected with the banks by elegant suspension bridges.

Though of great antiquity, the origin of Inverness is unknown; but a castle occupied an eminence to the south-east in the eleventh century, in which, according to tradition, King Duncan was murdered. English or Lowland Scotch is now the ordinary language of the inhabitants; but Gaelic is known to most of the working population, and to nearly all the servant girls belonging to the district, and is alone spoken in some of the secluded parts of the county. About 5 miles east of Inverness lies Cul-loden Moor, where the army of Prince Charles was

totally defeated in about half an hour in 1746, and became the victims of an unsparing slaughter.

INVERNESS-SHIRE, the largest county of Scotland, is bounded N. by Ross-shire, S. by the shires of Perth and Argyle, E. by those of Nairn, Elgin, Banff, and Aberdeen, and W. by the Atlantic Ocean. The mainland is comprised between $56^{\circ} 40'$ and $57^{\circ} 36'$ N. lat., and between $8^{\circ} 50'$ and $5^{\circ} 50'$ W. long. The greatest length from N.E. to S.W. is 85 miles, and the greatest width from N.W. to S.E. is nearly 55 miles. The entire county contains about 4600 square miles, or 2,944,000 acres. The population in 1861 was 88,888—47,524 females and 41,364 males—being a decrease of nearly 8000 on the census of 1851. There were 16,615 inhabited houses, 252 uninhabited, and 82 building. According to a parliamentary return issued in 1865, the number of electors then on the county register was 878, of whom 617 were tenants. Inverness sends one member to Parliament. It comprehends various districts, particularly those of Badenoch on the S.E., Lochaber on the S., Glenelg on the N.W., besides many inferior districts, such as Glengarry, Glen Morriston, Strathspey, Strathglass, &c. It also comprehends a considerable portion of the Hebrides, or Western Isles, including the Isles of Skye, Harris, Benbecula, North and South Uist, Barra, &c.

This county, which is extremely mountainous, is intersected by innumerable lakes and rivers, and is divided into two nearly equal parts by the deep valley usually called the Great Glen of Scotland, which runs from Fort William to Inverness. The county forms a large part of the Highlands of Scotland, and the Highland character and Gaelic language predominate in it. The low grounds are well cultivated; the lower hills are pastured by sheep, or reserved for grouse shooting, and the high grounds are for the most part set apart as deer forests, for which they are well adapted.

The prevailing rocks are of the primary class. Gneiss and mica slate are perhaps the most abundant, but huge masses of granite and of the oldest trap or porphyritic rocks are met with in the Grampians and the mountains of Glencoe and Ben Nevis. Limestone is found in several districts, and frequently approximates to the nature of marble. Sandstone is also met with in the southern sections of the country. The beds of the stratified rocks are usually highly inclined to the horizon, approaching almost to the vertical. Some veins of lead and silver have been discovered, and also iron ore in small quantities. The soil is for the most part light and sandy, with a subsoil of gravel or clay. The principal rivers are the Spey, Lochy, Ness, and Beaulie, in all of which there are valuable salmon-fisheries. The two principal mountains are Ben Nevis and Mealfourvounie. The former, which is separated from the Grampians by the desolate tract called the Moor of Rannoch, is composed of porphyry and granite; recent surveys have determined it to be the highest point in Great Britain, being 4406 feet above the level of the sea. It is easily ascended on the western side. Near its summit the snow lies for a great part of the year. Mealfourvounie rises 2730 feet above the sea-level. The surface of the county is an alternation of mountain ranges and deep shadowy glens. The principal ranges are the Grampians and the Monadhli,

the latter stretching from the borders of Lochaber to the neighbourhood of Nairn; its highest peaks attain an elevation of 2500 to 3000 feet, and in many parts the ridge forms an immense rugged mass, full thirty miles in breadth, presenting the utmost variety of outline and contrast of colour. The Ben-alder range, near Loch Erich, is less lofty but more picturesque; and the artist might well resort to its romantic recesses and abrupt pinnacles for inspiration.

All kinds of cereals and green crops are grown, but attention is chiefly directed to the rearing of sheep and cattle. The sheep are mostly of the black-faced and cross breeds; the cattle of the Skye or cross breeds. A great deal of waste land has been drained and reclaimed, and much ground planted. The fir woods in Glenmore and those of Strathspey, belonging to the earl of Seafield, are supposed to be more extensive than all the other natural woods in Scotland together. The native woods chiefly consist of oak, fir, birch, ash, mountain ash, elm, hazel, and the Scotch poplar. Those which are planted are the larch, spruce fir, silver fir, beech, plane, and fruit-trees. Red-deer, roe-deer, grouse, black-game, ptarmigan, woodcock, partridges, the alpine and common hare, and other game, are abundant.

Formerly a good deal of hemp, worsted, and linen yarn was made in this county; but this has greatly declined since the establishment of the large manufactories of the south. One considerable woollen factory (Mr. Nicol's) has long been in existence: another is in course of construction, and two others are in immediate contemplation.

The Glenmore, or Great Glen of Albion, as it is sometimes called, which stretches across the county from Fort William to the town of Inverness, is partially covered by three lakes, Loch Lochy, Loch Oich, and Loch Ness, lying nearly in a straight line between the above-mentioned limits. Their aggregate length is 37 miles, and the entire distance between Fort William and Inverness 60 miles. In 1802 Mr. Telford was appointed by the commissioners of the Treasury to make a survey of these lakes and of the adjoining country preparatory to the cutting of a canal. His report was made in the following year, and the works were in full operation in 1805, but the whole line of navigation was not opened till the latter end of the year 1822. It was repaired and re-opened in 1847. The expense of constructing the Caledonian Canal, as it is called, was defrayed by government, and amounted to 986,924*l*. That part of the navigation which is not upon the lakes is 22 miles and 1628 yards in length: it is 50 feet wide at the bottom, 110 feet at the surface, and 17 feet deep. Loch Oich is nearly the summit-level of the canal, and its elevation is 94 feet above the level of the sea on the east coast, at high water. The canal has not fully answered the expectations of its promoters; for instead of availing themselves of the route, seamen seem to prefer taking the chance of a favourable run round the northern extremity of Scotland. It is, however, extensively employed in summer for the transit of passengers and goods between the Clyde and Inverness; and forms an important link in the system of Highland tours inaugurated and still carried out by Messrs. Hutcheson, of Glasgow.

The scenery of Inverness-shire is exceedingly romantic and highly diversified.

The county contains thirty-six parishes, but no royal burgh, except Inverness, its capital. Fort William and Fort George, at opposite extremities of the Great Glen, were originally erected as strongholds to overawe the Highlanders. The former is a considerable garrison, capable of accommodating two or three thousand men. Fort Augustus, at the south-west extremity of Loch Ness, was built soon after the rebellion of 1715.

Portree, a fishing town on the east shore of the Isle of Skye, is the principal place on the west side of the county.

INVERSE, INVERSION. Any two operations of algebra are said to be inverse when one of them undoes, so to speak, the effect of the other; so that, if both be successively performed upon the same quantity, the result is that quantity itself. For instance, the operations implied in $1 + x^2$ and $\sqrt{x-1}$ are inverse to one another; for

$$1 + \left\{ \sqrt{x-1} \right\}^2 = x, \sqrt{1 + x^2 - 1} = x.$$

We need do no more than name addition and subtraction, multiplication and division, raising of powers and extraction of roots, as pairs of inverse operations.

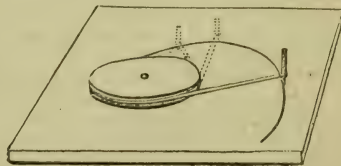
INVERSION, in Music, is a change in the relative position of two sounds, or of the several notes of a chord. Thus C D, an interval of a 2nd, becomes by inversion (D C) a 7th.

INVERTEBRATE ANIMALS are those animals which do not possess a vertebral column or spine. All systems of zoology accept the natural division of animals into vertebrate and invertebrate. Cuvier divides the latter into Mollusca, Articulata, and Radiata, to which later zoologists have added Acrita and Protozoa.

INVERURY. [ABERDEENSHIRE.]

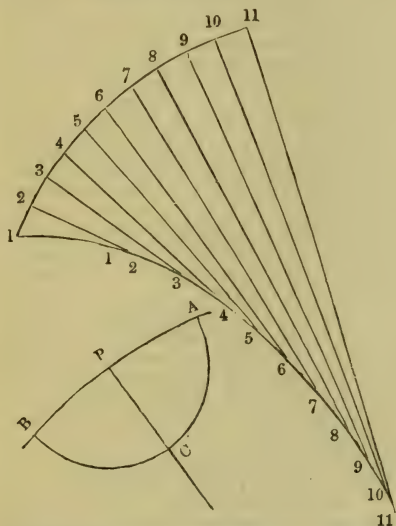
INVESTITURE. [FEUDAL SYSTEM.]

INVOLUTE AND EVOLUTE (the curve unrolled and the curve from which it is unrolled), a name given to two curves so formed and placed, that, supposing the second to be cut out from solid matter, the first can be formed by fastening one end of a thread upon a point in the second, attaching a pencil to the other end, and moving the pencil so that the thread may either gradually enwrap or be unwrapped from the curve to which it is fastened. Thus the pencil in the diagram is describing the involute of a circle, or the curve of which the circle is the evolute. But the evolute of a circle is evidently a point.



Every curve has one evolute, and an infinite number of involutes. The proper name for curves described from the same evolute is *parallel curves*, since they have the fundamental property of parallel lines: for they never meet, though (if they admit of it) ever so far produced; a straight line perpendicular to one is always perpendicular to the other; and the part of

the perpendicular intercepted is always of the same length. When arcs of parallel curves are required to be laid down, the most commodious method of proceeding is to construct the evolute of one of the arcs approximately, as follows. On the arc draw tangents at moderately small distances, and draw perpendiculars to those tangents. The parts of the tangents cut off from each by its neighbours will together give the arc of the evolute near enough for all purposes. And it may be well to notice that it will be a sufficiently accurate method of drawing the perpendicular to the tangent at a point P, if we take a small circle whose centre is P, bisect the arc A C B in C, and join and produce P C.



The angular error thus committed is only a small portion of the angle made by the tangents at P and A.

INVOLUTION AND EVOLUTION are algebraical terms—the former signifying the raising of powers, and the latter the extraction of roots. When any number is multiplied by itself, we get its square or second power; and if we multiply this product by the number again, we get the cube, or third power, and so on. The inverse process, called Evolution, enables us to find a particular root of a number—say, the fourth, or that number which, being multiplied into unity four times, the product will be the number originally given. Both subjects are treated of in every algebraical text-book.

INWOOD, the family name of three architects, father and two sons, who constructed many public and private buildings in London and elsewhere.

William Inwood was born about the year 1771. He was brought up to the professions of architect and surveyor. He was employed as steward to Lord Colchester, was surveyor to a large number of gentlemen, and several eminent architects were instructed by him. He died March 16, 1843.

Henry William Inwood, the eldest son of William Inwood, was born May 22, 1794. He was several years in Greece, and examined with great care the architectural remains at Athens and elsewhere. He

assisted his father in most of his architectural pursuits, especially in designing and constructing St. Pancras Church, New Road, London. He died March 20, 1843, when the ship in which he had sailed for Spain was wrecked, and all on board perished.

H. W. Inwood published in 1827 'The Erectheion at Athens, Fragments of Athenian Architecture, &c., illustrated with Thirty-nine Plates.'

IO (Gr. *ἰώ*), in ancient mythology, a daughter of Inachus, king of Argos, whose beauty excited the admiration of Zeus, and the jealousy of Hera. The queen of heaven, therefore, transformed her into a heifer, and intrusted her to the care of Argos Panoptes, who was slain by Hermes, thence called Argeiphontes, or the slayer of Argos. Hera then sent a gadfly who stung the heifer into madness, and drove her wandering over the earth; furnishing Æschylus with a subject for his tragedy of 'Prometheus Bound.' This legend seems to be connected with an old Egyptian myth.

IODINE (Gr. *iodēs*, 'violet-coloured'), a non-metallic elementary body, discovered by M. Courtois in 1812. Iodine exists in the water of the ocean and mineral springs, and in marine molluscous animals and sea-weeds; but it is principally obtained from *kelp*, or sea-weed which has been burnt for the purpose of obtaining alkali.

Iodine is a soft opaque solid, of a bluish black colour and metallic lustre. The primary form of the crystal is a right rhombic prisin, and the crystals are usually flat. According to Gay-Lussac, its specific gravity is 4.948. When moderately heated (at 345°) it rises in vapour of a violet colour, and hence its name, from the Greek *iodēs*. On cooling, it again crystallizes unchanged, nor is it decomposed or altered by being subjected to very high temperatures, and it has resisted all attempts to decompose it. Iodine has a strong disagreeable odour and taste; it stains the skin of a brownish colour, but not permanently; it is readily dissolved by alcohol, but scarcely at all by water. It is very poisonous. Its characteristic property is that of giving an intense blue colour when added to a solution of starch. It unites with metals to form compounds, which are termed *Iodides*, and, like chlorine and bromine, it forms acids both with hydrogen and oxygen.

Oxygen and Iodine combine to form three or four compounds. One of these, *Oxide of Iodine*, is said by Sementini to be a soft yellow substance, which by an addition of oxygen becomes *Iodous Acid*, a yellow liquid; but very little is known of these substances. *Iodic Acid* ($O^5 I$) is a white semitransparent solid substance, inodorous, but astringent. It is so dense as to sink in sulphuric acid, and it deliquesces in a moist atmosphere. It is very soluble in water; the solution reddens vegetable blue colours; it detonates when mixed and heated with charcoal, sugar, and sulphur. It combines with metallic oxides to form salts, which are termed *Iodates*. *Oxidic or Peroxidic Acid* ($O^7 I$) is a crystalline substance, easily resolvable by heat into its elements. *Nitrogen and Iodine* form *Iodide of Nitrogen*, which is a dark brown powder, very explosive: it consists of $N^1 I^3$. *Hydrogen and Iodine* form *Hydriodic Acid*, which has a sour taste, reddens vegetable blues, and when mixed with atmospheric air forms dense white fumes with its moisture. It is soluble in water. The salts

which it forms are termed *Hydriodates*. It consists of $H^1 I^1$. Chlorine and Iodine unite to form a *protochloride* (with chlorate of potassium); a *trichloride* (with chlorine gas); a *tetrachloride*, and a *pentachloride*. Sulphur and Iodine combine to form a *sulphuret*, which is a dark substance easily decomposed by heat. Phosphorus and Iodine combine to form three compounds: one ($P^1 I^1$) is an orange-coloured substance, which sublimates when heated; another ($P^2 I^2$) is a dark gray crystalline mass, which fuses at 84° ; a third ($P^2 I^3$) is a black substance, fusible at 114° .

The compounds of iodine and metals are mentioned under the names of the metals.

Medicinal Properties of Iodine.—Iodine, though only obtained in an isolated state of late years, has been long employed as the efficient principle of other preparations and therapeutic agents, namely, burnt sponge and certain mineral waters. It is only since it has been procured as a distinct principle that its action has been ascertained with precision. In the present day it is administered rather in some artificial compound than as pure iodine, owing to its very sparing solubility in water.

The diseases in which it has been found useful are glandular swellings, especially bronchocele or goitre, which rarely resists its action; in some strumous diseases; in chronic rheumatism; and also as an antidote in instances of poisoning with strychnia, brucia, and veratria; but its claims to confidence are not clear as to these formidable poisons.

IOLITE (Gr. *ion*, 'a violet,' and *lithos*, 'a stone'), a mineral of a dark violet colour, which, when viewed by a light transmitted at right angles, appears of a yellowish brown. It is found crystallized in six-sided prisms. Its specific gravity is 2.56; and its constituent elements, silica, 50.24; alumina, 33.42; magnesia, 10.84; oxide of iron, 4.00; water, 1.50.

IONA, also known by the names of Icolmkill and Hy, or I, is one of the Hebrides belonging to Argyleshire. It is situated on the western side of the Isle of Mull, from which it is separated by a narrow channel called the Sound of I. Its length is three miles, and at its widest part it is about one mile and a half in breadth. The general aspect of the island is rugged and mountainous, and the surface for the most part consists of moor and bog, occasionally varied by a patch of green pasture. It is one of the trap islands of the western coast, being composed chiefly of basaltic and trappean rocks, which frequently collect in grand columnar masses, and attain a considerable elevation.

The soil is naturally so very fertile that it was regarded as miraculous in the dark ages. Barley sown in the middle of June is ready for the sickle in August. The area is estimated at 2000 acres, of which about one-fourth is under cultivation. There is only one village, Baile Mòr, at which steamers from Oban call twice a week during the summer. A church and manse have been erected by government grant, and there is also a Free church and school. A small and comfortable inn, erected for the accommodation of tourists by the duke of Argyll, the present proprietor, was opened in 1864. The population of the island in 1861 was 264.

A religious establishment was founded on the

island by Columba, a native of Ireland, about the year 563. This was an establishment of Culdees, not subjected to vows, but governed by a code of laws formed by Columba; and it so continued for several centuries, with the highest reputation, not only for sanctity, but for learning. The remains of forty-eight Scottish kings, four Irish kings, and eight Norwegian kings, were interred there. For about 200 years it was a bishopric under the kings of Norway. When the papal power was established in Iona, the monastery became a Benedictine abbey. In 1507 the abbey of Iona was annexed to the diocese of the bishop of the Isles. In 1561 the whole of the ecclesiastical buildings were demolished. The revenues of the monastic institution were united to the see of Argyll, and upon the abolition of episcopacy they became the property of the duke of Argyll. This island is now chiefly interesting on account of its numerous architectural and other antiquities, a full account of which is given in Dr. Macculloch's 'Highlands and Western Isles of Scotland.'

IONE', or **JONE'**, a parasitic genus of minute crustaceans, placed by Desmarest under the *Isopoda*, but by Latreille under the *Amphipoda*.—Example, *Oniscus thoracicus*, Montagu, in 'Linn. Trans.,' ix. iii. 3, 4. This parasite hides itself under the shell of *Callianassa subterranea*, and there forms a tumour on one of its sides.

IONIA and **IONIANS**, a people belonging to the Greek or Hellenic race. Herodotus (viii. 44) says that the Athenians were Pelasgi, and that they took the name of Iónes from Ion, the son of Xuthus. The name only occurs once in the Iliad, and under the form Iáones. The Ionians at some unknown early period occupied the northern part of the Peloponnesus, along the Corinthian Gulf, and their country was called Ionia. When the Dorians invaded the Peloponnesus, about B.C. 1100, the Achæi [ACHÆI] took refuge in Ionia, which from that time was called Achæa, and the Ionians emigrated to Attica, but this emigration was probably gradual. From Attica there was a great emigration of Ionians and others under the sons of Codrus, the last king of Athens, which is called the great Ionian emigration; but there may have been various emigrations at different times. The Ionians established colonies in most of the Cyclades, such as Naxos, Andros, Paros, and Delos, and also in Eubœa. The emigrants who proceeded to the coast of Asia, under their leader Neleus, took Miletus, which was then inhabited by the Carians. They also took other towns on the same coast, which, with the islands of Chios and Samos, ultimately formed the confederation of the twelve cities of Ionia. Smyrna being seized by Colophonian exiles (according to Herodotus), was added to the confederation.

This confederation was united by a common religious worship and the celebration of a periodical festival. The place of assembly was the Panionium, at the foot of Mount Mýcale, where a temple, built on neutral ground, was dedicated to Poseidon. We have no materials for a history of these cities of Ionia as a political community, and no reason for supposing that their political union came near the modern notion of a federation.

Asiatic Ionia extended from the Cumæan Gulf on the north to Mount Grius and the Gulf Basilicis,

south of Miletus, a length of not more than 100 miles in a straight line, but with a coast three times that length, owing to the many sinuosities, and the form of the large Chersonesus opposite Chios. The Ionian territory did not extend inland above 40 miles from the coast as far as Mounts Sipylus and Tmolus. The principal rivers of Ionia were the Hermus, the Caystrus, and the Mæander.

The Asiatic Ionians early attained a high degree of commercial and maritime prosperity. Miletus alone is said to have founded seventy-five towns or colonies. They became wealthy and luxurious. The remains of their monuments prove their taste for the arts; and their temples and public buildings rivalled those of European Greece. The literature of Greece may be said to have originated on the coast of Asia Minor. The historian Hecateus was a native of Miletus; Thales, one of the earliest philosophers, was from the same country. Anacreon was a native of Teos; and Herodotus, though a Dorian, adopted, in his History, the language of his Ionian neighbours.

The subjection of the Ionians to the Lydian kings, their conquest by Cyrus, B.C. 546, and their subsequent struggle with the power of Persia, are the chief events in their history to B.C. 479, the date of the battle of Mycale. From that time their history is connected with that of Athens and Sparta, until the peace of Antalcidas, B.C. 387, by the terms of which the Asiatic cities were given up to Persia. Their subsequent history under Alexander and his successors can be very obscurely traced. Under the Roman empire several of the cities of Ionia still maintained the rank of wealthy cities, such as Smyrna and Ephesus. (Chandler's *Travels in Asia Minor*, and the *Ionian Antiquities*, published by the Dilettanti Society, 2 vols. folio; Colonel Leake's *Travels*; Dr. Smith's *Dictionary of Greek and Roman Geography*.)

IONIAN ISLANDS, the collective name given to the islands of Corfu, Cephalonia, Zante, Santa-Maura, Theaki, Paxo, Cerigo, and some small islets, all situated in the Ionian Sea, off the west coast of Albania and the coast of Greece. The area and population of the seven principal and only inhabited islands are as follows:—

	Area in sq. miles.	Population in 1862.
Corfu, ...	275	75,532
Cephalonia, ...	256	70,541
Cerigo, &c., ...	107	13,007
Leucadia, ...	110	20,043
Paxo, ...	7	5,025
Ithaca, ...	37	11,348
Zante, ...	164	38,627
Total, ...	956	234,123

The islands rise in irregular rugged abruptness from the sea, and their structure consists chiefly of limestone, gypsum, and sandstone. Oil, wine, corn, some cotton, the small species of grape called currants, and other fruits, and flax, are the chief productions; the olive is extensively cultivated in all the islands; the currant is grown in the greatest perfection in Cephalonia and Zante. Earthenware, salt, soap, and some coarse woven goods, are the

principal industrial products. The fisheries give employment to a considerable number of hands. The coasting trade is important. The imports consist of sugar, coffee, and drugs; raw and manufactured cotton and silk; wool and woollen cloth, glass, hardware, staves and hoops; iron, timber, wheat, Indian corn, rice, cheese, flour, fish, cattle, sheep, tobacco, &c. The import and export trade is almost entirely carried on in British ships. The productions of the Ionian Islands in 1860 comprised 69,553 barrels of olive oil, worth from 50s. to 55s. a barrel; 30,250,897 lbs. of currants, worth from five to ten guineas per 1000 lbs.; and 148,539 barrels of wine, ranging from 11s. to 21s. a barrel. Only 67,580 bushels of wheat were grown in the year. The soil is more favourable to grape cultivation than to the raising of corn, and corn and flour are the chief imports. The live stock consisted of 13,171 horses, 10,374 horned cattle, 131,684 sheep, and 111,907 goats, showing a considerable increase within a few years. The revenue of 1860 was 140,855*l.*, the expenditure 151,187*l.*; in the preceding twelve years the Ionian revenue had only on two occasions provided the exchequer with a surplus. The export duty on oil produced above 80,000*l.* in 1857, only 19,000*l.* in 1859, and 27,000*l.* in 1860. More than a third of the revenue in the year 1860 was raised from the export duties of 19½ per cent. on olive oil and currants. The total value of the goods exported from the Ionian Islands to Great Britain—chiefly currants and olive oil—in 1864 was 189,259*l.* The exports from this country were valued at 454,599*l.* Cotton and woollen goods were the staple commodities.

Shipbuilding is an important branch of industry, and many of the inhabitants are engaged in maritime trade and navigation.

The climate of the Ionian islands is mild and healthy; the winters are rainy, and attended by boisterous winds; the heat in summer is moderated by the north-east wind; it is only when the sirocco blows that any inconvenience is experienced from the heat. Shocks of earthquake are often felt in winter, especially in Zante.

There is a university and an ecclesiastical college for clergy of the Greek Church at Corfu; and each of the islands and chief towns has a school, in which ancient Greek and Latin, modern languages, and mathematics are taught. Besides these educational establishments there are numerous district schools.

About four-fifths of the whole population are of the Greek Church, which is the established religion, and are under the spiritual government of an exarch or primate, which office is held for five years in rotation by the Greek archbishops of Corfu, Cephalonia, and Santa-Maura; each island has besides its own archbishop or bishop. The rest of the population, with the exception of some of the British residents, and about 5000 Jews, are Catholics, who are superintended by one archbishop and two bishops. The language of the islands is modern Greek. The inhabitants are of Greek and Albanian descent, with a considerable admixture of Italian blood.

Cephalonia and *Corfu* have been noticed under separate heads.

Cerigo, the ancient *Cythera*, the fabled birth-place and resort of the goddess Venus, presents a rocky and barren aspect. It is the most southern of the

islands, lying E. of Cape Matapan, and is traversed nearly through its centre by the meridian 23° E. long. The chief products are corn, wine, oil, raisins, honey, and wax; some cotton and flax are also grown; a great number of goats are fed. More cattle are reared here than in any other of the Ionian islands. Some remains are shown, near the chief town, Capsali (population 5000), which are stated to have formed part of the temple of Venus, mentioned by Pausanias. The olive oil and honey produced in this island are much esteemed.

Santa-Maura, the *Leucas* of the ancient, and the *Leucadia* of the modern Greeks, lies nearly opposite the entrance of the Gulf of Arta, and is twenty miles long by from six to ten wide. It is separated from the mainland by a long narrow channel navigable only for canoes (monoxyla), and consists of a range of mountains, terminating northwards in a flat peninsula, and southwards in the Leucadian promontory or Cape Ducato, about two miles N. by W. of which is the rock called Sappho's Leap, whence the lovelorn poetess is said to have plunged into the sea from a height of 200 feet. The east side of the island is barren; the north and west parts consist of a rich soil, and are very productive. The olive, the vine, and other fruit trees, are the principal objects of cultivation; corn is produced, but not in quantity nearly enough for the consumption; the fisheries and the manufacture of salt are a great source of employment to the inhabitants, many of whom emigrate to the mainland in harvest time to work. The chief town of the island, *Amazichi*, or *Santa-Maura*, is unhealthily situated on the low peninsula in the north of the island; it is much resorted to for the purchase of manufactured goods, which are supplied chiefly from Malta. Population 7000. On an islet N. of the town stands the castle of Santa-Maura, which is joined to it by a causeway, constructed on 365 arches, over the salt lagoon that separates the island from the main. In the mountains, the highest of which is St. Elias (3000 feet above the sea), game is abundant, and the lagunes swarm with pelicans and almost every species of water-fowl. The antiquities are the tomb of Artemisia and the ruins of the town of Leucas.

Paxo lies ten miles S. of Corfu; it is only about five miles long, and scarcely two broad; the surface is rocky, mountainous, arid, and deficient in water. The principal produce is oil, which is of excellent quality. The chief place is *Porto-Gayo*, a mere cluster of houses built on the shore.

Theaki, or *Ithaca*, lies E. of Cephalonia, from which it is separated by a long narrow strait. It is fourteen miles long and four broad at its widest part; but it is deeply indented about the middle of its length on the eastern side by the beautiful Bay of Vathi, between which and the channel of Cephalonia is a narrow isthmus that unites the northern and southern parts of the island. The limestone range which runs through its whole length, rises everywhere into rugged eminences, so that the surface of the island is entirely destitute of plains and valleys properly so called, there being scarcely one hundred yards of continuous level ground in the island. The soil is light and shallow; yet olives, currants, fruits, superior wine, and some corn, are raised by the industrious population. The honey of

Ithaca is greatly valued. The climate is renowned for its salubrity; the inhabitants commonly reach 80, 90, and not unfrequently 100 years of age. *Vathi*, the chief town, stands on the shore of the little bay of Dexia, an inlet from the Bay of Vathi, and has 2500 inhabitants. The chief antiquities of the island are the cyclopean walls, named the castle of Ulysses, which stand on Mount Aito, in the isthmus before mentioned. The rocky surface of the island presents numerous caverns, to which the shepherds and their flocks retire by night.

Zante, the *Zakynthos* of the ancient and modern Greeks, situated about eight miles S. of Cephalonia, and fifteen W. of the Morea, is a beautiful and fertile island. It is about twenty-three miles long, and consists chiefly of an extensive plain that stretches from the north to the south coast, with a breadth of six to eleven miles, and terminates westward in a range of hills running parallel to the coast, and eastward in Mount Skopo and the hills about the city of Zante. The products are similar to those of the other islands, but more abundant. Pomegranates, peaches, melons, and citrons, are cultivated, and some salt is manufactured. The wine of Zante is of superior quality, and in great request all over the Levant. The great trade of the island is in *currants*, the fruit of a dwarf vine originally brought from Corinth, whence the name. The *Petroleum* or *Pitch Wells*, described by Herodotus (iv. 195) are about twelve miles S. from the town of Zante, in a marshy district, near the shore of Chieri Bay, in the south-eastern part of the Island. Another well, called the *Tallow Well*, is in a cavern on the shore. There are very few remains of antiquity in the island. *Zante*, the largest, most populous, and most commercial town of the Ionian Islands, stands at the head of a bay on the east coast. The population is 20,000. The streets are narrow, as in all warm climates; the houses are well built, chiefly in the Italian or Venetian style. The churches are numerous, and richly ornamented. There are two piazzas or squares, in one of which is erected a handsome monument to Sir Thomas Maitland. The harbour is protected by a wall, and has a lighthouse; but it is much less secure than those of Theaki and Cephalonia. From the citadel, which stands on the highest part of the town, there is a magnificent view over Cephalonia, the gulf of Lepanto, and the coast of the Peloponnesus. Zante is the seat of a Greek archbishop and a Catholic bishop; it has a theatre, a custom-house, and an arsenal. The city has frequently suffered from earthquakes; those of December 29, 1820, and January 19, 1825, were very destructive.

The smaller dependent islands are *Merlera* and *Fano*, which lie N.W. of Corfu; *Anti-Paxo*, S.E. of Paxo; *Kalamo* and *Meganisi*, E. of Santa-Maura; and *Cerigotto*, which lies S.E. of Cerigo, and is the most southern, as well as the most eastern, of the Archipelago.

The Ionian islands were subject to Venice from 1386 to 1797, when they were ceded to France. They were seized by Russia and Turkey in 1800, by France in 1807, by Great Britain in 1809, and on November 5th, 1815, were formed into a republic ('the Septinsular Republic') under the protectorate of the latter, and so remained till October, 1863, when the Parliament at Corfu unanimously voted

their annexation to the kingdom of Greece, which was accomplished, with the consent of the British government, in 1864. [GREECE, CORFU.]

IONIAN SCHOOL comprises several of the earliest philosophers of Greece, whose speculations were chiefly of a physical character, and who, with one or two exceptions, were natives of the Ionian colonies in Asia Minor.

IONIC DIALECT, one of the four written varieties of the Greek language, was spoken in the Ionian colonies of Asia Minor, and in several of the islands of the Egean Sea. As the new Ionic, it is distinguished from an older, which was the common origin of itself and the Attic. The old Ionic was widely diffused, and its use was co-extensive with the Ionian settlements in the Peloponnesus and Northern Greece. The language of epic poetry arose out of this original tongue, which after the Dorian conquest passed, on the one hand, with the fugitives into Asia Minor, while on the other, it continued to be spoken, for a while at least, by the conquered peasantry who remained in Greece Proper. Herodotus (i. 142) distinguishes four varieties of the new Ionic, in one of which he wrote, and though a Dorian, has left us the best and most complete specimen of it. Hippocrates and Galen also wrote in this dialect.

IONIC ORDER. [CIVIL ARCHITECTURE.]

IONI'DIUM, a genus of violaceous plants inhabiting the tropical parts of America. Several species are used medicinally. *I. Ipecacuanha* and some others have emetic roots. [IPECACUANHA.]

I O U. A mere acknowledgment of a debt which does not amount to a promissory note.

Such an acknowledgment is frequently made in an abbreviated form, thus:—

London, 1st January, 1866.

To Mr. A. B.

I O U one hundred pounds. C. D.

An acknowledgment in this form is called an I O U, and is evidence that at the time when it was made, there was a debt due to the party to whom it was given for the amount specified.

Being merely evidence of the existence of debt, it requires no stamp. It is neither a promissory note nor a receipt, but, except that it cannot be negotiated and circulated, it has all the effect of a promissory note payable on demand; for a debt is acknowledged to be due, and may be sued for at any time.

It is always desirable to adhere strictly to the above form, for if words be added expressing a promise to pay the amount on a particular day, the instrument would then be a promissory note, and could not be given in evidence without a stamp. Again, the addition of certain other words might make the document amount to an *agreement*, in which case, if over 20*l.*, it would require a stamp. In this case, however, there is less danger, for an agreement may be stamped after it is written, or even at the trial, on payment of a fine, but a promissory note cannot.

If the name of the person to whom it is given does not appear on the I O U, it will, *prima facie*, be taken as evidence of a debt due to the person who produces it; but this the defendant may, of

course, rebut. To avoid difficulties, the creditor's name should always be mentioned, as in the form given above.

IOWA, one of the United States of North America, had its boundaries defined by an Act of Congress passed August 4, 1846. It is situated between 40° 20' and 43° 30' N. lat., and 90° 12' and 96° 53' W. long., the area being 55,045 square miles. It is bounded N. by Minnesota; E. by Wisconsin and Illinois, from which it is separated by the Mississippi river; S. by Missouri; and W. by the Nebraska Territory, from which it is separated by the Missouri river. The population in 1840 was 43,112; in 1850, 192,214; in 1860, 674,948.

The surface is undulating and beautiful, with alternate forests and prairies. There are no mountains, but bold bluffs, with picturesque ravines, line the rivers, which, rising in the elevated grounds of the northern parts of the territory, flow respectively eastward into the Mississippi, westward and southward into the Missouri, and northward into the British possessions. James River has a course S. of upwards of 400 miles, and falls into the Missouri. Of the rivers which fall into the Mississippi, one of the largest is the Des Moines River, which is navigable for 300 miles from its mouth. Next in size is the St. Peter's River, with its numerous tributaries, which flows about 300 miles S.E., then about 200 miles N.E., and falls into the Mississippi a little below the Falls of St. Anthony. The Skunk River, the Lower Iowa, with its affluent the Cedar River, the Wabepisipimecon River, the Great Macquonetois River, the Turkey River, and the Upper Iowa are also rivers of large size. Of the rivers which flow northward the Red River is the largest; it has a course of from 300 to 400 miles northward before it enters the British possessions, through which it flows to Lake Winnipeg. In the most northern and north-eastern part of the state the country is flat and swampy, and there are numerous lakes.

The soil is exceedingly fertile, and the climate generally healthy. Maize, wheat, barley, potatoes, fruits, wool, tobacco, and furs are the chief products; and lead, copper, zinc, and iron ore are abundant. Portions of the state are occupied by the Ottawa, Chippeway, and several other Indian tribes.

Iowa was separated from Wisconsin in 1838. In 1855 *Fort Des Moines* was made the capital. The state is now being rapidly covered with railways. It is divided into forty-nine counties, and returns two members to Congress. Besides the capital, the chief towns are Iowa, Burlington, and Dubuque.

Iowa, on the river of the same name, has 5214 inhabitants, and a capitol of Grecian-Doric architecture, now used as the state university. It was formerly the capital of the territorial government, and is built on a succession of plateaux rising from the river. It has some state asylums and several factories on the falls of the river.

Burlington, on the Mississippi, 250 miles above St. Louis, has a population of 6706, with a court-house, several churches, and a gaol.

Dubuque is on the right bank of the Mississippi, 70 miles N.E. of Iowa city. It is the emporium of the lead mines of this and the states of Wisconsin and Illinois. Many railways meet here. In 1860 the inhabitants numbered 13,000.

The legislature of Iowa consists of forty-six senators and ninety-three representatives. The senators are elected for four years, and the representatives for two years.

IPECACUANHA (Peruvian, *ipe*, 'a root,' and *cacuan*, the name of this particular plant) is an emetic substance, the root of several plants growing in South America. All the kinds have nearly the same ingredients, but differ in the amount of the active principle which they respectively contain, termed emeta. The best is the annulated, yielded by the *Cephaelis Ipecacuanha*, a small shrubby plant, native of Brazil and of New Granada. Of this sort there are three varieties, namely, the brown, red, and gray, or gray-white, called also greater annulated ipecacuan. As this is the only sort sent from Rio Janeiro, it is sometimes called Brazilian or Lisbon ipecacuanha. It is sent in bales and barrels.

The dust or powder of ipecacuanha applied to any mucous surface causes irritation and increased secretion from the part. It is chiefly employed to excite the stomach either to augmented secretion, or to invert its action, and effect vomiting. It is also capable, by being combined with other substances, of being directed to the skin, and producing increased perspiration. From 15 to 20 grains of the powdered root in an ounce of water is an emetic; one to four grains, a nauseant; and a fourth of a grain to a grain, an expectorant and diaphoretic.

The imports of ipecacuanha into the United Kingdom in 1864 amounted to 59,078 lbs., value 23,359*l*.; and the exports to 45,891 lbs., value 18,165*l*.

IPHICRATES, an Athenian general, who introduced a happy innovation upon the ancient routine of Greek tactics, during that general war which was ended B.C. 387 by the peace of Antalcidas. Iphicrates laid aside the weighty panoply which the regular infantry, composed of Greek citizens, had always worn, and substituted a light target for the large buckler, and a quilted jacket for the coat of mail; at the same time he doubled the length of the sword, usually worn thick and short, and increased in the same, or by some accounts in a greater proportion, the length of the spear. It appears that the men also carried missile javelins, and that their mode of attack was to venture within throw of the heavy column, the weight of whose charge they could not have resisted, trusting in their individual agility to baffle pursuit. When once the close order of the column was broken, its individual soldiers were overmatched by the longer weapons and unnumbered movements of the lighter infantry. In this way Iphicrates and his targeteers (*peltastæ*) gained so many successes, that the Peloponnesian infantry dared not encounter them, except the Lacedæmonians, who said that their allies feared the targeteers as children fear hobgoblins. They were themselves taught the value of this new force, B.C. 392, when Iphicrates waylaid and cut off nearly the whole of a Lacedæmonian battalion. Iphicrates afterwards commanded in the Hellespont, B.C. 389; in Egypt, at the request of the Persians, B.C. 374; relieved Corcyra in 373, and served with credit on other important occasions.

IPOMEA (Gr. *ipa*, 'a worm,' and *homoios*, 'like'), a genus of plants of the natural family of *Convolvulaceæ*, which is very closely allied to

Convolvulus, or Bindweed. The species are very numerous, and found in the tropical parts of Asia, Africa, and America. A few ascend the mountains in such latitudes.

Like the kindred genus *Convolvulus*, which affords us scammony, many of the species of *Ipomœa* are useful for their purgative properties; thus the Jalap plant is of this genus. [*CONVOLVULUS JALAPA*.]

I. Jalapa is a species which has not long been accurately determined, though its root has so long and so extensively been employed as a powerful medicinal agent.

IPS (Gr. *ips*, a wood-piercing insect, so called from *ipto*, 'to destroy'), a genus of coleopterous insects, of the family *Silphidæ*, generally found under the bark of trees.

IPSAMBUL. [*ABOUSAMBUL.*]

IPSWICH. [*SUFFOLK.*]

IRAK ARABI. [*BAGDAD.*]

IRAWADDY. [*BERMA.*]

IRELAND, an island on the N.W. of Europe, forming part of the United Kingdom of Great Britain and Ireland, extends from 51° 26' to 55° 21' N. lat., and 5° 20' to 10° 26' W. long. It is surrounded by the Atlantic on all sides, except the E., where it is separated from Great Britain by St. George's Channel, 47 miles across where narrowest; the Irish Sea, 138 miles; and the Northern Channel, 13 miles. Its shape is that of a rhomboid, the greatest diagonal of which is 302 miles, and the lesser, 210 miles; the greatest length on a meridional line is 225 miles; the greatest and least breadths on parallels of latitude, 174 and 111 miles; comprising an area of 32,509 square miles, or 20,808,271 acres.

Coasts.—The northern, western, and southern coasts are indented with numerous deep and safe bays; the eastern side presents but few suited for large vessels. Their total number has been estimated at fourteen capable of harbouring the largest men-of-war; fourteen for frigates; from thirty to forty for coasting vessels; and twenty-five good summer roadsteads; besides numerous inlets for fishing craft. There are in operation more than sixty coast light-houses, and three floating lights, which are maintained in an efficient state at an expenditure of about 60,000*l*. a year.

The Islands are numerous but small. The total number is 196: the largest are Rathlin and Tory, N.; Achill, Clare, the South Arran Isles, and Valentia, W.; and Whiddy and Cape Clear, S.

Surface.—The greater part of the surface is a plain, not strictly level, but mostly interspersed with low hills. The principal mountain groups are, N.E., the Mourne mountains in Down county—highest, Slieve Donard, 2796 feet above high sea-level; W., the mountains surrounding Clew Bay in Mayo county—highest, Mulrea, 2688 feet; S.W., M'Gillicuddy's Reeks in Kerry county—highest, Carran-Tual, 3414; E., the Wicklow mountains—highest, Lugnaquilla, 3039 feet. The interior of the country is intersected by several lofty ranges, among which the Devil's Bit, Slieve-Bloom, Galtees, Mount Leinster, and Blackstairs, are the most remarkable.

The Rivers are numerous: the principal is the Shannon, 159 miles long, from Lough Allen to Limerick, where it expands into an estuary of 45 miles, opening into the Atlantic; it is navigable through

nearly the whole of its course. The Suir, Barrow, Nore, Blackwater, Slaney, Boyne, Foyle, Erne, Lee, Bandon, Bann, and Moy, are all navigable to a greater or less extent: smaller rivers, serving chiefly for agricultural and domestic purposes, are to be met with in every district.

The Lakes, generally termed loughs, are numerous: the largest, Lough Neagh, in Ulster, covers 98,255 acres; the others more remarkable are, Loughs Erne, Corrib, Mask, Conn, and the Lakes of Killarney. Altogether the lakes in Ireland occupy a surface amounting to nearly 1000 square miles.

Climate.—The climate is temperate and moist. The number of days on which rain fell, as registered at the Ordnance Survey Office, Phoenix Park, was in 1855, 189, in 1860, 210, and in 1863, 212 days. The crops are more frequently injured by excess of moisture than of aridity. Plants which require artificial heat in England, flourish here in the open air; while, owing to the humidity of the atmosphere, many kinds of seeds must be supplied from England or the Continent. This peculiarity of climate is not prejudicial to health; the average of life is much the same as in Great Britain; longevity much greater. The prevalent diseases are low fever and consumption. The mean temperature in the N. is 48° Fahrenheit; in the middle, 50°; and in the S., 52°.

Geology.—The geological structure of Ireland has this striking peculiarity, that most of the great mountain ranges are near the coast, while the central portion is an almost uniform plain, varied only by low hills. The prevailing formations are limestone, granite, mica-slate, clay-slate, old red sandstone, yellow sandstone, and basalt or trap. The limestone extends over the central plain, 120 miles E. and W., from Dublin to Galway Bay, and 120 miles N. and S. Its greatest elevation is about 300 feet, which is the height of the summit levels of the canals that traverse it. The principal tracts of granite are those of Wicklow, Galway, Newry, and Donegal. The mica-slate of Leinster is confined to a narrow fringe, edging the granitic region of the province; in Donegal and Galway it spreads over large tracts. The clay-slate is among the most important rocks, both for extent of area and valuable mineral deposits. The counties of Wexford, Louth, Waterford, Cork, and Kerry, are mostly formed of it. In the north it is contained in the district bounded by a line from Longford to Drogheda, eastward, and to Donaghadee, north-eastward. At Kingscourt, Carrickmacross, and Cavan, the clay-slate dips and forms a basin, in which the limestone and coal formations are deposited. Slate is quarried extensively at Killaloe and Westport, in Clare, and in Wicklow. The old red sandstone is chiefly developed in the south; it forms the greater part of Cork and Waterford counties, and of the inland mountain ranges of Knockmeledon, Comme-ragh, and the Galtees; it shows itself also in several places in Westmeath, Longford, and Leitrim. A large tract of old red and yellow sandstone forms the sea-coast at Killaloe, skirts Loughs Conn and Cullen, and reaches the Atlantic at Westport. An extensive tract in Fermanagh and Tyrone, from Lough Erne to Cookstown, has this rock for its basis. It is also found in patches in Antrim, Derry, and Tyrone. Crystallized gypsum occurs in Derry and Antrim, and selenite at Benburb. Uncrystallized gypsum is raised in

large quantities at Carrickmacross. The yellow sandstone usually accompanies the red, and rests upon it. The basalt or trap occupies a very limited area, being confined almost exclusively to the N.E. portion of the island, forming the substrata of the county of Antrim and of some portions of Derry and Armagh.

Mines, &c.—The principal minerals are coal, iron, copper, lead, and gold. The coal-fields are seven in number: one in Leinster, occupying large portions of Kilkenny and Queen's counties, with a small part of Carlow; two in Munster, one in Tipperary, bordering on that of Kilkenny, the other spread over large portions of Clare, Limerick, Cork, and Kerry counties, being the most extensive development of the coal strata in the British empire. All these beds lie S. of Dublin, and yield only stone coal, or anthracite, which burns without flame. The remaining fields, which lie to the N. of Dublin, are formed of bituminous or flaming coal. Of the northern coal-fields, three are in Ulster—one at Coal Island, near Dungannon, the second in the northern extremity of Antrim county, and the third in Monaghan. They are all small—the narrowness of the seams of coal rendering the last-named almost valueless. The Connaught coal-field extends over portions of Roscommon, Sligo, Leitrim, and Cavan counties. The total quantity of coal raised in Ireland in 1864 was 70,000 tons of anthracite and small coal, and 55,000 tons of bituminous coal. The number of collieries in Ireland is seventy-three, chiefly situated in Kilkenny, Tipperary, and the Queen's County. Only thirty-nine of these are working. Besides the stores of fuel applicable to manufacturing and domestic uses which lie imbedded in the coal-fields, Ireland enjoys two others—lignite, and turf or peat. Lignite, an intermediate species of fuel between wood and coal, is found in dense strata encompassing the southern half of Lough Neagh. The total area of turf bog is estimated at 2,830,000 acres, nearly one-seventh of the surface of the island. Of this quantity, 1,576,000 acres are flat bog, spread over the central portions of the great limestone plain; the remaining 1,254,000 are mountain bog, chiefly scattered over the hilly districts near the coast.

The tracts of peat bog which cover the limestone plain of Ireland seem to be formations occasioned by inequalities of surface. The natural course of streams from springs and rain-falls having been obstructed, stagnant lakes and pools were formed, which promoted the growth of aquatic reeds, grasses, and rushes; and these, by their constant increase and decay, appear to have composed the mass of the bogs in Ireland. The average depth of these bogs is commonly from 16 to 25 feet, but some reach from 30 to 35 feet; and the extreme depth observed is 47 feet.

That fallen forests were not the origin of these peat bogs seems evident from the circumstance, that two and even three successive growths of trees have been observed at different depths in a section of the same bog. In these instances the trees lay horizontally, frequently crossing each other, either attached to their roots or broken over; and in the latter case the stumps usually stood erect. The prostration of trees may, however, to a certain extent, have been an auxiliary in promoting the growth of peat; and

this prostration appears to have taken place either from natural decay, or from trees which possessed little hold of a wet spongy soil having been overturned by storms. This may partly account for trees of all ages being found in the bogs of Ireland, whether these bogs be in plains, or form the immediate cover of high mountain tracts. That Ireland was once covered by extensive forests, even in the more elevated chains, can scarcely be doubted; for numerous stools of trunks, long since cut down, yet remain in most of the mountain districts. The destruction of the forests of Ireland is to be attributed principally to the general introduction of iron furnaces; and the almost total neglect of copping the tracts in which the woods had been felled. The bogs of Ireland have no analogy to the fens of England, as they lie in all cases so far above the sea level as to be readily susceptible of drainage and reclamation. Notwithstanding their moisture they are not insubrious, owing to the large quantity of tannin which they contain; and such are their antiseptic properties, that bodies of men and animals have been found in them with but few symptoms of decay, after the lapse of generations.

Iron ore is found in all the localities of coal, and was largely manufactured while timber for fuel was abundant, but there are now only a few mines working. The total yield of ore in 1864 was 60,602 tons, value 20,326.

In 1864 the mines of Wicklow produced 66,894 tons of iron pyrites, valued at 37,320*l.*; and from the Belfast district considerable quantities of black band ironstone are now shipped to Scotland.

The copper mines are distributed throughout the clay-slate districts in a great number of localities. The quantity of Irish copper ore sold at Swansea in 1864 was 14,237 tons, valued at 122,000*l.*

Lead is more extensively diffused through Ireland than copper. The granitic district of Wicklow contains numerous veins. The clay-slate districts also yield numerous indications of this metal, but few of the mines have proved profitable. The quantity of lead raised in 1864 was 441 tons, containing 15,534 ounces of silver.

The value of silver produced from ores raised in Ireland during the years 1859-64 was 22,467*l.*, at 5*s.* 6*d.* per ounce.

Tin stone has been found in the auriferous soil of Wicklow, but no veins or working deposits have been discovered. Zinc was obtained at the Silver Mines in Tipperary in 1860.

Other minerals, useful in manufactures and the arts, and found in quantities in various parts of the country, are manganese, antimony, nickel, tin, alum, clays of various kinds, building stone, marble, flags, and roofing slates.

Salt rock has latterly been worked near Carrickfergus. The quality is said to be superior to the Cheshire rock-salt, and the present annual produce is about 20,000 tons.

Agriculture, &c.—Ireland is essentially an agricultural country; and upon the cultivation of the soil the mass of the people depend for their subsistence. It was almost exclusively a pasturing country until the middle of the last century. That the soil of Ireland is, however, eminently fitted for tillage, appears from the evidence of every intelligent person qualified to

give a sound opinion, who has visited the country. Arthur Young, who travelled through it in 1776-78, says of Limerick and Tipperary—'It is the richest soil I ever saw.' Wakefield, in his 'Statistical Account of Ireland,' says, 'Ireland may be considered as affording land of excellent quality: some places exhibit the richest loam I ever saw turned up by a plough.' And the late Mr. McCulloch, in his valuable work on the 'Statistics of the British Empire,' confirms these statements. 'The luxuriance of the pastures,' he writes, 'and the heavy crops of oats that are everywhere raised, even with the most wretched cultivation, attest its extraordinary fertility.' Natural manures abound in most districts. The greatest portion of the soil lies on a substratum of limestone; marl is raised in many places, as is gypsum or sulphate of lime; coralline sand and seaweed are collected along the shores.

In the ten years from 1851 to 1861, no less than 784,952 acres of bog were reclaimed and converted into grass land. But land under bog and waste must not be considered as altogether unprofitable, as the large areas of bog distributed throughout the country afford the necessary fuel at a cheaper rate than coals could be procured.

The tenure of landed property in Ireland varies considerably. Formerly the custom prevailed of granting leases either in perpetuity, for 999 years, or for lives renewable for ever, with or without renewal fine. Hence some of the owners of very large estates receive a very small share of the actual profits. The leases commonly granted at present are for sixty-one, thirty-one, or twenty-one years, with very frequently a life or lives. Landlords ordinarily neither erect nor repair the farmsteads, and the maintenance and improving of the farm is, in too many instances, thrown on the tenant. Estates are of every extent, from a very small quantity to a very large number of acres. Grazing farms are large; the arable in general small, particularly in Ulster, in which province much of the land in several counties, particularly in those where the domestic manufacture of linen prevails, is parcelled out into very minute subdivisions. The practice of taking into cultivation large tracts of mountain bog or other land hitherto unreclaimed, is now very prevalent. The cottier system, by which the occupying tenant receives a patch of land in part or whole payment of wages, and that of rundale, in which a large tract is held by a number of individuals in common, are still kept up, though by no means to such an extent as formerly.

Few of even the moderate-sized farms are entirely under tillage, and the extensive farms, especially in the western and some of the midland counties, are devoted exclusively to pasture, or have a small portion of arable attached to a large share of permanent pasture. The farm buildings are therefore suited to these circumstances, and present a marked contrast to English and Scotch steadings erected for farms of similar extent and fertility.

Though now improving, the general husbandry of Ireland has long been in a backward state, owing to the minute divisions of land, the system of subletting, and the undue dependence of tenants upon landlords or their agents. To the effect of these circumstances in discouraging enterprise and paralysing effort, political agitation in time past contri-

buted. Besides the cereal produce, of which oats form the largest crop, as suited to the moisture of the climate, a considerable extent of surface is devoted to the growth of flax for the linen trade, chiefly in the northern province of Ulster, with limited spaces in other quarters. The light calcareous soil, the softness of the climate, and the fresh breezes which fan the island from the Atlantic, tempering the heat of the summer sun, conduce to the health and perfection of that delicate plant. It is usually sown in March or April, flowers about the beginning of July, and is considered ripe towards the end of August. The extent of land devoted to flax cultivation had steadily increased from 91,646 acres in 1858 to 301,693 in 1864. With a view to promote its cultivation in the south and west, the government granted in 1864 a sum of 2000*l.*, and in the following year 3000*l.*, to send out instructors to teach the farmers, and a great impetus was thus given to its growth. Among the green crops are potatoes, which had long formed the staple food of the Irish peasantry, till their memorable failure in 1845-47, when a government grant of 10,350,000*l.* was found necessary to prevent starvation.

Dairy produce and live stock, consisting of cattle and swine and poultry, are exported to an immense extent. The pig, especially, is an inmate of almost every peasant's cabin, is remarkably docile, and as carefully provided for as any member of the family. The animals are sent in large numbers to Bristol and Liverpool; and after supplying the local demands, the surplus stock, alive or cured, is sent to the metropolitan and other inland markets. The following table shows the extent under each of the principal crops in 1863 and 1864, and the increase or decrease in the latter year:—

Crops.	Extent Cultivated in		Increase or Decrease in 1864.	
	1863.	1864.	Increase.	Decrease
	Acres.	Acres.	Acres.	Acres.
Wheat, . . .	260,311	276,483	16,172	—
Oats, . . .	1,953,883	1,814,586	—	138,997
Barley, . . .	171,892	172,700	808	—
Bere and Rye, .	8,659	8,594	235	—
Potatoes, . . .	1,023,414	1,039,724	16,310	—
Turnips, . . .	351,436	337,355	—	14,081
Mangel Wurzel,	16,320	14,073	—	2,247
Cabbage, . . .	34,125	31,821	—	2,304
Flax, . . .	214,089	301,693	87,594	—
Hay, . . .	1,560,638	1,609,569	48,931	—
Total Increase,	5,594,777	5,607,198	12,421	

The total number of cattle in Ireland in the year 1864 was 3,257,309, being an increase of 113,078 over 1863; number of sheep, 3,363,068, being an increase of 54,864. In horses there was a decrease in 1864, the total number being 564,361, which was 18,617 less than in 1863; and pigs also decreased, the number amounting to 1,056,245, being 11,209 less than in 1863. The total value of live stock in Ireland in the year 1864 was computed at 30,085,082*l.* In 1859 its value was 35,368,259*l.*, showing a falling off to the extent of more than 5,000,000*l.* within a period of five years; but in 1865 the number again increased, and it may be observed that during the last ten years the oscillations

in the sum of the whole value of stock have pretty nearly balanced themselves, being a little above 30,000,000*l.*

Botany.—Generally speaking, the botanical characteristics of Ireland are identical with those of Great Britain. The oak, however, does not flourish, and the principal trees are the birch, aspen, alder, willow, blackthorn, and elm.

Ireland once had the name of the Island of Woods, from being covered with forests, and latterly acquired the poetical name of the Emerald Isle, from the perennial brilliancy of its verdure. Its Flora contains some rare varieties; the *Arbutus unedo* flourishes in Killarney; varieties of saxifrage and of ferns are found in the mountains of Kerry; Connemara, Benbulbin Mountain in Sligo, and Antrim county, abound in scarce Alpine plants; rare and hitherto unknown species of algæ have been discovered on various parts of the coast.

Zoology.—None of the larger carnivorous quadrupeds are found in Ireland, though the wolf and the bear were common up to a comparatively recent date. The fox is rare; and the badger and the otter are seldom met with, except in the neighbourhood of the Lakes of Killarney. The wild cat haunts the wooded districts, and two or three varieties of the weasel and marten occur.

The common squirrel has only recently been introduced. Of hares and rabbits numerous varieties exist, and in many localities their 'name is legion.' The mole is not found in Ireland, and while it can boast of the red deer, it lacks the roebuck. The fossil remains of a large species of deer, commonly known as the Irish elk, are frequently discovered in boggy localities. The golden eagle inhabits the wild mountainous districts.

The elk, or moose deer, was a native of the country; its bones have been found in several places: wolves were once so numerous that a price was set upon them, and the Irish wolf-dog kept for hunting them. Venomous animals are unknown; the moisture of the climate is destructive to them.

As is well known, from a tradition associated with St. Patrick, no snakes occur in Ireland; and the only reptiles which it possesses are a single species of lizard, and four of the order of *Batrachians*.

Fisheries.—Bounties to encourage the fisheries of Ireland, granted in 1764, and continued for several years, failed to place them on a productive footing. The experiment was repeated in 1819, when commissioners were appointed, with power to grant bounties to persons building fishing boats of a certain tonnage, and for the curing of herring and some other kinds of fish. An annual sum of 5000*l.* was placed at their disposal, the application of which was afterwards limited to the building of piers and the repairing of boats; a large portion of the grant was also employed as a loan fund, to enable the poorer fishermen to procure the necessary gear on advantageous terms. The commission was revoked in 1830, and no further measures were adopted respecting the fisheries until 1842, when the Board of Public Works were appointed commissioners for their improvement and regulation. The country is portioned out into forty coast fishery districts, and seventeen salmon and inland fishery districts. In 1848 the Act of 11 & 12 Vict., c. 92, passed, which first imposed a

license duty on all engines used for the capture of salmon and trout, and constituted, for the first time, an organized body for the general protection of the salmon fisheries. The amount of license duty paid in Ireland in 1864 was 7002*l*.

The number of vessels and hands engaged in the sea fisheries in 1864 was:—

Vessels and boats, ...	9,300
Men and boys, ...	40,946

The herring fishery is prosecuted chiefly on the east coast of Ireland by a fleet of between 200 and 300 vessels from Cornwall, which for several weeks continue profitably employed in the capture of fish for the Dublin and Liverpool markets. The native fishermen of Howth are now successfully competing in energy and skill, number and character of boats, and superior fishing equipments. The Irish markets are still extensively supplied with cured fish from Scotland and the Isle of Man. The number of barrels of herrings imported into Ireland in 1864 was 55,420.

Notwithstanding that in her sea fisheries Ireland has an almost unbounded source of wealth—for there are unlimited supplies of cod, ling, hake, herring, pilchards, &c.—yet strange to say, they are comparatively neglected. An Irish sea fishery company under the Limited Liability Act has just been established (1866) for the purpose of developing the great resources of the fisheries on the Irish coast.

Trade and Commerce.—The staple manufacture of Ireland is that of linen, which has long been established in the country, and to promote which has always been a favourite idea with the government. It was formerly carried on chiefly by hand-loom at the homes of the weavers, and at one time had begun to seriously decline, but of late years it has greatly revived in consequence of the application of machinery to the spinning of yarn, and of the introduction of the power-loom in weaving. The export of linen yarns and linen manufactures from Ireland to Great Britain and foreign countries, was in 1862, 6,292,000*l*.; in 1863, 8,084,000*l*.; and in 1864, 10,327,000*l*. The number of spindles in operation for spinning flax in Ireland, in 1864, was 761,060; 200,000 persons are altogether employed in connection with the trade, and the amount invested in buildings, machinery, and the requisite floating capital, is estimated at 3,000,000*l*. The estimated quantity of flax grown in Ireland in the seven years ending 1864 was 216,897 tons, or on an average 30,985 tons per annum. The number of acres sown in 1863 was 214,092; the average product, 64,227 tons. In 1864 there were 301,693 acres, or an increase of 87,594 acres. The trade is almost entirely confined to the province of Ulster—the town of Belfast being the principal seat of its manufacture.

A great source of employment for females has recently sprung up in the North of Ireland, in the working of patterns on muslin with the needle. Belfast is also the centre of this manufacture, which employs about 300,000 persons, chiefly females, scattered through all the counties of Ulster and some localities of the other provinces. About forty firms are engaged in the trade, some being Irish houses and others agents for Scotch firms, and the gross value of the manufactured goods amounts to about 1,400,000*l*.

Cotton, woollen, silk, and paper manufactures are

carried on in different parts of the country, but only to a comparatively limited extent, the Irish character not being suited to the restraints and confinement necessary both to factory life and mining operations.

The exportation of the agricultural produce of the country has always been the principal commercial business carried on in Ireland. During the revolutionary war, the country furnished a large share of the provisions for the army and navy, and it still sends supplies to the colonial markets. But Great Britain is by far the best and most extensive market for all sorts of Irish produce. By much the greater part of the export trade is carried on by the cross-channel navigation, chiefly to Liverpool, Bristol, and Glasgow, the staple articles being black cattle, sheep, swine, salted provisions, grain, flour, butter, eggs, and linen. The trade with the colonies and with foreign parts is comparatively inconsiderable. The cessation of the collection of the duties on the cross-channel trade, which took place in 1825, has taken away the means of estimating the amounts of imports and exports to and from Great Britain since that period.

The number of vessels registered as belonging to Ireland is 2300, of about 250,000 tons burthen. The total entries at the different ports in 1864 were 27,518 (4,084,613 tons), and the clearances 13,665 (2,722,592 tons).

Railways, Telegraphs, and Canals.—The chief features of the railway system in Ireland are—1st, the gauge, which is 5 feet 3 inches, and is compulsory; 2nd, the heavy weight of rails (on some lines 90 lbs. per yard), the permanent character and moderate cost of the works generally, and a singular and almost entire freedom from tunnels. The average cost of the lines that are open has been, including carrying stock, &c., about 16,000*l*. per mile. The Irish railways are exempt from passenger duty, and have participated to a considerable extent in the government loans. The portion of capital in Irish railways held by resident proprietors has been estimated at 1,500,000*l*. in 1841, at 11,000,000*l*. in 1859, and at 13,000,000*l*. in 1865. There are now (1866) nearly 2000 miles open.

Lines of electric telegraph wires connect the principal towns, and submarine communication has existed between Ireland and England for many years.

The principal canals of Ireland are the Royal Canal, commenced in 1789, from Dublin to Tarmonbarry, on the Shannon, with a branch from Killashee to Longford; total length, ninety-seven miles; the Grand Canal, commenced in 1765, from Dublin to the Shannon at Shannon Harbour. It has several branches. The length of the main trunk, from the Liffey to the Shannon, is eighty miles, and thence to Ballinasloe, fifteen miles, being ninety-five miles in a western direction; that of all the branches is 65½; total length, 160½. The Ulster Canal proceeds from Charlemont, on the Blackwater river, by which it communicates with Lough Neagh, and passing by Monaghan and Clones, enters the upper Lough Erne. Its length is forty-eight miles.

Shannon Navigation.—The River Shannon rises in Quilca Mountain, in Leitrim county, passes southward between Connaught and Leinster to Limerick, forming in its course several large lakes, the principal of which are Loughs Allen, Reagh, and Derg, and turning westward, discharges itself into the Atlantic

through a large estuary between the counties of Clare and Kerry, a distance of 254 miles. The navigation is open for traffic throughout its entire length, between the northern extremity of Lough Allen and Limerick, a distance of 143 miles in a direct course; but by adding the Boyle branch of nine miles, and the Strokestown branch of six miles, a total length of river and canal navigation of 158 miles is now open; of which 129 miles, viz., from Killaloe to Leitrim, including the two branches above mentioned, are suited to the navigation of large steamers. In the main river of 115 miles the entire fall amounts only to thirty-five feet, which has been overcome by the erection of five locks. This important navigation, which occupies nearly a central position between the east and west coasts of Ireland, is connected with Dublin by means of the Grand and Royal Canals.

Incumbered Estates.—Much of the land in Ireland having long been so loaded with debt that improvements were well-nigh impossible, and many of the proprietors being reduced to a chronic state of bankruptcy, in 1848, the Act 11 & 12 Vict., c. 48, to facilitate the sale of incumbered estates in Ireland, was passed, but owing to the defectiveness of its construction it proved wholly inoperative; and in the following year it was superseded by the Act of 12 & 13 Vict., c. 77. Under the provisions of this Act a royal commission was issued, with the title of 'The Commission for sale of Incumbered Estates in Ireland,' having three commissioners appointed by the Crown; and to be a court of record, with powers to frame rules for regulating its proceedings.

The commissioners commenced their sittings in October, 1849. The total number of petitions presented in the eight years ended 31st August, 1857, was 4413. Of these 1363 were lodged by owners; and the court made 3547 absolute orders for sale. The first sale was held on the 21st of February, 1850.

The gross amount produced by sales from October, 1849, up to August, 1859, was 25,190,839*l*. The court distributed to creditors 24,229,027*l*., inclusive of 3,692,611*l*. allowed to incumbrancers who became purchasers. A sum of 961,809*l*. remained at that date in hand to satisfy unadjusted claims.

In 1858, an Act was passed extending the powers of the Incumbered Estates Court for the sale of incumbered properties to properties that are unincumbered. By this Act the judges and officers of the former court are transferred to a new court, called 'The Landed Estates Court,' which commenced its sittings on 1st November. Since this date the amount of sales made by the court have been nearly 10,000,000*l*., so that altogether by means of these tribunals land of the value of 35,000,000*l*., and comprising one-seventh of the whole area of Ireland, has within the last seventeen years been brought into the market and transferred from necessitous to solvent hands.

Political Divisions and Population.—Ireland is now divided into the four provinces of Leinster, Munster, Ulster, and Connaught; Meath being merged into Leinster and Ulster. These are subdivided into thirty-two counties, besides the eight small exempt jurisdictions of Dublin, Cork, Kilkenny, Limerick, Waterford, Carrickfergus, Drogheda, and

Galway; the first five of which are styled counties of cities, the remaining three, counties of towns. The counties are divided into 316 baronies, and again into 2422 parishes. The smallest political divisions are called townlands, and in some parts, ploughlands. Irrespective of those divisions the whole of the country is divided, under the Poor Law Act, into 163 unions, subdivided into 3439 electoral divisions.

The following is the area in acres and population enumerated in 1851 and 1861, in each county and county of a city or town (including the army and navy serving in Ireland):—

Provinces, Counties, and Cities.	Area in Statute Acres.	Population.		Increase or Decrease in the Number of Persons between 1851 and 1861.	
		1851.	1861.	In- crease.	De- crease.
LEINSTER.					
Carlow, . .	221,293	68,075	57,137	—	10,638
Dublin, . .	222,709	146,631	155,444	8,813	—
Dublin City,	3,593	258,361	254,808	—	3,553
Kildare, . .	418,415	95,724	90,946	—	4,778
Kilkenny, .	506,332	138,773	110,341	—	28,432
Kilkenny C.	921	19,973	14,174	—	5,799
King's, . .	493,019	112,080	90,043	—	22,037
Longford, .	257,222	82,350	71,694	—	10,656
Louth, . .	200,955	90,812	75,973	—	14,839
Drogheda T	441	16,845	14,740	—	2,105
Meath, . .	578,247	140,750	110,373	—	30,377
Queen's, .	424,554	111,623	90,650	—	20,973
Westmeath,	433,769	111,409	90,879	—	20,530
Wexford, .	573,200	180,159	143,951	—	36,205
Wicklow, .	499,894	98,978	86,479	—	12,499
Total, .	4,834,865	1,672,543	1,457,635	—	214,908
MUNSTER.					
Clare, . .	768,265	212,428	166,305	—	46,123
Cork, . .	1,836,655	563,158	464,697	—	98,461
Cork City,	2,266	85,745	80,121	—	5,624
Kerry, . .	1,159,536	238,239	201,800	—	36,439
Limerick, .	660,898	208,688	172,801	—	35,887
Limerick C,	2,074	53,448	44,476	—	8,972
Tipperary,	1,048,969	331,487	249,106	—	82,381
Waterford,	455,773	138,754	110,959	—	27,795
Waterford C	533	25,297	23,293	—	2,004
Total, .	5,934,789	1,857,244	1,513,558	—	343,686
ULSTER.					
Antrim, . .	690,225	249,459	247,564	—	1,895
Belfast T.,	5,637	103,607	121,602	18,935	—
C'kfergus T.,	16,702	8,520	9,422	902	—
Armagh, . .	312,328	196,085	190,086	—	5,998
Cavan, . .	466,261	174,071	153,906	—	20,165
Donegal, .	1,189,979	255,160	237,395	—	17,765
Down, . .	609,811	319,972	299,302	—	20,670
Fermanagh,	417,781	116,007	105,768	—	10,239
Londond'y,	513,388	191,868	184,209	—	7,659
Monaghan,	318,734	141,753	126,482	—	15,276
Tyrone, . .	778,944	255,819	238,500	—	17,319
Total, .	5,319,790	2,011,786	1,914,236	—	97,550
CONNAUGHT.					
Galway, . .	1,498,593	298,564	254,511	—	44,053
Galway T.,	617	23,695	16,967	—	6,728
Leitrim, . .	376,213	111,915	104,744	—	7,171
Mayo, . .	1,321,281	274,830	254,796	—	20,034
Roscommon,	585,407	174,492	157,272	—	17,220
Sligo, . .	451,086	128,510	124,845	—	3,665
Total, .	4,233,197	1,012,006	913,135	—	98,871
Total Ireland.	20,322,641	6,553,579	5,798,967	—	754,612

The following is the number of the inhabitants of Ireland according to computations made at various times :—

Year.	Population.	Increase.	Decrease.
1672	1,320,000	—	—
1695	1,034,102	—	285,898
1726	2,309,106	1,275,004	—
1754	2,372,634	63,528	—
1767	2,544,276	171,642	—
1788	4,040,000	1,495,724	—
1792	4,088,226	48,226	—
1805	5,395,456	1,307,230	—
1814	5,937,856	542,400	—
1821	6,801,827	863,971	—
1831	7,767,401	965,574	—
1834	7,954,100	186,699	—
1841	8,175,124	221,024	—
1851	6,552,385	—	1,622,739
1861	5,798,967	—	753,418

The returns for 1861 give a density of population of 181 inhabitants per square mile, showing that Ireland is more thickly populated than France, but slightly less than Germany. Of the population in 1861, there were 2,837,370 males and 2,961,597 females. The decrease was $11\frac{1}{2}$ per cent. during the ten years from 1851.

The decrease is most apparent in the city of Kilkenny and town of Galway, and the counties of Tipperary, Wexford, Meath, Kilkenny, King's, Clare, Waterford, and Cork. The only localities in which an increase of population has taken place are Dublin county, and the towns of Carrickfergus and Belfast, in which latter locality it amounts to 20,476 on the returns for 1851. The decrease in the number of families between 1841 and 1851 was 268,468, or 18·23 per cent.

The earliest known inhabitants of the island were of Celtic origin; these intermixed in the south and west with Milesian tribes from Spain; in the maritime districts of the east and south-east, with Danes and Anglo-Normans; and in the north with the Scotch, who settled there in great numbers in the reign of James I.; subsequently, many English families settled in the country, and small colonies of French emigrants settled in Dublin, the Queen's county, and Lisburn in Antrim; some Germans, called Palatines, in Tipperary.

Public Works.—The Board of Public Works in Ireland has in charge the disposal and regulation of the loans and grants for public works, landed improvements, and drainage; also the expenditure for public buildings, roads and bridges, fisheries, piers and harbours, and certain lines of inland navigation.

The drainage works executed through the medium of loans under the Land Improvement Acts, have, as a whole, been tolerably successful; and improvements in agriculture, especially in the spread of rotative husbandry and the introduction of green crops, have generally followed the completion of the works. A number of loans which had been sanctioned have been relinquished or cancelled by the Board, in consequence of which a sum amounting to 250,000*l.* remains unappropriated out of the fund of 2,000,000*l.* voted by Parliament for the Land Improvement service.

The total area that has been thorough-drained amounts to 250,000 acres, which has been effected at an average cost of 5*l.* per acre.

Government.—The executive government is vested in a lord lieutenant, assisted by a privy council, appointed by the Crown and indefinite in number, the bishop of Meath being always one, *ex officio*; and by a chief secretary, a member of the House of Commons. In the absence or vacancy of the lord lieutenant, his place is supplied by lords justices, who generally are the primate or the archbishop of Dublin, the lord chancellor, and the commander of the forces. Each county is in charge of a lord lieutenant, generally a peer, an indefinite number of deputy lieutenants and magistrates, who act gratuitously, and one or more resident paid magistrates, all appointed by the Crown during pleasure. The counties of cities and towns, and the boroughs, are governed by their own magistrates.

Representation.—The country is represented in the Imperial Parliament by 4 Spiritual and 28 Temporal Peers, and 105 Commoners; of which latter class 64 represent the 32 counties, 2 Dublin University, 12 the cities and towns of Dublin, Cork, Limerick, Waterford, Belfast, and Galway, and 27 the boroughs. The Act 13 & 14 Vict., c. 69, was passed in 1850 to amend the representation; and in addition to those persons previously qualified to register and vote in county elections, occupiers of any tenements rated in the last poor rate at a net annual value of 12*l.* and upwards, are entitled to vote in elections for counties, also owners of certain estates of the rated net annual value of 5*l.* In boroughs, occupiers rated in the last poor rate at 8*l.* and upwards are entitled to vote, subject to certain limitations. By this Act the polling at contested elections is to continue in counties for two days only, and in cities and boroughs for one day only. The number of electors was, by the last returns, 172,000 in the counties, and 30,000 in the cities and boroughs; total, 202,000.

Religion and Education.—By a special provision, inserted in the Act 23 & 24 Vict., c. 62, for taking the census of Ireland upon April 8, 1861, it was ordered that there should be an inquiry into the religious creed of the population. It was the first occasion on which this subject formed a portion of the decennial census; nevertheless, it is stated to have given rise to few, if any, complaints and objections. The return, therefore, may be admitted as tolerably correct. The numbers in the principal religious denominations, as estimated by the commissioners of public instruction in 1834, and ascertained by the census commissioners in 1861, were as follows:—

Profession.	1834.	1861.
	Number.	Number.
Established Church, . .	853,160	693,357
Roman Catholics, . . .	6,486,060	4,585,265
Presbyterians, ...	643,058	523,291
Protestant Dissenters, .	21,822	76,661
Jews, ...	—	398
Total, ...	7,954,100	5,798,967

In 1834 there were 100 Roman Catholics to 13·25 members of the Established Church, and in 1861 the proportion was 100 to 15·38.

Previously to the Church Temporalities Act, 3 & 4 Will. IV., c. 37, the country was divided for eccle-

statistical purposes into four archbishoprics, nearly identical with the four civil provinces, but taking their names from the cities which were the seats of the sees. By that Act the archbishoprics of Cashel and Tuam were reduced to bishoprics, and the whole of Ireland divided into two provinces, by a line drawn from the north of Dublin county to the south of Galway bay, and the bishoprics were reduced to ten.

The revenues of the suppressed bishoprics, together with those of suspended dignities and benefices, and disappropriated tithes, were vested by the Church Temporalities Act in the Board of Ecclesiastical Commissioners, to be applied by them to the erection and repairs of churches, to the providing for the church expense which had been defrayed by vestry rates, and to other ecclesiastical purposes. The revenues of the suppressed sees are now nearly £70,000 per annum—the income of the Commissioners being altogether over £150,000.

From a recent parliamentary return it appears that the number of adherents to the Established Church, and the income of the several Irish dioceses in 1834 and 1861 were as follows:—

Dioceses.	Number of Members of the Established Church in		Revenues of the Estab. Church in each Diocese in
	1834.	1861.	1861.
Armagh and Clogher, . .	207,371	150,386	£82,930
Dublin and Kildare, . .	120,506	112,766	55,103
Meath, ...	25,626	16,321	34,828
Derry and Raphoe, . .	83,857	65,603	56,153
Down, Connor, & Dromore,	136,650	152,722	44,785
Kilmore, Elphin, & Ardagh,	81,046	53,165	47,410
Tuam, Killala, & Achonry,	22,755	17,156	27,539
Ossory, Ferns, & Leighlin,	57,424	35,663	62,248
Cashel, Emily, Water- ford, and Lismore, . .	19,307	13,853	43,093
Cork, Cloyne, & Ross, . .	55,156	43,228	65,423
Killaloe, Kilfenora, Clon- fert, & Kilmacduagh, }	24,801	15,906	28,789
Limerick, Ardfer, and Aghadoe, ... }	18,651	15,103	32,117
Total, ...	853,160	691,872	£580,418

The Roman Catholic hierarchy consists of four archbishops, whose sees are in Armagh, Dublin, Cashel, and Tuam, and twenty-four bishops. [BISHOPRIC.] The bishops are nominated by the pope, generally from a list of names submitted to him by the bishops of the province and the clergy of the vacant diocese. In case of expected incapacity from age or infirmity, the bishop names a coadjutor, who is usually confirmed by the pope. Every diocese has a dean and an archdeacon, the former appointed by the cardinal protector at Rome, the latter by the bishop; but these dignities are without jurisdiction or emolument. The whole of the clergy are supported solely by the voluntary contributions of their flocks. The episcopal emoluments arise from the parish in which the bishop officiates, from marriage licenses, and from the cathedraicium, an annual sum varying from 2*l.* to 10*l.*, paid by each incumbent in the diocese. The parochial clergy are nominated exclusively by the bishop. The number of priests in Ireland in 1864 was 2291, of whom 1222 were educated at Maynooth College. Their incomes arise from fees on marriages,

baptisms, and deaths, on Easter and Christmas dues, and from incidental voluntary contributions, either in money or labour. All the places of public worship are built by subscriptions. There are numerous monasteries and convents; the latter are supported partly by sums, usually from 300*l.* to 500*l.*, paid by those who take the vows in them, and partly by the fees for the education of the daughters of respectable Roman Catholics. The friars and nuns also devote themselves to the gratuitous education of the children of the poor. Candidates for clerical ordination, formerly under the necessity of obtaining their education in continental colleges, are now educated at home; the principal clerical colleges are the Royal Colleges of St. Patrick, Maynooth, supported by grants of public money and by pensions from the students, the Catholic University, Dublin, and the College of St. Patrick, Carlow, and St. Jarlath, Tuam, by voluntary contributions.

The Presbyterians, who are found chiefly in Ulster, are formed into congregations, each of which is under the ecclesiastical government of a court called a session, consisting of the minister and elders of the congregation. An indefinite number of the ministers of these congregations, with a lay elder for each, constitutes a presbytery, which has the charge of the congregations represented in it. Delegates from each of these presbyteries, consisting of all the ministers, with a lay elder for each, constitute the general assembly, which is presided over by a moderator chosen annually, and regulates the ecclesiastical concerns of the body. The General Assembly of the Presbyterian Church in Ireland comprises about 550 congregations, arranged under 40 presbyteries. The ministers are supported by voluntary contributions, the rents of seats or pews, and the *Regium Donum*, or royal gift, first granted in 1672 by Charles II., who gave 600*l.* of 'secret service money' to be distributed in equal portions among them annually. The grant was discontinued towards the close of his reign and during that of James II., but was renewed by William III., who augmented it to 1200*l.* a year. In 1784 the amount was increased to 2200*l.*; in 1792 to 5000*l.*; and in 1803 a classification was made according to the number of families in each congregation and the amount of the minister's voluntary stipend, by which those of the 1st class received 100*l.* annually; of the 2nd, 75*l.*; and of the 3rd, 50*l.* In 1831 the system of classification was altered, and 35 (1st class) ministers now receive 92*l.* 6*s.* 2*d.* each, and 512 (2nd class), 69*l.* 4*s.* 8*d.* each, per annum. As the ministers in the first class die, their successors will only receive the latter amount. The number of members of other denominations of Protestant dissenters in Ireland is very limited.

The institutions for communicating instruction are—the University of Dublin; the Queen's Colleges of Belfast, Cork, and Galway, in connection with the Queen's University in Ireland (established in 1850); the College of St. Columba, near Dublin; the General Assembly's College, Belfast; the Belfast Academical Institution; the Roman Catholic University, Dublin; the Roman Catholic Colleges of St. Patrick, Maynooth; St. Jarlath's, Tuam; St. Patrick's, Carlow; Armagh, and Thurles; St. Kyrn's, Kilkenny; Clongowes, Clane, and the Missionary College of All Hallows, Drumcondra, near Dublin; endowed

schools, parochial school, national education schools, church education schools, &c.

In 1833 the grants of public money for the education of the poor were intrusted to the charge of the lord lieutenant, to be expended on the instruction of the children of every religious denomination, under the superintendence of commissioners appointed by the Crown, and named 'The Commissioners of National Education.' The principles on which the commissioners act are, that the schools shall be open alike to Christians of every denomination; that no pupil shall be required to attend at any religious exercise, or to receive any religious instruction which his parents or guardians do not approve, and that sufficient opportunity shall be afforded to the pupils of each religious persuasion to receive separately, at appointed times, such religious instruction as their parents or guardians think proper. This system of united education is one which does not exclude children of any denomination, while it admits to a participation of its benefits those of every religious creed who may wish for instruction without interfering with any conscientious scruples. The duty of the commissioners consists, therefore, in guarding against any infraction of these fundamental principles from any quarter; in establishing regulations as to details, so as best to secure the general efficiency of the system; and in granting or refusing assistance to every applicant, for erecting and maintaining suitable buildings for schools, and for furnishing them with books and other requisites.

In 1845 the commissioners were incorporated under the name of 'The Commissioners of National Education in Ireland,' with power to hold lands to the yearly value of 40,000*l.*, to erect and maintain schools where, and as many as they shall think proper, to grant leases, &c. The commissioners (who must not be more than fifteen in number, and are removable at the pleasure of the lord lieutenant) being enabled, under this charter, to accept conveyances of property in their corporate capacity, have resolved, in every case of making a grant for building a national school-house, to take upon themselves the trust for the public, and the charge of repairs; leaving the local managers, who in general are not the trustees, the rights they now possess as to the appointment and removal of teachers, and the general regulation of the school.

The number of schools under the superintendence of the commissioners in 1834 was 1106, with 145,521 pupils on the rolls, and having a parliamentary grant of 35,000*l.* In 1864 the schools had increased to 6263, the pupils to 870,401, and the parliamentary grant to 251,016*l.*

According to the census of 1861, the proportion of the population able to read and write had risen, since 1851, from 33 to 41 per cent.; the number of those who could read only remained stationary at 20 per cent.; and the number of those who could neither read nor write had fallen from 47 to 39 per cent.

Judicial Divisions and Criminal and Pauper Statistics.—The judicial establishment of Ireland consists of the Chancellor, the Lord Justice of the Court of Appeal in Chancery, the Master of the Rolls, four judges in each of the Courts of Queen's Bench, Common Pleas, and Exchequer, those of the Exchequer being styled Barons, three judges in the

Landed Estates Court; the Bankrupt and Insolvent Court, with two judges, and the judges of the Courts of Probate and Admiralty; and a Chairman of Quarter Sessions for each county, the county of Cork having two. The superior courts are held in Dublin; their terms of sitting are Hilary, Easter, Trinity, and Michaelmas. Two of the judges hold assizes for criminal and civil pleas, in each county, in spring and summer every year, for which purpose the country is divided into six circuits. Two of the judges also hold a general gaol delivery for Dublin every six weeks.

The decrease in the number of criminals in Ireland during the last fifteen years is altogether unexampled—amounting altogether to 60 per cent. In 1850 not less than 17,108 persons were convicted of various offences; in 1855 the number had been reduced to 5220, and in 1860 to 2979. In 1865 there was a slight increase on the latter number—the convictions then being 3000. This satisfactory result is no doubt partly due to the improvement of the police and judicial organization; but, besides being a sign of social progress, it must in a great measure be credited to Sir Walter Crofton's system of prison discipline, which is a plan of preparing men for liberty and for an honest life by a gradual emancipation earned by their own good conduct. It has gone far to abolish the class of regular criminals; and from an inquiry just instituted by a distinguished English philanthropist, it has been ascertained that the employers of the released convicts in Dublin—builders and other tradesmen—universally testify to the completeness of the reformation of the men who were once professed thieves and felons. One only form of crime remains beyond the reach of any force yet in action—the cruel 'agrarian murders,' which year after year, as the autumn closes, send desolation into one home after another. In the matter of pauperism, also, the improvement of the country is very clearly proved by the returns. The total number of persons in receipt of relief in 1850 was 307,970; in 1865, only 69,217.

Military Divisions.—The staff of Ireland consists of the departments of commander of the forces, adjutant-general, and quartermaster-general, under which are those of the judge-advocate-general and medical director-general. The military divisions are according to the following districts:—Dublin, or Northern District, Dublin; Cork, or South-Western District, Cork. For Recruiting Service—Northern District, Head-quarters, Belfast; Centre District, Dublin; Southern District, Cork. The number of troops stationed in Ireland in 1864 was 24,000.

The Militia of Ireland, when embodied, consists of 12 regiments of artillery (5002 men) and 35 regiments of infantry (26,347 men); total, 31,349 men.

The Constabulary of Ireland is very efficient. The first regular police force was established in 1814. The reserve force was established in 1839. Originally the expense was paid partly by grand jury presentments, and partly out of the consolidated fund; but the Act 9 & 10 Vict., cap. 97, passed in 1846, provides that the whole expense shall be borne by the consolidated fund, except a moiety of the cost of additional constabulary force applied for by the Magistrates of any county or district, or of the reserve force when employed therein, or of an

increased force stationed there by the lord lieutenant. The Act 6 Will. IV., c. 13, likewise authorized the lord lieutenant to appoint resident stipendiary magistrates, to act in disturbed districts, or in districts where, owing to the absence or non-residence of the local magistrates, or for any other sufficient cause, it should appear to be expedient. The constabulary force, on the 1st January, 1865, consisted of 11,824 men, and 376 horses. Its total maintenance for the year 1864 amounted to 696,310*l.*, including the expenses of 72 stipendiary magistrates, whose annual salaries are—22 at 500*l.*, 30 at 400*l.*, and 20 at 300*l.*, with extra allowances for forage, travelling expenses, &c. The expense of the force charged on the consolidated fund in 1864 was 680,606*l.*; and on the counties, cities, and towns of Ireland, for augmentations, conveyance of prisoners, &c., 15,784*l.*

Revenue, Expenditure, and Debt.—The public revenue collected in Ireland averages about 6,750,000*l.* per annum. Of this sum 2,750,000*l.* is derived from excise duties—chiefly in the 10*s.* per gallon levied on the 5,000,000 gallons of whisky consumed yearly—and 2,250,000*l.* from the customs. The expenditure generally exceeds the income by at least 500,000*l.*, and often considerably more, but this is in a great measure owing to the very large military and constabulary force maintained in the country. The unredeemed debt of Great Britain and Ireland, in British currency, as in the Treasury Return of 15th April, 1824, was:—

Great Britain.	Ireland.	Total.
1801, 420,305,944 <i>l.</i>	26,841,219 <i>l.</i>	447,147,163 <i>l.</i>
1817, 688,820,032 <i>l.</i>	107,380,158 <i>l.</i>	796,200,190 <i>l.</i>
1818, 755,737,972 <i>l.</i>	21,004,430 <i>l.</i>	776,742,402 <i>l.</i>

On the 5th January, 1818, the unredeemed debt of Great Britain was increased 66,917,940*l.*, out of 86,375,728*l.* taken from the unredeemed debt of Ireland as it stood on the 5th January, 1816. In the intervening time there was transferred to the names of the Commissioners for Reduction of National Debt, 22,348,528*l.* The action of the sinking fund, therefore, covered all additions in the year, and provided for the diminution appearing on the 5th January, 1818. No separate account of the debt of Ireland has been kept since its consolidation with that of Great Britain in 1817, per Act 56 Geo. III., cap. 98.

History and Antiquities.—All the early names of Ireland, such as *Iris*, *Erim*, *Hibernia*, are believed to be derived from the same Celtic roots. The *Scoti*, who were in possession of the island at the time of the introduction of Christianity, appear to have been to a great extent the successors of a people whose name and monuments indicate a close affinity with the Belgæ of Southern Britain. The monuments and relics which attest the presence of a people considerably advanced in civilization at some period in Ireland, such as cyclopean buildings, sepulchral mounds containing stone chambers, mines, bronze instruments and weapons of classic form and elegant workmanship, would appear to be referable to some of the predecessors of the *Scoti*.

The *Erse*, a dialect of the Celtic, is the native language, and is now chiefly used in the west and south part of the country.

Their dark complexion, and smaller and more

slender form of body, as well as their more volatile temperament, distinguish the Irish from the Saxons.

The general conversion of the Irish Scots to Christianity took place in the earlier and middle portion of the fifth century. The principal instrument in effecting the change was St. Patrick, who landed in Ireland on this mission in the year 432. A considerable advance in civilization followed the introduction of the new religion. Greek and Roman literature got some footing among the clergy, and an improved system of architecture became requisite for religious edifices. The Irish round towers are now generally ascribed to an ecclesiastical origin, and are supposed to have been erected during the sixth, seventh, and eighth centuries. Extensive monasteries were also founded, in which religion and learning were zealously cultivated, and from which numerous missionaries issued, and carried the doctrines of Christianity, under great difficulties, into the still pagan countries of Europe. Many students of distinction, from England and the Continent, frequented Ireland, and received gratuitous instruction at this period. The country was torn by civil contests, from the eighth to the twelfth centuries, between the kings and chiefs. In 1174 Henry II. of England took possession of the island with the formal sanction of the Pope, and made the native kings and chiefs his tributaries. The country was portioned out among the Anglo-Norman conquerors. In the twelfth year of the reign of King John, the division into counties took place, and appears to have embraced almost the whole of Ireland, though through subsequent reverses most of the counties in Ulster and Connaught ceased to be considered shire-ground. English laws and customs were to some extent introduced; but the great barons, finding the Irish laws more congenial to arbitrary authority, gradually assumed the character of despotic chieftains; so that on the accession of King Henry VIII. there was only an inconsiderable tract along the eastern coast in which the English law was fully recognized.

In this and the succeeding reigns of Elizabeth and James I., the English government having now the double motive of effecting a religious as well as a civil reformation in Ireland, applied themselves with great energy to the recovery of their authority, and, after a tedious series of rebellions and confiscations, succeeded at length, in the beginning of the seventeenth century, in making the entire island shire ground, and planting a numerous Protestant proprietary in Ulster. In 1641, the Irish, taking advantage of the disordered state of England, rose in insurrection and massacred nearly 40,000 Protestants. The country remained in a state of anarchy till 1649, when it was thoroughly reduced by Cromwell. At the revolution in England in 1688, most of the Irish took the part of James II., and again rose in rebellion, which lasted from 1689 to 1692. At its conclusion most extensive confiscations followed; and a system of much severity was adopted towards the political leaders; yet notwithstanding the harshness of the penal laws from time to time enacted against Roman Catholics, the country generally prospered during the century of uninterrupted tranquillity that ensued. Another outbreak occurred in 1798; but this, being likewise suppressed, led the way to the Act of Union, by which the Parliament

of Ireland, which had of late years enjoyed an absolute independence of all power but the Crown, was merged in that of the United Kingdom in 1800.

In 1829 the Roman Catholics, who had greatly increased in Ireland, were emancipated from many of the penal laws which pressed upon them. In 1832 the Irish Reform Bill passed. About the same year, the agitation for a repeal of the legislative union with Ireland commenced, and was continued almost yearly to 1849. In 1833 and 1836 Acts were passed by which several of the bishoprics were incorporated with others, and regulations were made for the improved application of the revenues of the church. In 1838 a poor law for Ireland was first enacted, which has been altered, amended, and extended by subsequent Acts. In 1838, also, an Act was passed for commuting Irish tithes into rent-charges. In 1840 a law was put into operation in Ireland, similar to the Municipal Reform Act of England. In the summer of 1842 food riots in many parts of Ireland bore witness to the impoverished state of the peasantry. Political agitation reached a great height in Ireland in 1843. The measures advocated were—the total abolition of the tithe rent-charge; fixity of tenure for occupying tenants; encouraging Irish manufactures; universal suffrage and vote by ballot; and abandonment of the new poor law. Two great meetings were held, but another was prevented by the government, and Mr. O'Connell and several other persons were tried for sedition. These trials, and the appeals, and 'writs of error,' consequent thereon, occupied public attention during a great part of 1844. Mr. O'Connell was eventually acquitted on purely technical grounds; but the blow dealt by the British government was not the less effectual, and the repeal agitation never again rose to any degree of importance. In the same year another step was made towards the removal of penal statutes against the Roman Catholics of Ireland. In 1845 two important Acts were passed: one for placing on an improved footing the Roman Catholic College of Maynooth; and the other for enabling the Crown to endow new colleges in Ireland. The potato crop of this year was almost wholly diseased; a circumstance which led immediately to the adoption of large plans for relief, and indirectly to the repeal of the corn laws. The year 1846 exhibited the effects of this failure of the potato crop in starvation and insurrection. The spring of 1847 brought with it the full horrors resulting from the famine; many thousands perished from actual hunger, and thousands more from fever, notwithstanding the unprecedented aid derived from England and elsewhere. In August nearly 3,000,000 rations of food were daily distributed to the suffering Irish by the relief commissioners. By the month of October outrages and murders became very frequent, and the government had to adopt stringent measures for their prevention. In 1848 the revolutionary party attained great influence, and carried on those proceedings which led to the conviction and transportation of Mr. Smith O'Brien, Mr. Mitchell, and others.

Although the effects of the potato blight were so terrible at the time, it undoubtedly had the good result of breaking up the vicious circle into which the evils of Ireland had run; a peasantry ill-fed and ill-housed, yet satisfied to live in misery, since living

was just possible, rather than emigrate, or incur harder labour than the culture of the miserable plot of potato-ground and the care of the swine; and a landholding class, burdened with debt and charges, and unable to expend on the land which supported them the capital necessary to render it productive. Famine and the exodus [EMIGRATION] mitigated the difficulties of the peasant, and the Incumbered Estates Court, previously noticed, those of the landlord; and, during the last ten years, Ireland has experienced such an amount of material prosperity as could never have been realized under the former system. It is true there is still room for great improvement, and the vast resources of the country require to be much more fully developed before its position can be said to be thoroughly satisfactory; but the results which have already been accomplished justify sanguine expectations as to the future. No outbreak of a serious character has occurred since 1848 except the Fenian movement of 1865–66, which became sufficiently formidable to require the suspension of the Habeas Corpus Act and other stringent measures for its suppression. It is satisfactory, however, to note that from this last movement the more respectable classes have entirely held aloof.

(Thom's *Irish Almanac*, 1866; *Statesman's Year Book*, 1866; Parliamentary Papers, and Communications from Ireland.)

IRELAND ISLAND. [BERMUDAS.]

IRELAND, NEW. [NEW IRELAND.]

IRELAND, REV. DR. JOHN, Dean of Westminster, was born at Ashburton, Devonshire, in 1761. He was the intimate friend and associate of William Gifford, translator of Juvenal; and, like him, he was of very humble origin, being the son of a butcher in the same town. They were associates in the Grammar School at Ashburton; and Gifford, in the preface to his edition of Ben Jonson, thus alludes to his old friend Dr. Ireland, on his elevation to the deanery of Westminster. 'With what feelings do I trace the words, "The Dean of Westminster!" Five and forty years have now passed over my head since I first found Dr. Ireland, some years my junior, in our little school, at his spelling-book. During this long period, our friendship has been without a cloud; my delight in youth, my pride and consolation in old age!' Dr. Ireland's first promotion in the church was to the vicarage of Croydon, in Surrey, to which he was collated, in 1793, by Archbishop Moore. In 1802 he was promoted to a prebendal stall in the collegiate church of Westminster; and on the death of Dr. Vincent, in 1816, he was installed to the deanery, and also succeeded to the rectory of Islop, which is in the patronage of the Dean and Chapter of Westminster.

Dr. Ireland was not only a warm patron and friend of learning, but he also extensively applied his talents to the walks of literature. In conjunction with his friend Mr. Canning, he was one of the principal writers who aided Mr. Gifford in the early volumes of the *Quarterly Review*. He was also the author of 'Vindiciæ Regiæ, or a Vindication of the Kingly Office,' 'Paganism and Christianity Compared,' 'Nuptæ Sacre, an Inquiry into the Scriptural Doctrine of Marriage,' with numerous lectures, discourses, and sermons, on a variety of subjects. Having no family he was enabled to apply his large

property to the most useful purposes. He was the founder of four scholarships in the University of Oxford, of 30*l.* per annum each. To Westminster School he gave 500*l.*; to the school where he had been educated 2000*l.*; to Oriel College, Oxford, 2000*l.* for an exhibition; and 10,000*l.* to the University for the Professor of 'The Exegesis of the Holy Scripture.' He also left by his will several large sums in reversion for different charitable objects:—to the Western Dispensary he left 1000*l.*; to the Devon and Exeter Hospital, 2000*l.*; to the Westminster Hospital, 2000*l.*; for a chapel in Westminster, 5000*l.*; to King's College, 2000*l.*; to trustees for poor persons in Ashburton, 1000*l.*; with other liberal bequests and legacies. He died in 1842.

IRENÆUS, SAINT, bishop of Lyons in Gaul, was a pupil of Polycarp, in Asia Minor, and a presbyter of Pothinus, bishop of Lyons. After the martyrdom of Pothinus in 177, Irenæus was elected bishop of Lyons. He discharged the duties of his office with diligence, and is said to have been the means of converting many pagans to the Christian religion. The place of his birth is not known; but it is probable that he was a native of Asia Minor. It is commonly supposed that he suffered martyrdom in the beginning of the third century; but even that is uncertain.

With respect to the works of Irenæus, we learn from Eusebius ('Hist. Eccl.,' v. 20) that he wrote several letters against the heretics and false prophets who at Rome corrupted the true doctrine of the church; one to Blastus, concerning schism; another to Florinus, concerning the monarchy, or that God is not the author of evil; another concerning the number eight, and also a discourse against the Gentiles, entitled Concerning Knowledge; another inscribed to a brother named Marcianus, being a demonstration of the apostolical preaching; and a little book of divers disputations. Irenæus also wrote a letter to Victor, bishop of Rome, concerning the controversy about the time of holding Easter; and 'Five Books against Heresies.' A Latin translation of the last work is still extant; but all the rest have perished, with the exception of a few fragments.

IRETON, HENRY, the eldest son of German Ireton, of Attenton, in Nottinghamshire, was born in 1610. He was entered at Trinity College, Oxford, in 1626, and having taken the degree of bachelor of arts, became a student of the Middle Temple. He entered the parliamentary army, and made such a proficiency in the military art, that it has been asserted that Oliver Cromwell learned its rudiments from him. In 1646 he married Bridget, Cromwell's eldest daughter. He distinguished himself in the battle of Naseby, and was taken prisoner by the royalists, but made his escape. He attended most of the sittings of the regicide court, and signed the warrant for Charles' execution. On the establishment of the Commonwealth he was made president of Munster, and afterwards lord-deputy of Ireland. While in the height of his successes, he was seized before Limerick with the plague, of which he died on the 15th of November, 1651. He was buried in Henry the Seventh's chapel in Westminster Abbey; but the corpse was exhumed after the Restoration, gibbeted, and burned at Tyburn.

IRIARTE. [YRIARTE.]

IRIDA'CEÆ, a natural order of endogenous plants. The genera are numerous, and some not well defined; they inhabit the temperate parts of the world in preference to the hottest, where they are comparatively rare. The *Iris* and *Crocus* are representatives of the predominant northern form of the order, as *Gladiolus* and *Ixia* are of the genera prevalent in the southern hemisphere. All the species are sufficiently ornamental to deserve cultivation, and many are of striking beauty.

IRIDIUM, a metal discovered by Dr. Wollaston, and found combined with the ores of platinum, from which it may be separated by a complex chemical process. A few minute grains of native iridium have been met with.

Iridium is brittle, and when carefully polished, has the appearance of platinum. Specific gravity, about 18·6. When heated to redness in the air, if in a state of fine division (which is obtained by precipitation), it is oxidized, but not if in mass. Iridium is with difficulty acted upon by acids.

Oxygen and *Iridium* combine and form several oxides: the protoxide, sesquioxide, and teroxide. They are precipitated by the alkalies from the corresponding chlorides. The protoxide is black, and greenish gray when combined with water. The sesquioxide is also black, but its hydrate is deep brown. It is not decomposed by a low red heat. When slightly heated with charcoal, sulphur, or phosphorus, it detonates violently. Acids do not act upon it, but, on the contrary, it unites with salifiable bases. The teroxide is yellowish brown, or greenish in the state of hydrate.

Chlorine and *Iridium*.—The protochloride of iridium is insoluble in water, and is sparingly dissolved by acids or nascent chlorine. The sesquichloride has so dark a yellowish brown tint, that a small quantity renders water opaque. It yields by evaporation a dark-coloured, uncrystallizable, deliquescent mass. The bichloride has many of the external properties of the last-named compound.

Iridium combines with carbon when a piece of this metal is held in the flame of a spirit lamp. The resulting compound consists of about 19·8 of carbon, and 80·2 of iridium. The remaining compounds of iridium are very little known.

IRIS. [EYE; RAINBOW.]

IRIS, a genus of plants the type of the natural order *Iridaceæ*. *I. versicolor*, Blue Flag, is a native of swamps and wet meadows in the United States. The root-stock has a nauseous acid taste. It acts as a cathartic. *I. pseudacorus*, Yellow Flag, is a native of wet places in Great Britain, France, Germany, and most countries in Europe. *I. Florentina*, Florentine Iris, is a native of the southern parts of Europe and the islands of the Mediterranean. The root-stock, known by the name of *Orris-root*, has an aromatic odour and subacid taste, and is employed as a dentifrice. It was at one time used in medicine, and admitted into the British Pharmacopœias. The fresh root-stock acts as a purgative, and was also employed as an expectorant in diseases of the chest. When dried and turned into small balls, it is used for Issue-peas. Many species of *Iris* have been described. *I. Germanica* has been used for the same purposes as *I. Florentina*, and they are considered by some botanists to be identical. The roots of many

of them contain starch, and Pallas says that the roots of *I. dichomata* are eaten in Siberia. *I. edulis* is eaten by the Hottentots of Africa. All these species are cultivated in gardens on account of their handsome showy flowers.

IRISH LANGUAGE. [GAELIC.]

IRITIS is an inflammation of the iris, the membrane that surrounds the pupil of the eye. It most frequently originates in a disordered state of the system, as in gout or syphilis, but it sometimes follows the exposure of the eye to an intense light, or is produced by external injury, as the wound which is made in the operation for cataract, &c. This disease requires an active antiphlogistic treatment.

IRKUTSK. [SIBERIA.]

IRON (*Ferrum*, Latin; *Fer*, French; *Eisen*, German; *Ferro*, Italian), one of the most useful of the metals, and of the highest industrial value, is of a bluish-gray colour, but acquires lustre by polishing. It is fibrous in fracture, and of the ductile metals is the hardest and toughest. It cannot be hammered into very thin plates, but may be rolled out into sheets of astonishing thinness, or drawn into very fine wire.

The iron of commerce is seldom or never pure, but contains small portions of sulphur, carbon, silicium, phosphorus, arsenic, &c.; its density varies a little according to its purity and the method of its manufacture. Purified by fusion with smithy scales, it furnished in some experiments a specific gravity of 7.8439, which is increased by rolling and drawing into wire. Pure soft bar iron, with only a trace of carbon, has a density of 7.79; that of ordinary bar iron is 7.788.

When iron is subjected to a red heat it softens and becomes tough, a quality which increases its value in the manufacturing arts; and its faculty of welding, or uniting, at a white heat, renders it more easily workable than any other metal; when heated above the welding point it crumbles under the strokes of the hammer.

The point at which iron melts is variously estimated by different authorities. Mackenzie places it at 158° Wedgwood; Morveau at 175° Wedgwood, or 6436° Centigrade; and Daniell at 1587° Centigrade. As the metal when impure is more easily fused, this may account for the discrepancies in the foregoing statements, though they are sufficiently wide to enable us to appreciate the great difficulty of obtaining accurate measurements of very high temperatures.

Iron, as everybody knows, is attracted by the magnet, and is easily rendered magnetic; but it loses this property when converted into steel.

Historical Notice.—Whatever may have been the characteristics of the mythic age of gold, it is certain that man could only attain to a high degree of civilization in the age of iron; for without that metal, nations never rise out of the completest barbarism. Its possession by any people is equivalent to their advancement in all those arts and sciences which promote the happiness of the many, while leading to the enrichment of the few. It may be for this reason that, notwithstanding the obvious difficulties of its manufacture, iron is one of the earliest metals mentioned in history. We read in Genesis of Tubal Cain, the great-grandson of Cain, as ‘an instructor of every artificer in brass and iron.’ The

hills of Palestine produced ferruginous ore, and Job says that ‘iron is taken out of the earth.’ In the most ancient books of holy writ, reference is constantly made to weapons and implements fabricated from this valuable metal, and it is certain that iron furnaces were generally in use in Ancient Egypt. It is evident that the Pyramids, and similar colossal works, could never have been executed without the assistance of iron tools.

We gather from Homer some idea of the value which the Greeks of his era set upon the metal, for a mass of iron is one of the prizes at the funeral games which Achilles celebrated in honour of Patroclus:—

Then hurl'd the hero, thundering on the ground,
A mass of iron—an enormous round—
Whose weight and size the circling Greeks admire,
Rude from the furnace, and but shap'd by fire.
. Who furthest hurls it, takes it as his prize.
If he be one enriched with large domain
Of downs for flocks, and arable for grain,
Small stock of iron needs that man provide;
His hinds and swains whole years shall be supplied
From hence; nor ask the neighbouring city's aid
For ploughshares, wheels, and all the rural trade.
(Pope's Translation.)

The iron which is here spoken of, and in other passages of Homer and Hesiod, was an imperfectly malleable metal wrought at once from the ores in the furnace. The ore was probably obtained through the Phenicians—those navigators and carriers of the ancient world, who in so many respects were the prototypes of our own nation—from Laconia and the shores of the Black Sea. Diodorus Siculus refers to the isle of Elba as furnishing the ore of this metal, which the natives dug out of the ground, and subsequently melted to obtain the metal. Pliny, in his ‘Natural History,’ describes its manufacture at considerable length, and the various uses to which it was applied. It should be noted, however, that though the Latin writers apply the word *ferrum* (iron) to a sword, the weapons and cutting instruments discovered among the ruins of Pompeii and Herculaneum are almost invariably found of bronze.

Nothing, perhaps, is more remarkable in the history of the iron manufacture than the slowness with which it was developed in England. Iron was mined and smelted in our island in the time of the Romans, but for some centuries afterwards our English mines were left wholly unworked; and so precious was the metal esteemed, that Edward III. included the pots and pans of the royal kitchen among his majesty's jewels. The Spaniards, in designing the Armada, calculated on the superior excellence and abundance of Spanish iron compared with English as an important element of success. In the fourteenth and fifteenth centuries we were supplied with iron and steel from Spain and Germany; while, as late as the middle of the eighteenth century, we imported from Sweden no less than four-fifths of the iron used in this country.

This neglect of what is now one of the principal sources of our national wealth was owing to the enormous consumption of timber as fuel rendered necessary by the old smelting processes. The charcoal required to produce a single ton of pig iron represented four loads of wood, and for a ton of bar iron, seven loads of wood. The iron manufacture, then, was confined to the counties of Kent, Surrey, and Sussex—that is, to the neighbourhood of the Weald, or ‘wooded

country,' and it threatened to sweep away the forests which were once its glory and its wealth. This destruction of timber attracted attention as early as the sixteenth century, and both Henry VIII. and Elizabeth attempted to check it by legislative provisions. John Norton, in his 'Surveyor's Dialogue,' (1607) asserts that Sussex alone contained nearly 140 hammers and furnaces for iron, each of which consumed every twenty-four hours from two to six loads of charcoal. Drayton, in his 'Polyolbion,' grievously bewails the disappearance of thick embowering woods and leafy groves:—

These forests, as I say, the daughters of the Weald
(That in their heavy breasts had long their griefs
concealed),
Foreseeing their decay each hour so fast come on,
Under the axe's stroke, fetched many a grievous groan,
When as the anvil's weight, and hammer's dreadful
sound,
Even rent the hollow woods and shook the queachy
ground;
So that the trembling nymphs, oppressed through ghastly
fear,
Run madding to the downs, with loose dishevelled hair.

The Sussex iron varied in quality. 'Some,' says Camden, 'was more brittle than the Spanish iron; but that worked in the neighbourhood of Ashburnham is said to have been equal to the Swedish metal, generally accounted the best in the world.'

The first iron cannon ever produced in England was cast at Buxted, in Sussex, by Ralph Hoge or Hogge, in 1543.

From the time of the civil war the iron manufacture of Sussex, as of England generally, declined very rapidly. In 1740, only fifty iron furnaces existed in all England, of which ten were in Sussex; and in 1788, there were only two. A few years later, and the Sussex iron furnaces were altogether extinguished. The din of the iron hammer was silenced, and the glare of the furnace had faded. Some of the furnace ponds were drained, and planted with hops or willows; others were converted into beautiful lakes in sequestered pleasure grounds; and the remainder were employed to drive flour mills, as the streams in Kent, once used to drive fulling mills, were diverted to work paper mills.

The rise of the English iron manufacture, as a staple of national wealth, dates from the employment of coal in the smelting operations. The first who attempted it was a German, named Simon Strutevant; but his process, theoretically correct, proved a failure in application. Dod Dudley, an enterprising Worcestershire iron master, was more successful, and in February, 1620, applied for a patent for his invention, which was granted for thirty-one years. In due time the process was introduced by a quaker, named Abraham Darby, at the celebrated Colebrookdale Works, in the valley of the Severn. It was a grandson of this ingenious person who designed and erected the first iron bridge in England.

The change from charcoal to coke as fuel necessitated a more powerful blast, and a longer subjection of the materials to the heat. The latter was effected by enlarging the height of the furnace, and the former by substituting for the common forge bellows large cylinders with closely fitting pistons. The earliest blowing cylinders of any magnitude were erected by the celebrated Smeaton at the Carron Ironworks in

1760. These improvements produced an astonishing increase in the quantity of iron manufactured. Dr. Ure supplies the following figures as representing the quantity of cast iron produced in 1788:—

	Tons.
By means of coal, ...	48,800
By means of charcoal, ...	13,100
Total, ...	61,900

In 1806 there existed 227 blast furnaces in this country, 159 of which were in active blast at once, and yielded 250,000 tons of iron.

The blast furnaces were distributed as follows:—

In Wales, ...	52
Staffordshire, ...	42
Shropshire, ...	42
Derbyshire, ...	17
Yorkshire, ...	28
The counties of Monmouth, Gloucester, Leicester, Lancaster, Cumberland, and Northumberland, ...	18
Scotland, ...	28
Total, ...	227

Nearly contemporaneous with the earliest improvements in the manufacture of cast iron by means of pit coal, were others of an equally important kind for the conversion of cast iron into malleable or bar iron. In 1783 Mr. Richard Cort—one of the most illustrious names in the history of the iron manufacture—succeeded in converting cast iron into malleable iron by the employment of pit coal in a reverberatory, instead of a blast furnace, and thus introduced what is known as the *puddling process*. Notwithstanding its great value, Mr. Cort met with the common fate of inventors, and derived but little benefit from his ingenuity; and it was not until a few years ago that a pension of 50*l.* per annum was granted by government to the widow of the man who had contributed so largely to the national wealth.

The general introduction of the steam-engine, as improved by Watt, also gave a great impetus to the development of the iron manufacture. It enabled mines to be sunk to a greater depth, and facilitated the process of raising the coal and ore, while its employment as a motive power effected astonishing changes, of which it is unnecessary in these pages to speak in detail.

Finally, the hot-blast process, invented by Mr. Neilson, of Glasgow, in 1824, which produces nearly four times the quantity of iron with little more than one-third of the fuel required by the cold blast; and Bessemer's refining process, which materially facilitated the conversion of iron into steel, mark two great eras in the history of this important and valuable metal.

Ores of Iron.—We now proceed to a brief examination of the various sources from which iron is obtained:—

Native Iron was for a long time unknown, and even its existence doubted; but nevertheless it has been found in several localities, both on the continent of Europe and in America. In this country it has been discovered in minute quantities in trappean

rocks, but invariably in such small fragments that it can only be regarded as a mineralogical curiosity. Native iron is almost pure white, more resembling silver than ordinary iron, is generally softer and less dense, and, unlike meteoric iron, contains no nickel. A mass was found at Gross Ramsdorf in Thuringia, which, according to Klaproth, yielded the following constituents:—Iron, 92·5 + lead, 6·0 + copper, 1·5 = 100 parts.

In Siberia it is found in considerable quantities; and as it is soft and flexible, and easily cut with a chisel, the natives use it for implements. It contains 98·48 parts of iron, and 1·60 of silica.

Meteoric Iron.—Nothing is certainly known of the history and origin of those large masses of iron found in localities where no ferruginous strata exist, but they are generally supposed to have fallen from the atmosphere, and, accordingly, are designated *meteorites*. They are generally covered with a kind of black enamel, which protects the metal from the atmospheric action, and the iron usually forms a species of network round a crystallized metallic mineral, containing various ingredients, such as iron, nickel, cobalt, copper and tin, manganese, phosphorus, silica, alumina, potassium, magnesia, soda, carbon, sulphur, chlorine, etc.

Oxydulous or Magnetic Iron.—This is formed by a combination of the protoxide with the sesquioxide of the metal; has a black colour, and is hard, crystalline, and arenaceous. It exists abundantly in different rocks—in granite, hornblende, mica-slate, clay-slate, syenite, chlorite, and most of the limestone formations. Almost all the Swedish iron is manufactured from this compound, which also abounds in the United States of America. Its density varies from 5·00 to 5·10, and its chemical composition is as follows:—

$\text{Fe}_3 \text{O}_4$, or $\text{Fe}_2 \text{O}_3 + \text{Fe O}$.	
3 Eqs. Iron, ...	71·68
4 Eqs. Oxygen, ...	28·32
	100·00

Oligiste Iron; Specular or Micaceous Iron; Red Hematite.—Occurs in masses, and crystalline. The crystals are attached; the primary form is a rhomboid; colour, a bluish-gray, with slightly iridescent surface.

Bog Iron Ore is amorphous, with a vitreous lustre, and a yellowish or dark-brown colour; belongs to very recent formations, and appears to arise from the decomposition of certain rocks by running water. Hence it derives its name from being always found in low, marshy localities. It consists of sesquioxide of iron, water and organic matters, and of protoxide of iron, lime and magnesia, oxide of manganese, phosphoric acid, silica, and alumina, in varying quantities.

Iron Pyrites occur in many forms, but always consist of combinations of iron and sulphur. They vary in tint according to their exposure, from a yellow bronze to a silver white. Their crystals are beautiful cubical and octahedral figures. Arsenical iron pyrites, or *mispickel*, is found abundantly in Cornwall and on the Continent, and frequently associated with other metals, such as tin. When struck by a hammer, or rubbed on any hard or heated

surface, it emits a strong garlic-like smell. Its constituents are as follows:—

Iron (two equal parts of), . . .	33·54
Sulphur, ...	19·87
Arsenic, ...	46·59
	100·00

Carbonate of Iron is the most common of the British ores, and most of the British iron is manufactured from it. They chiefly consist of a carbonate found in beds in the coal formation, frequently alternating with the seams from which the coal is taken. These deposits in Britain occur at Dudley, in England, in Lanarkshire and Ayrshire, in Scotland, and in Wales. Of these ores we note two principal varieties:—First, the argillaceous or clay-band, which, as they contain a large admixture of earthy matter or clay, yield, when wrought alone, a weak and inferior kind of iron. They present a dark gray colour, nearly black, and their specific gravity varies from 3·17 to 3·41. We subjoin analyses of specimens procured in different districts:—

Protoxide of iron, .	32·22	38·80	35·0
Carbonic acid, .	32·53	30·76	25·5
Manganese, . . .	—	0·07	0·3
Lime, ...	8·62	5·30	—
Magnesia, . . .	5·19	6·70	1·6
Silica, ...	9·56	10·87	26·5
Alumina, ...	5·34	6·20	11·8
Sesquioxide of iron, .	1·16	0·33	—
Carbon, ...	2·13	1·87	—
Sulphur, ...	0·62	0·16	—
Loss, ...	2·63	—	—
	100·00	101·06	100·7

The second variety of this ore, black-band, was for a long time unknown, and was first pointed out by the late D. Mushet. It contains less earthy matter than the clay-band, and is much blacker in appearance. The difference will best be understood by a reference to the following analyses:—

Protoxide of iron, .	49·4	49·6	46·6
Carbonic acid, . .	35·2	30·4	30·1
Magnesia, ...	4·0	8·1	—
Alumina, ...	1·8	1·3	—
Lime, ...	—	—	6·3
Silica, ...	—	—	5·4
Coaly material, . .	9·6	9·6	8·4
Loss, ...	—	0·5	3·2
	100·0	100·0	100·0

Iron Froth consists of very thin, brownish-red, scaly particles, which stain the fingers, and have a saponaceous feel. The massive varieties are amorphous; the structure foliated.

Hydrous Oxide of Iron; Brown Iron Ore; Brown Hematite.—Occurs in aggregated crystals and massive prisms. Primary form a right rhombic prism; colour brownish. The massive varieties are globular and reniform; some of the varieties constitute brown clay ironstone.

Among the artificial oxides and other compounds of iron procured by chemical agency, we may name the following:—

Oxygen and iron combine to produce three or four bodies. The *protoxide* ($O^1 I^1$) is tasteless, black, insoluble in water, readily dissolved by most acids, and easily affected by the magnet. The *magnetic oxide* ($O^4 I^3$) is also black, obeys the magnet, brittle, easily reduced to powder, and in water insoluble. The *peroxide* or *sesquioxide* ($O^3 I^2$) constitutes the common rust of iron; colour red, is inodorous, tasteless, insoluble in water, and forms red solutions with acids.

Chlorine and iron combine to form two chlorides. The *protochloride* ($Ch^1 I^1$) is a gray crystalline substance; easily soluble in water, but insoluble in absolute alcohol. The *perchloride* ($Ch^3 I^2$) appears as brownish iridescent scales, very deliquescent. The aqueous solution is readily decomposable.

Fluorine and iron form the *protofluoride* ($F^1 I^1$), in small, square, colourless crystals; and the *perfluoride* ($F^3 I^2$), a pale, astringent, flesh-coloured substance.

Bromine and iron unite to form a yellow fusible bromide ($Br^1 I^1$), readily soluble.

The result of combined carbon and iron is steel; or, in other words, steel contains *carburet of iron*. *Sulphur* and iron also unite very readily; and the native compounds are among the ores already described. *Protosulphuret* ($S^1 I^1$) resembles in appearance the native mineral; the *bisulphuret* forms a yellow crystal or yellow powder, according to its mode of preparation.

Diphosphuret of Iron, a brittle, fused, granular mass ($P^1 I^2$), is a compound of *phosphorus* and iron; so, also, is the *perphosphuret* ($P^4 I^3$).

Iodine and iron combine to form a *protiodide* ($Iod^1 I^1$), an iron-gray coloured opaque mass, very deliquescent, and soluble both in water and alcohol. It is used in medicine. The *periodide* ($Iod^3 I^2$) is a red, volatile, deliquescent compound.

The Alloys of Iron.—These are much less useful than might be expected from the extreme usefulness of the metal itself.

Potassium and iron, and *sodium* and iron, combine when heat is applied to them: the alloys are more fusible than pure iron, especially when in contact with the air. These alloys are decomposed by air and water. *Silicium* and iron form an alloy which is ductile or brittle according to the quantity of charcoal which it contains. *Arsenic* and iron form an alloy which has a grayish-white colour, does not obey the magnet, is very brittle, and much more fusible than iron. Other alloys with arsenic may be formed. *Chromium* and iron form an alloy very little known. With *columbium* a hard brown alloy is formed. *Zinc* gives a white and brittle alloy with iron. *Tin* and iron form the alloy seen on tin-plate ware. *Antimony* and iron unite when heated together in close vessels: the alloy is white, hard, brittle, and its specific gravity is less than that of the mean of the two metals. No metal appears to deprive iron more of its magnetic property than antimony. *Cobalt* and iron form a hard magnetic alloy. *Nickel* and iron form the meteoric alloy. *Bismuth* combines with difficulty with iron. *Molybdenum* forms with it a bluish-gray brittle alloy. The alloy of *copper* and iron is magnetic. *Silver* combines readily with iron when they are fused together, but they separate on solidification, and globules of

silver appear on the surface of the alloy. With *Mercury* a white tenacious alloy is formed. *Lead* and iron combine with difficulty. *Rhodium*, *iridium*, *tungsten*, and *platinum* may all be made to form alloys with iron. *Gold* and iron combine with facility. A compound of eleven parts of gold and one part of iron is nearly white. It is very ductile, and its specific gravity 16.885. An alloy of three parts of iron and one part of gold is of a silver colour, and is attracted by the magnet.

The action of acids upon iron differs, being greatly dependent upon their nature and composition, and upon their temperature at the time of contact.

Sulphate of Iron, or *Sulphate of Protoxide of Iron*, is largely made use of for various purposes, especially for dyeing black. It is generally known as *copperas*, or green vitriol. The primary form of the crystal is an oblique rhombic prism; its colour, bluish-green when recently prepared; but by exposure to the air, and the partial peroxidization of the iron, it changes to green, and then to a dull yellow. Like the other salts of iron, it has a disagreeable styptic taste. The sulphate of peroxide of iron represents the soluble salts of peroxide of this metal. When concentrated, its colour is reddish; when diluted, yellowish. No crystals are yielded by evaporation, but a brown deliquescent mass is deposited; its taste is very astringent, and it dissolves in alcohol.

There are two *Nitrates of Iron*: a pale green protonitrate results from the action of very dilute nitric acid, and pernitrate when the acid is very moderately diluted.

Carbonate of Iron is the protoxide combined with carbonic acid so as to form a solid. It is the basis of what is termed the argillaceous iron ore, and sometimes occurs pure in transparent rhombic crystals.

Phosphate of Iron.—The *protophosphate* occurs in Cornwall, America, &c., as a greenish, oblique, rhombic, prismatic crystal; it may also be prepared artificially as a blue precipitate. The *perphosphate* is white; it is obtained by adding phosphate of soda to persulphate of iron. Like the protophosphate, acids, but not water, will dissolve it, and from them it may be precipitated unaltered.

Arsenates of Iron.—The *proto-arseniate* is a grayish precipitate, which, upon exposure to the atmosphere, absorbs oxygen and becomes darker. The *perarseniate* is a pale yellow powder, insoluble.

Chromate of Iron. [CHROMIUM.]

Iron Manufacture and Trade.—This metal is usually divided into two distinct qualities—pig iron and malleable or bar iron—the second resulting from an extension of the processes necessary for the production of the first.

The first process is that of reducing the ironstone ore, or, as it is technically called, the *mine*, into a metallic state by means of fusion. This operation is conducted in a blast or smelting furnace. (See Plate 1, 'Iron Manufacture'.)

The most modern kind of blast furnace may be exemplified by reference to the works recently erected at Ulverstone by Messrs. Schneider and Hannay. Here the waste gases are drawn off by a tube descending several feet into the furnace, where it is supported on arms of brick. The diameter of the tube is about one-third that of the furnace-mouth.

The gases are led away in this manner to admit of the charges of ore, fuel, and limestone being equally distributed, so as to equalize the working of the furnace. Large fans, to assist in drawing them off, are placed in connection with the flues, which receive the products of their combustion in the stoves and under the boilers. Thus, to a great extent, the loss formerly caused by the 'waste gases' is prevented.

The furnace, thus arranged, is charged from the top with certain proportions of iron-ore, coke, and limestone; the ore having been previously roasted in a kiln, in order to drive off its admixture of water, sulphur, and arsenic—a process by which it loses one-sixth part of its weight.

A furnace of the size commonly employed will produce from five to six tons of pig iron in twelve hours, though the improved blast-furnace already referred to yielded 1279 tons in fourteen days. For six tons the furnace must be charged progressively with 15 tons of roasted iron-ore, $2\frac{1}{2}$ tons of coke, and about 6 tons of limestone. But the exact proportions of the materials put into the blast furnace differ in every locality, and with every charge of ore or coal. The ingredients are supplied at fifty charges, and must be closely mixed together in the furnace. Some smelters break up the limestone into small pieces of the size used for macadamizing roads; others think it unnecessary, as the limestone, when thrown into the furnace, very soon flies to pieces by the heat. Its use is to act as a flux to the ore, and promote fusion.

Turan thus describes the action of the furnace: The changes which occur in the descending ore commence with the uncalcined ores in the throat of the furnace; they lose their moisture and volatile gases before they reach the level of the boshes, absorbing from the fuel the necessary caloric for calcination. Below this the ore is gradually converted from a sesquioxide to a magnetic oxide, or, as sometimes occurs, into metallic iron; having combined with a portion of the carbon from the fuel, to form the fusible carbide of iron. From the bottom of the boshes to the level of the tuyeres, the reduction of the ore and flux into a liquid mass is completed. The fusion of the ore and flux occurs at a height of eight or ten inches above the tuyere, from whence it descends into the hearth. Here the metal, from its greater specific gravity, drops to the bottom, freed more or less from the fluid cinder which floats on the surface, and protects it from the oxidizing influence of the blast.

As soon as the ore is properly fused, a tap-hole is opened in the crucible or hearth, and the molten metal is allowed to run out every twelve hours into channels grooved in the sand of the smelting-house floor. The iron in this form is called *pig iron*, and in Britain its produce averages about 60 per cent. The term was given by the workmen; the metal being run off from the furnace in a main channel, which they call the *sow*, and the bars at right angles to it, like *pigs* attached to their mother's teats. The quality of this product depends upon the nature of the ore and fuel employed, but it is usually divided into *founndry iron* and *forge iron*, the former adapted for castings, and the latter for malleable purposes. Cast iron is further divided into five classes:—

No. 1 is the best gray, possesses the greatest

quantity of carbon, and melts at a lower degree of heat than any of the others; it sets with a smooth surface, is soft, and has little sound when struck by the hammer.

No. 2 is lighter in the colour than No. 1; not so soft nor so fluid when melted, nor so smooth on the surface when solidified; it is closer in the texture, and is preferable for strong parts of machinery.

No. 3 has less carbon than the other two, and is still less fluid when melted; has smaller grains, and is smoother in the fracture. This is used for very strong machinery where it is subjected to great and sudden strains, such as heavy shafts, wheels, and the like.

No. 4 is not so much used in foundry work; it is lighter in colour and harder than No. 3, but is with difficulty distinguished from it.

No. 5, or what is termed white iron—sometimes silver iron—is rarely employed in the foundry; it is very brittle, and does not run into the moulds, being difficult to keep in a state of fusion.

Manufacture of Malleable Iron.—Before pig iron can be converted into malleable or bar iron, it must undergo a refining operation, and be purified from the foreign matters which more or less affect its natural properties of malleability and ductility. This refining process is performed in peculiarly constructed furnaces, called *refineries* or *running-out fires*, which are composed of a body of brickwork, about nine feet square, rising but little above the ground. In the centre is placed the rectangular-shaped hearth, about three feet by two, and thirty inches deep; it is formed by the junction of four cast-iron troughs, through which is poured a continual stream of cold water to prevent them from being fused by the heat.

The operation begins by filling the hearth or crucible portion of the furnace with coke; upon this are laid six pigs of iron from the blast furnace, and more coke is heaped upon them. The fire is kindled at bottom; after a while the blast is let on, and, as the heat increases, the iron melts and flows to the bottom; more coke is added as it burns away, to preserve the metal in a state of fusion. During this operation the iron expands, heaves up, and evolves oxide of carbon. In the course of two hours the metal is tapped out into pits or beds, forming large plates, on which quantities of water are poured to render them brittle. The metal thus treated is very white, and, owing to its rapid cooling, generally possesses a fibrous radiated texture; it is also full of cells from the escaping of gaseous matters. A heavy black scoria, principally composed of silicate of iron and other impurities, is produced in this operation. When the quality of the iron is very inferior, a small portion of lime is added to the fire to take up the earthy matters, and in this case the scoria will contain lime. As already remarked, in fusing iron in the cupola the earthy matter in the coke requires to be combined with a little lime; otherwise, if present in any quantity, it will take away much of the iron. In some places the iron is run into these refining furnaces directly from the blast furnace, a method which saves the time and fuel required to remelt the pigs, but is also attended with certain disadvantages which have prevented its general adoption.

The change effected upon the iron in this operation is the oxidation and consequent dispersion of a great

portion of the impurities. The following are Dr. Muspratt's analyses of the results:—

	Iron before refining.	Same iron after refining.
Iron, ...	95·26	98·33
Carbon, ...	2·63	·87
Silicium, ...	1·38	·53
Aluminium, ...	·73	·26
Phosphorus, ...	trace	trace
Sulphur, ...	trace	trace
	100·00	99·99

Puddling.—The next process of refining is termed puddling, and is performed in a reverberatory furnace. [FURNACE.] From three and a half to four hundredweight is put in at once, in pieces laid one upon another on the sides of the hearth, leaving the central part free for the puddler's operations. The furnace is then closed up, and the fire kindled to a white heat; in about twenty minutes the metal begins to melt, and falls off in drops upon the hearth or sole of the furnace. The furnace-man, by means of a paddle, removes the iron from the hottest parts to prevent its melting too rapidly. When all the metal is reduced to a pasty state, the temperature of the furnace is lowered that it may not become more fluid. The furnace-man then works about the pasty metal with his paddle, during which it expands with the discharge of gaseous matters. As this continues, the metal as it gets finer becomes less fusible; the gases no longer escape; and by the constant puddling or kneading with the paddle, it becomes reduced to a

sort of sandy consistence. During these operations, small quantities of water are thrown into the furnace. At this stage the heat is increased; the metallic particles again cohere, and grow what the workmen call *heavy*. The furnace-man, with his paddle, gathers a lump of metal on the end of it, as a kernel, and rolls it to and fro on the surface of the clotted mass until he collects a ball of about seventy pounds in weight. This is placed on the side of the hearth at the hottest part, and, with a rake or paddle, termed a *dolly*, is squeezed as forcibly as possible to drive out any scoria. When the whole of the metal is thus gathered into balls, the furnace heat is again intensified to facilitate the welding. The balls are then lifted out; by means of tongs, if roughing rollers are to be used, or with an iron rod, welded to the ball, if it is to be subjected to the action of the hammer.

The time occupied in puddling a charge is from two to two and a half hours. The loss of iron in this process varies considerably, both according to its quality and the skill of the workman. On an average the loss is about 10 per cent. During this operation, a considerable quantity of scoria, which exudes from the metal, runs off from the hearth and is removed. The component parts of this scoria scarcely differ from those of the scoria produced in the refining furnace, except that a quantity of the iron is found in the state of sesquioxide.

We borrow from Dr. Muspratt the following analyses of refined or malleable irons of different qualities, and from various localities, exhibiting the extent of the effects produced by refining, when compared with the composition of crude iron:—

	Iron.	Carbon	Phosphorus.	Silica.	Arsenic.	Copper.	Manganese.
Swedish, from Dannemara, ...	98·78 ...	0·84	... —	0·12 ...	0·02 ...	0·07 ...	0·05
Do. common bar, ...	99·73 ...	0·24	... trace	0·03 ...	... —	... —	trace
German, very strong rod, ...	99·13 ...	0·66	... —	trace ...	... —	0·05 ...	0·29
German, strong, Hartz mounts, ...	98·88 ...	0·40	... —	0·10 ...	... —	0·32 ...	0·30
German, weak, fibrous, ...	99·87 ...	0·09	... —	0·03 ...	... —	... —	... —
Welsh, puddled iron, ...	98·90 ...	0·41	... 0·40	0·08 ...	... —	... —	0·04

Rolling the Iron.—After the balls of iron, or *blooms*, have been removed from the puddling furnace, and subjected to ten or twenty blows from a heavy hammer, called *shingling*, they are passed through the rollers. The hammer now in use was invented by Mr. Condie, of the Govan Iron Works, near Glasgow, about 1846. It weighs from forty to fifty cwt. The rollers may be roughly described as consisting of two cylinders worked in contact, and having on their surfaces a series of grooves, varying in size. Through these grooves the iron is successively passed, until reduced to the requisite width and thickness, water playing upon each pair of rollers in order to keep them cool. It has now been converted into a tough and elastic bar, which is readily fusible, and which, from its property of changing its form under the hammer, has acquired the name of malleable iron.

Sheet iron is made by passing the metal between smooth rollers, without grooves, the rollers being gradually screwed nearer together as the requisite thickness is being approximated to.

The speed of the different kinds of rolling-mills varies according to the character of their work. Those for merchant bars make from sixty to seventy

revolutions a minute, while those of large size for boiler plates are reduced to twenty-eight or thirty. Others, such as the finishing rollers, in which the shape and size of the bars are finally determined, run at from one hundred and twenty to four hundred revolutions a minute. (See Plate 1, 'Iron Manufacture'.)

Conversion of Iron into Steel.—*Bessemer's Process.*—The process by which Bessemer converts iron into steel is of recent date, and has justly been characterized as one of the grandest instances of progress in manufactures which has been made of late years. To insure its successful operation, however, it is necessary to employ pig iron as free as possible from sulphur and phosphorus. The following are the principal details:—

The crude pig iron having been melted in a reverberatory furnace is run into what is called the *converting vessel*, A (see Plate 2, 'Iron Manufacture,' figs. 9 and 7), for the purpose of undergoing its transformation into steel. The converting vessel is shown, enlarged in section, in fig. 2; the melted pig iron being run into it direct from the furnace. It is made of stout boiler plate, and lined with a powdered silicious stone, found in the vicinity of

Sheffield, below the coal, and locally known as 'gannister.' The converting vessel, A, is mounted on bearings, which rest on stout iron standards, C C, and by means of the gearing and handle, D, it may be turned into any required position. An opening is made at the top for filling and pouring out the metal, and at the bottom of the vessel are inserted seven fire-clay tuyeres, each with seven holes as shown in the Plate, fig. 1, and in the enlarged longitudinal and horizontal section of one of the tuyeres, fig. 3. The blast from the engine is conveyed through one of the bearings, E, of the vessel, fig. 7, into the tuyere-box, F, and enters the tuyeres at a pressure of 14 lbs. per square inch, which is more than adequate to prevent the vessel from entering therein.

Before commencing with the first charge of metal, the vessel's interior is thoroughly heated by coke, with a blast through the tuyeres to stimulate the fire; when sufficiently heated, it is inverted, and all the unburnt coke falls out. The vessel is then placed horizontally, and the melted pig iron run into it from the furnace by the spout, the vessel being so held during the operation that the holes of the tuyeres are above the surface of the metal. When the proper charge of iron has been run in, the blast is turned on, and the vessel quickly moved up into the position shown in fig. 2. The blast now rushes up from each of the forty-nine tuyere holes into the fluid metal, producing a most violent agitation of the whole mass. The silicium, always present in greater or less quantities of pig iron, is first attacked, and unites readily with the oxygen of the air, producing silicic acid; a small portion of the iron simultaneously undergoes oxidation, and hence a fluid silicate of the oxide of iron is formed, a little carbon being simultaneously burnt off. Thus the heat is gradually increased, until nearly the whole of the silicium is oxidized, which usually occurs in about twelve minutes from the commencement of the process. A most intense combustion rapidly takes place; the metal rises higher and higher in the vessel, sometimes occupying more than double its former space, and in its frothy fluid condition presenting an enormous surface to the atmospheric action, until the whole mass glows like flame, and presents a perfect combination of metal and fire. The carbon is now burnt off so rapidly as to produce a series of innocuous explosions, throwing out the fluid slag in great quantities, while the combustion of the gases is so complete that a volume of white flame rushes from the vessel's mouth, illuminating the entire building, and indicating to the skilful eye the precise condition of the metal inside. A little charcoal pig iron is now added, the blast turned on for a few seconds, and the process, which altogether occupies about twenty minutes, is complete.

The vessel, A, is then turned into the position shown in fig. 4, and the fluid steel run into the casting-ladle, B, which is carried by the hydraulic crane, H, being counterbalanced by the weight, I, on the opposite end of the jib, as shown in fig. 9. When all the metal is poured out of the converting vessel, the crane is raised by water pressure, and turned round, as shown in fig. 5, for the purpose of running the steel into the ingot moulds, K. Instead of tilting the casting-ladle for pouring into the

moulds, it is made with a hole in the bottom fitted with a fire-clay seating, L (fig. 6), and closed by a conical fire-clay plug, forming a conical valve. The valve-rod, N, is coated with loam, and bent over at the top, and works in guides on the outside of the ladle, as shown in fig. 8, with a handle, O, for opening and closing the valve. By thus tapping the metal from below, no floating impurities can pass into the mould, and the current of fluid steel pours down the centre of the mould without coming in contact with its sides. The different moulds, which are of a slightly tapered form, are arranged in the pit in an arc of the circle described by the casting-ladle, as shown in the plan, fig. 1.

By this ingenious process, which has proved of the greatest utility to our manufacturers, from one to ten tons of crude iron may be converted into cast steel in thirty minutes, without manipulation, and without employing any other fuel than is required for melting the pig iron, and for the preliminary heating of the converting vessel. The loss in working English iron in small quantities is from 14 to 18 per cent., but with pure Swedish iron does not exceed $8\frac{3}{4}$ per cent.

Trade in Iron.—From the *Mercantile Gazette* we extract the following remarks on the present condition and future prospects of this important trade:—

'The great advance in the value of iron in 1865 forms an important feature in our commercial history. Production has increased, the demand for home use and export has been somewhat active, and even a 7 per cent. bank rate has not prevented Scotch pig iron from advancing to 65s. per ton. This quotation, which shows an improvement on the year of 15s. per ton, is well supported, and some of the makers are sanguine that it will shortly be exceeded. The large quantity of iron now raised, and the dearness of money, must, we apprehend, check heavy speculative investments, and compel not a few of the masters to sell at prices which cannot be otherwise than remunerative. In England the transactions in metals generally have been extensive. The quotations have, consequently, steadily improved, although the importations from abroad have been on a liberal scale. That the consumption of metals generally in America is increasing, is evident from the rapid extension of the railroad system, as well as from the steady progress of trade generally. The necessity for larger imports, therefore, is obvious; and had it not been for the high duties levied upon foreign manufactured articles in the States, last year's shipments from the United Kingdom would have been considerably in excess of 1864, apart from the necessities of war. We have, however, done a good business as a whole, and the new year has opened with very good prospects for the trade generally. The value of metals in the United States is unusually high; there is no accumulation of stock either here or abroad; and the present rates ruling for most descriptions of iron are such as to insure considerable activity in the mining districts. There is, in point of fact, only one drawback to great activity—viz., a 7 per cent. rate for money. But then it may be said that we are likely to suffer from undue competition on the Continent from home makers of iron; that we cannot possibly sell at continental rates; and, further, that every effort will be made to exclude us from a fair partici-

pation of profit. Last year the total quantity of metal purchased in England on account of French houses was much larger than in 1864. The increased make in Belgium, however, and the unusually low prices ruling in that country, reduced our shipments of railroad iron from 6699 tons in 1863, and 1946 tons in 1864, to 786 tons in 1865. Russia was a large customer for iron last year. Of railway parcels she took 39,421; of castings, 11,897; of hoops, 5240; and of wrought, 7757 tons. Upwards of 25,000 tons of wrought iron were forwarded to India last year. To the same quarter nearly 100,000 tons of railway iron were shipped. The gradual extension of the railway system in India and Russia, and the trifling quantity produced in the latter country, must long continue to have an important bearing upon the trade in the United Kingdom.

We have already alluded to the trade in iron as one of the principal sources of our national wealth. The produce in Great Britain, in 1740, was estimated at 17,350 tons; in 1840, it had risen to 1,400,000 tons; and in 1865, to nearly 5,000,000.

The extension of iron manufacture, and the development of iron ore producing districts in Great Britain, is shown every year in the returns. In 1864 there were obtained 10,064,890 tons of iron ore. This was employed to feed 612 blast furnaces, which produced 4,767,951 tons of pig iron. The quantities produced in the years 1860-64 were as follows:—

	Tons.
1860, ...	3,826,752
1861, ...	3,712,390
1862, ...	3,943,469
1863, ...	4,510,040
1864, ...	4,767,951

When to this is added the immense quantities of iron in various stages of manufacture, which are annually imported into the United Kingdom, and the still greater quantities exported thence, some idea will be gained of the vast importance of the iron trade and manufacture of this country. The following table gives the weight and value of the different kinds of iron imported into the United Kingdom in 1864:—

Iron.	Tons.	£
Ore, ...	74,163	57,424
Pig, ...	20,126	120,756
Chromate of, ...	12,325	49,082
Unwrought, in bars, ...	53,918	625,283
Steel, unwrought, ...	7,619	124,066
Sheet, ...	2,442	28,600
Wire, ...	1,716	39,470
Rough Castings, ...	7	91
Bloom, ...	2,501	22,509
Slit into rods, ...	98	875
Cast, ...	1,349	16,188
Hoops, ...	117	1,847
Old broken, ...	13,635	40,905
Manufactures, ...	10,117	332,876

Total, ... 200,133 1,459,472

Iron ore is principally imported from Spain and France, pig iron from Sweden and Belgium, chromate of iron from Russia, bar iron from Sweden, and manufactured articles from Holland, Belgium, and France.

The following table gives the weight and value of

the various descriptions of iron and iron manufactures exported from the United Kingdom in 1864:—

Iron.	Tons.	£
Ore, ...	1,310	2,096
Pig and Puddled, ...	465,985	1,412,352
Bar (British), except railroad, ...	248,573	2,250,040
Bar (foreign), ...	12,881	149,366
Angle, ...	2,926	33,853
Railroad—rails and chairs, ...	384,042	2,852,966
“ wheels and axles, ...	8,428	179,711
“ other kinds, ...	15,745	272,409
Bolt and rod, ...	28,259	284,156
Castings, ...	64,183	575,528
Galvanized (not wire), ...	23,100	601,613
Hollow ware, ...	4,694	94,583
Sheets and boiler plates, ...	59,037	735,119
Hoops, ...	41,146	439,920
Wire (not telegraphic), ...	16,787	338,348
Manufactures of wire, ...	2,622	78,267
Anchor and grapnels, ...	4,547	93,073
Chains and cables, ...	23,898	380,587
Tubes and pipes, ...	11,068	241,456
Nails, screws, and rivets, ...	14,627	359,411
Bedsteads, ...	2,519	88,098
Agricultural implements, ...	359	11,772
Articles of cast and wrought iron, ...	2,343	44,005
Other sorts (not ordnance), ...	47,748	1,039,004
Old, for re-manufacture, ...	3,494	13,818
Steel, cast in ingots, ...	529	18,016
“ bar of all kinds, ...	23,722	779,389
“ sheets, ...	2,583	92,990
Manufactures of steel and iron, ...	5,825	445,676
Iron and steel, un- wrought (foreign), ...	2,151	35,025
Iron and steel, wrought or manufactured (foreign), ...	22,946	47,704

Total, ... 1,548,077 13,990,351

Note.—The above table does not include steam-engines, machinery, and telegraphic wire; the imports and exports of which will be found under MACHINERY and TELEGRAPH.

To specify the markets for all these goods would be a waste of time and space, as they include nearly every country. We can only mention the most important, viz.:—Australia, British North America, United States, East Indies, and France, for pig and bar iron; the East Indies, United States, Argentine Confederation, Naples, Spain, and Russia, for railroad iron; and Australia, British North America, South Africa, East Indies, and British colonies generally, the United States, Russia, Denmark, Holland, Belgium, France, Egypt, and Brazil, for other kinds.

In 1865 the exports of pig and puddled iron had increased to 543,018 tons; bar, angle, bolt, and rod, 256,823 tons; railroad, 431,910 tons; wire, 24,037 tons; castings, 88,968 tons; hoops, sheets, and boiler plates, 116,161 tons; and wrought, all sorts, 127,556 tons.

For fuller details, consult Fairbairn, article Iron, *Encyclopædia Britannica*, 9th edition; Manufacture

of Iron and Steel, *Cabinet Cyclopædia*; Dr. Ure, *Dictionary of Science*; Brande, *Dictionary of Art, Science, and Trade*; Dr. Muspratt, *Chemistry applied to the Arts and Manufactures*; Bigelow, *Technology*; *Official Returns*, &c., &c.

IRON, APPLICATIONS OF. The applications of iron to the useful arts, and its employment for various purposes by the ingenuity of man, is a theme on which our limited space forbids us to enlarge. But its recent adaptation as a means of offence and defence in warfare is of so much importance to the interests of nations, that we cannot omit all reference to it.

Iron armour for the protection of ships of war and fortifications was suggested in America in 1812, and in France in 1821. Even in England, generally behindhand in the adoption of novel appliances, an experiment on the value of wrought-iron bars as an external defence for masonry, took place at Woolwich as early as 1827. The result, however, was not such as to induce a repetition of the experiment, and for several years the project was wholly forgotten. It was revived again in 1850, and at the commencement of the Russian war first practically realized by the French emperor. The French iron floating battery, engaged in the bombardment of Kinburn in 1855, proved so much more effective than its wooden rivals that the British Admiralty were induced again to turn their attention to the practicability of iron defences. A committee was appointed to conduct a series of elaborate experiments, which were not finally concluded until 1860, and the following result was obtained: That a good wrought-iron plate, $4\frac{1}{2}$ inches thick, backed with 18 inches, of teak, was proof against the 68-pounder and 7-inch breech-loader Armstrong gun, at a range of 400 yards. Acting upon these data, the Government ordered the construction of three floating batteries of iron, each carrying 1954 tons, with a mean draught of water of 8 feet 9 inches. They were formed of ribs of iron 6 inches deep, on which the armour and timber backing were placed.

But though these vessels were useful as coast defences for the protection of exposed towns and the mouths of rivers, their unwieldiness and want of sea-going qualities would prevent their general employment in naval warfare. The problem to be solved was the construction of iron-clad ships that should be as efficient men-of-war as the old 'wooden walls' of England, while invulnerable against the terrible discharges of modern artillery. For this purpose the *Warrior*, *Black Prince*, *Defence*, and *Resistance* were built. These ships were only partially cased in armour, their bows and stems being covered with nothing more substantial than $\frac{3}{4}$ -inch boiler plate, from a belief that if wholly iron-clad they would prove unmanageable in heavy seas. Their central battery was thus protected— $4\frac{1}{2}$ -inch wrought-iron plates, each 15 feet by 3 feet 2 inches, fastened by $1\frac{1}{4}$ -inch bolts, riveted on the inside; then a backing of 18 inches of sound hard teak, and a $\frac{3}{4}$ -inch wrought-iron skin on iron ribs, 18 inches apart. Each plate was about 15 feet long and 3 feet wide, and weighed four tons.

But the art of attack rapidly outstripped the art of defence, and such rapid advances were made in the improvement of artillery that the Admiralty

thought it advisable in 1861 to appoint a new committee, whose labours were continued until 1864. Numerous targets of iron, and iron and wood, were proposed by various inventors as models for the armour-plating of vessels of war, and at Shoebury-mess these targets were submitted to the severest proofs by exposure to the fire of the heaviest guns that Armstrong, Whitworth, and others could invent. Mr. Brande thus tabulates the general results of these experiments:—

1. Wrought iron of the softest quality is best adapted for armour plate, and the least approach to a steely quality should be avoided.
2. Very powerful machinery is absolutely necessary, and rolled plates are better than hammered.
3. Large and wide plates are better than small and narrow, all plates being weakest near the edges.
4. Tonguing and grooving weakens the plate, and tends to destroy the plate adjacent to that which is struck.
5. A combination of bars is inferior to a solid plate of the same weight or thickness.
6. A series of thin plates is similarly inferior.
7. Generally, no combination is so good as a solid plate, the resistance of which up to a certain point may be assumed to be nearly as the square of the thickness.
8. No advantage is gained by placing plates at an angle if the iron must be made thinner in consequence; or, in other words, iron of a given weight is most usefully employed in thick vertical plates.
9. Rigid backing is best for fortifications, but a soft backing yields to any distortion of the plate, distributes the effect over a larger area, and diminishes the damage to the general structure.
10. Wooden backing answers these conditions as well as, or better than, any other.
11. Increase of thickness of plate does not compensate for considerable diminution of backing.
12. All irregularities of surface, such as bosses, &c., tend to weaken the plate.
13. A facing of wood or other material saves the plate to some extent, but is easily destroyed by shell.
14. The bolts which fasten the plates should be of large diameter, at least two inches; countersunk bolts, with conical heads and double nuts, have been found to answer best.
15. Soft washers should be used to protect the fastenings.

The *Warrior* target, that is, the mode of armour-plating adopted for the protection of the *Warrior* ship-of-war, was for some time considered the most effective, but it was soon found that steel projectiles, both shot and shell, could penetrate it. A shell of 585 lbs. weight, containing 24 lbs. of powder, fired from the 13-inch Armstrong gun, went right through it, though the charge had been diminished so as to give the shell a velocity on striking equal to what it would have possessed at 2000 yards with the ordinary service charge. And though the thickness of the armour-plating has been increased and various expedients adopted to secure increased protection, it seems generally admitted that after we have arrived at the maximum thickness of iron which a ship will carry, our artillerymen will succeed in devising a projectile to penetrate it. Still, vessels of the class of the *Minotaur*, *Agincourt*, and *Northumberland*, will be very powerful assailants. They are 20 feet longer than the *Warrior*, 18 inches broader, and have two hundred tons (6021 tons) more burthen. They are completely armed from bow to stern. (See

Plate 'Iron-clads.') Similar protection is supplied to the cupola or shield ships designed by Captain Cowper Coles, and so called because they carry on their upper deck a revolving tower or cupola of iron, which affords complete shelter to the gunners, and enables heavy guns to be worked with facility, and trained in any direction. (See Plate 'Midship Section of Iron Cased Ship.')

While Great Britain has been steadily increasing and improving her iron-clad navy, other nations have not been idle. Turkey, Spain, Italy, and Denmark, have ordered plated vessels of our most eminent ship-builders, and France especially has run us very closely in the race. The latest addition to the imperial fleet is a formidable one, the ram *Taureau*, which will carry a rifled and hooped gun, weighing twenty-two tons, in her iron tower. The following particulars respecting this vessel is from the French papers:—It presents a very formidable, though by no means graceful aspect. Being intended for the defence of ports and roadsteads, it has a very small draught of water, and can therefore run into shallows where large vessels cannot approach it. Its prow is armed with a massive bronze cone, which, when driven at the rate of twelve knots an hour by an engine of 500 horsepower, will suffice to destroy the stoutest ship. The *Taureau* has two screws, which enable it to turn in a very short radius even when going at the rate of twelve knots an hour, whereas a frigate going at that speed could not turn in a circle of less than 700 yards in diameter. It is iron-clad from end to end to the depth of three feet below the water line.

Iron armour has also been suggested for forts, and it is evident that plates of any thickness might be employed for such a purpose—plates of a thickness which would defy the most powerful gun ever invented. The embrasures might be protected by shields, of which several kinds having been suggested, that which was introduced by Captain Inglis, R.E., appears to have found most favour in this country. It consists of slabs of wrought-iron crossing each other at right angles, the front layer being 6 inches, 7 inches, and 8 inches thick, and the rear layer 5 inches thick, secured through the centres by screw bolts with elastic washers under the nuts. This shield, when fired at with a 300-pounder Armstrong gun, was shaken, but not penetrated.

The iron-plated ships now laid down for the British navy (1866) are protected by a combination of armour and timber backing, adapted from an invention of Mr. Chalmers, but modified under the direction of the chief constructor of the navy. On the whole, our iron-clad fleet, in the opinion of competent judges, is the most powerful in existence, and presents the most perfect models.

IRON, MEDICINAL PROPERTIES OF. [CHALYBEATE SPRINGS.]

IRON PYRITES. Yellow sulphide of iron. A bisulphide composed of 20 parts of iron and 32 of sulphur. It is a very common and abundant ore of the metal, and has hitherto been principally employed for the production of the sulphate of iron, or *green vitriol*. Since the attempt to create a monopoly in the sulphur trade, it has been largely employed in the preparation of sulphuric acid.

IRONY (*σιγανία*), a refined species of ridicule,

which, under the guise of earnestness and simplicity, exposes all undue pretensions, even while it professes to honour and admit them. Of English writers Swift contains the strongest and the most numerous examples of irony.

IROQUOIS. [NORTH AMERICAN INDIANS.]

IRRADIATION denotes, properly, the emission of rays from a luminous object, but the word is generally used to signify an apparent enlargement of the disc of a celestial body, this enlargement being caused either by a deviation of the rays of light from a rectilinear direction, or by some illusion arising from the action of light on the eye.

It is a consequence of irradiation that objects which are in reality of equal magnitudes appear frequently to differ in size according to their colour or to the quantity of light which falls upon them. Sir William Herschel remarked ('Phil. Trans.,' 1783) that, when a bright circle was viewed together with a dark one on a bright ground, the latter always appeared smaller than the other.

IRRATIONAL QUANTITY. There are such things as magnitudes which are not in the proportion of any one number to any other; though if we may use numbers as great as we please, we can find a pair which shall be as nearly as we please in the ratio of any two such quantities.

According to the modern use of the term irrational, it simply means not expressible by a finite fraction. The word *ratio*, or its equivalent λόγος, does not here mean reason, in the common sense of the word, but mathematical proportion. A quantity whose proportion to the unit of quantity cannot be expressed arithmetically, that is, by a whole number or a fraction, is 'inexpressible by an arithmetical ratio,' or 'arithmetically irrational,' abbreviated into 'irrational.' This explanation is very important, since the student might otherwise be led to suppose that irrational meant unreasonable or absurd. Suppose, for example, that we have a geometrical problem which we solve by the application of arithmetic, taking a certain line to be unity. Suppose the problem thus reducible to the solution of $x^2 = 2$, or the quantity sought is such a fraction as multiplied by itself will give 2. The arithmetical answer is very simple; there is no such fraction. But is the problem therefore impossible? By no means; for the line required must be the diagonal of a square whose side is the linear unit. What, then, is the reason for our not being able to produce an arithmetical solution? Because the ratio of the line sought to the linear unit given is not to be expressed arithmetically, or is in the preceding sense irrational. The student has now arrived at the point where he must be taught (if he has not learnt it before) that arithmetic is not the science of all ratios or relative magnitudes, but only of the ratios or relative magnitudes of those quantities which are made by putting together quantities which are all equal to one another. The senses alone would never make this distinction, and those who desire nothing more than sensible evidence in their mathematical studies need not attend to it: unfortunately the present bent of such pursuits tends to inexactness, not explicitly avowed, but wearing the appearance of absolute rigour.

The student who begins to extract the square root of numbers is allowed to place the symbol of that

process over numbers which do not admit of its performance, as $\sqrt{2}$, $\sqrt{3}$, &c. Upon these symbols he reasons as if they represented fractions, and arithmetical deductions are drawn from thence; but when it is required to reduce them to practice, then the possibility of determining their arithmetical values is denied, and it is implied that they have an existence which can only be approximately represented. Thus, since 1.4142 multiplied by itself gives 2 very nearly, it is said that 1.4142 is very nearly the square root of 2. This method, which is indispensably necessary in practice, should not be allowed in perfectly strict reasoning. It cannot be just to say that 2 has no square root, but that since fractions very near to 2 have square roots, therefore these square roots are very near to the non-existent square root of 2. It is only in a properly extended arithmetic, which by express agreement admits of extended symbols of ratio, that it can be lawful to speak of the square root of 2.

IRRIGATION. Of all the substances which concur in the vegetation and growth of plants, water is the most essential. The warmer the climate, and the more rapid the evaporation, the more luxuriant is the vegetation, provided there be an abundant supply of water. This circumstance has suggested the plan of diverting streams from their original courses, and conducting them in channels to fertilize as great an extent of land as possible.

In China and in India, as well as in Egypt, ingenious methods of watering lands have been adopted from the most remote ages. No expense has been thought too great to secure a supply of water, and to distribute it in the most advantageous manner.

The whole art of irrigation may be deduced from two simple rules: first, to give a sufficient supply of water during all the time the plants are growing; and secondly, never to allow it to accumulate so long as to stagnate.

The supply of water must come from natural lakes and rivers, or from artificial wells and ponds, in which it is collected in sufficient quantity to disperse it over a certain surface. As the water must flow over the land, or in channels through it, the supply must be above the level of the land to be irrigated. But there must also be a ready exit for the water, and therefore the land must not be so low as the natural level of the common receptacle of the waters, whether it be a lake or the sea to which they run.

Along the banks of running streams nature points out the declivity. A channel which receives the water at a point higher than that to which the river flows, may be dug with a much smaller declivity than that of the bed of the river, and made to carry the water much higher than the natural banks. It may thence be distributed so as to descend slowly, and water a considerable extent of ground in its way to rejoin the stream. This is by far the most common mode of irrigation, and the shape, size, and direction of the channels are regulated by the nature of the surface and other circumstances, which vary in almost every situation.

When there is a considerable fall and a sufficient supply of water, a series of channels may be made, so situated below each other, that the second collects

the water which the first has supplied, and in its turn becomes a feeder to irrigate the lower parts of the declivity: a third channel receives the water and distributes it lower down, until the last pours it into the river. This is called *catch-work*, because the water is caught from one channel to another. It is by far the cheapest plan of irrigation, and as it can be applied to a hillside as well as to a level field, its adoption is rapidly extending. A small rill, which is often quite dry in summer, may still by judicious management be made to improve a considerable portion of land: its waters may be collected and allowed to accumulate in a pond or reservoir, and let out occasionally, so that none be lost or run to waste. If there is but a small quantity, it must be husbanded and made to flow over as great a surface as possible. If there is not a want of water, there may be a want of declivity to enable it to flow off, which, it should always be remembered, is an essential part of irrigation. Art may in this case assist nature by forming a passage for the water, either in its course towards the land to be irrigated, or from it after it has effected its purpose.

When the surface to be irrigated is very flat and nearly level, it is necessary to form artificial slopes for the water to run over. The whole of the ground is laid in broad beds, undulating like the waves of the sea; and the water, carried along the ridge of each bed, is allowed to flow down the slopes.

Experience has shown that there are particular seasons when the water has the best effect. During frost the water-meadows, having a current of water continually flowing over them, are protected from the effect of frost, and the grass will continue to grow as long as the water flows over it. Too much moisture, however, would be injurious, and the meadows are therefore laid dry by shutting the flood-gates whenever the temperature of the air is above freezing. By this management the grass grows rapidly at the first sign of spring. Before the dry upland meadows have recovered the effects of frost and begun to vegetate, the herbage of the water-meadows is already luxuriant; and by judicious management three or four crops of grass are obtained in each season, or only one abundant crop is made into hay, and the sheep and cattle feed off the others.

In hot weather much mischief may be done by injudicious flooding. In winter, on the contrary, the land may be covered with water for weeks without injury; and if an earthy deposit takes place, the subsequent fertility is greatly increased. But this is not properly irrigation: it is inundation, and the effects depend on entirely different causes. On the other hand, water may be carried in small channels through meadows without being allowed to overflow: this is watering, but not properly irrigating. The great advantage of water-meadows in England is not so much the increased quantity of grass or hay which is obtained when they are mown, as the early feed in spring, when all kinds of nutritive fodder are scarce.

When it is intended to form a water-meadow on a surface which is nearly level, the whole of the land must be laid in beds about 20 or 30 feet wide; the middle or crown of these beds being on a level with the main feeders, and the bottoms or drains on

a level with the lower exit of the water, or a little above it. Grass-seed being sown over these beds, the water may be let on for a very short time, to make them spring. As soon as the grass is two or three inches above ground, a regular flooding may be given, and in a very short time the sward will be complete. Instead of sowing seed, tufts of grass cut from old sward may be spread over the newly formed beds, and they will soon cover the ground.

It seems essential to the formation of a good water-meadow that the bottom be porous and free from stagnant water; hence under-draining is often indispensable before a water-meadow can be established; and a peat bog, if drained and consolidated, may have water carried over its surface, and produce very good herbage. If the soil is a very stiff clay, draining is almost indispensable where a water-meadow is to be made.

The usual time of letting on the water on water-meadows is just before Christmas, and it may continue to flow over the land as long as the frost lasts: in mild weather it may be turned off during the day and put on again at night until the frost is gone. The grass will soon begin to grow, and be ready to be fed off. When this is done, the water is immediately let on for a short time, and turned off again to allow the ground to dry after a few days' flooding, and the water is let on again at short intervals. The warmer the air is, the shorter time must the water be allowed to cover the meadows. By means of judicious irrigation good grass crops may be obtained, year after year, without any manure being put on the land.

Irrigation is not practised to such an extent in Great Britain as seems desirable. The whole of the water-meadows do not probably exceed 100,000 acres, and are chiefly confined to the south and west of England. On the Continent the great plains and valleys of the Po, Adige, Tagus, Douro, and other rivers, are systematically irrigated, and their fertility wonderfully increased in consequence. The system is also very extensively pursued in India, and is being extended in every direction in that country.

The distribution of liquid manure over the land answers the same purpose as irrigation; and from the satisfactory results which have attended this plan of increasing the fertility of the soil, there can be no doubt that it will be more and more resorted to. An extensive tract of land lying between Portobello and Leith has for some time been covered with the sewage of Edinburgh, and now yields a rent of from 20*l.* to 40*l.* an acre. Grass is cut on it from three to five times a year, and as much as ten tons an acre have been obtained at a cutting. The advantages of this application of liquid manure have long been shown on a small scale by Mr. Meehi, at Tiptree Farm, near Kelvedon.

Great improvements have recently (1866) been made in mechanical appliances for carrying on this work. Among these we may notice Messrs. J. Warner and Sons' new chain pump. This machine was made expressly for India. It requires little fixing. It throws a large quantity of water into the irrigating canals, and is so simple that any native may work or repair it. See Plate 2, 'Irrigation,' figs. 1 and 2; fig. 3 represents the horse gear

used to work the chain pump. Plate 1 represents the force pump for irrigation by the same makers.

IRTISCH. [SIBERIA.]

IRUN. [BASQUE PROVINCES.]

IRVINE. [AYRSHIRE.]

IRVING, EDWARD, A.M., a famous pulpit orator, and founder of a religious sect, was born at Annan in Dumfriesshire in the year 1792. He studied at the University of Edinburgh, and there he acquired such marked distinction in the exact sciences, that before reaching his seventeenth year he was recommended by Professor Leslie to the situation of teacher of mathematics in the burgh school of Haddington. In the following year he was appointed to a similar office in Kirkcaldy, where he remained nearly seven years, at the same time laboriously studying theology and attending at intervals the divinity hall at Edinburgh, with the view of entering the church. In 1819 he was licensed as a preacher in connection with the Established Church of Scotland by the presbytery of Annan; and happening to preach in St. George's church, Edinburgh, Dr. Chalmers, who was one of his hearers, was so favourably impressed with his discourse that he appointed him his assistant in the parish of St. John's, Glasgow. After spending three years in Glasgow, perhaps the happiest and most useful period of his life, he was invited to become the pastor of a Presbyterian chapel in Cross Street, Hatton Garden, London, attached to the Caledonian Asylum. He accordingly settled in London in August, 1822. The chapel was at that time nearly empty, and was besides situated in an obscure and unfavourable locality; but in the course of a few weeks Irving's remarkable style of oratory caused an extraordinary sensation in the metropolis, and the mean-looking, dingy sanctuary in Hatton Garden was thronged, Sabbath after Sabbath, with statesmen, philosophers, poets, painters, literary men, merchants, peers, fashionable ladies, mingled with shopkeepers and mechanics, while many hundreds were unable to obtain admission. About a year after his settlement in London he published a volume of discourses, under the title of—'For the Oracles of God, Four Orations: For Judgments to come, an argument, in nine parts,' three editions of which were called for in little more than six months. Irving's popularity continued with no abatement for about two years, and a new and stately church was erected for him in Regent Square, capable of accommodating at least two thousand persons. But, unfortunately, his thirst for applause had grown to a disease, and strong excitement had become a necessity of his nature, to be maintained at any cost. He now devoted himself with characteristic ardour to the exposition of unfulfilled prophecy, and in a bulky volume, entitled 'Babylon and Infidelity foredoomed by God,' 1826, he ventured to predict the exact date of the final overthrow of popery and infidelity, and confidently fixed upon 1868 as the period when the millennial reign of Christ was to commence on earth. He next adopted the opinion that it was want of faith alone which prevented the miraculous gifts conferred upon the primitive church from being enjoyed by the church in modern times; and having for some time earnestly prayed for, and eagerly expected the return of these gifts, he soon became infected with the religious frenzy which at this period broke out at Row,

on the Frith of Clyde, and declared his firm belief in the truth of the claims which some of his fanatical followers made to the power of working miracles and speaking in unknown tongues. And proceeding rapidly in the downward path of error, he began to disseminate, both from the pulpit and the press, heretical notions respecting the alleged peccability of our Lord's human nature. His erratic behaviour at length attracted the attention of the ecclesiastical courts, and after a formal trial for heresy he was deposed from the office of the ministry in the Church of Scotland. He continued, however, to preach to a numerous body of devoted adherents, who built a new chapel for Irving in Newman Street, where he continued to preach to the close of his life, and about fifty thousand persons throughout England adopted his views. His iron constitution, however, now began to give way under his incessant labour and excitement; he repaired to Scotland for change and repose, but died in Glasgow, December 8, 1834, in the forty-third year of his age. In addition to the works already mentioned, he published a missionary 'Oration' in 1824; an Introductory Essay to Bishop Horne's Commentary on the Psalms in 1826; 'The Coming of the Messiah in Glory and Majesty, by Juan Josafah Ben Ezra, a converted Jew, translated from the Spanish,' 1827; and 'Sermons, Lectures, and Occasional Discourses,' in 3 vols., in 1828. An admirable 'Life' of this extraordinary man has recently been published by Mrs. Oliphant, the well-known novelist.

IRVING, WASHINGTON, one of the most pleasing and popular of American writers, was born at New York, on the 3rd of April, 1783. He was of Scottish origin, his father belonging to a family of Irvings long settled in the Orkney Islands. The earliest contributions Washington made to literature were light sketches of men and manners, published in 1802 in the *New York Morning Chronicle*. In 1803 he travelled extensively in Southern Europe, paid a visit to England, returning home in 1806, and contributed a series of humorous essays to a periodical called *Salmagundi*. In 1809 Irving published his first book, the 'History of New York, by Diedrich Knickerbocker,' a burlesque chronicle written in a vein of such quiet humour that it has sometimes been taken for a veritable history. About this time Irving was admitted a partner in the thriving commercial house which his brothers had inherited from their father. He also edited the *Analectic Magazine*. In 1816 he visited England, and was introduced to Sir Walter Scott. In the same year disaster overtook the firm to which he belonged, and he turned to literature, not as a pastime, but a resource. Two eminent publishers refused the 'Sketch Book,' part of which had appeared in New York; but Scott came to the rescue, and advised Murray to publish it. Its success was immediate and immense. For his next work, 'Bracebridge Hall,' the publisher offered a thousand guineas without seeing the MS. 'Tales of a Traveller' followed in 1824. During a residence in Madrid, Irving wrote the 'Life and Voyages of Columbus' (which was published in 1828, and remains the standard work on the subject), 'The Voyages of the Companions of Columbus,' 'The Conquest of Granada,' 'The Alhambra,' 'Legends of the Conquest of Spain,' and 'Mahomet and his Suc-

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cessors,' which were published at intervals up to the year 1849. In 1829 he was appointed secretary to the American Legation in London. In 1831, the University of Oxford conferred on him the degree of LL.D.; and of the two gold medals placed by George IV. at the disposal of the Royal Society of Literature, Irving received one, and Mr. Hallam the other. Resigning his diplomatic functions in 1831, he returned to America a distinguished and respected man. A visit to the Rocky Mountains produced his 'Tour on the Prairies,' afterwards republished, with his 'Recollections of Abbotsford and Newstead, in the *Crayon Miscellany* of 1835. In 'Astoria,' 1836, he sketched the history of the remarkable enterprise which his friend John Jacob Astor had set on foot many years before, to carry the fur trade across the Rocky Mountains. The 'Adventures of Captain Bonneval' came from his pen in 1837, and numerous stories and essays in the *Knickerbocker Magazine*, afterwards collected under the title of 'Wolfert's Roost.' To 1841 belongs his 'Life and Poetical Remains of Margaret Davidson.' In 1842 he was appointed minister to Spain. Returning to America in 1845, he lived on his estate called Sunnyside, on the banks of the Hudson, twenty-five miles from New York, where he dispensed a liberal hospitality. In 1849 he published his 'Life of Goldsmith,' and in 1859 completed his last and best work, 'The Life of Washington.' He died at Sunnyside, in his seventy-eighth year, on the 28th November, 1859, having enriched the literature of his country with many excellent works, some of them among the most graceful in the English language, and bequeathing to the biography of authorship a life singularly pure, honourable, and happy. His life has been recently published by his nephew, Pierce Irving.

IRVINGITES, a name erroneously given to the supposed followers of Edward Irving. Irving, in common with many others, believed that God in these last days had restored apostles and prophets, together with other gifts of the Spirit, peculiar to this dispensation, for the blessing of the whole Church of Christ. In public estimation he was the most prominent person in this movement, though himself neither claiming nor possessing any special gift. Believing it to be a work of God, he to the very last abhorred the idea of his name being associated with it. His supposed followers, while honouring him very highly for his works' sake, and for his many noble qualities, consistently repudiate the idea of being called by his name, and refuse to take any other name than what belongs to the whole Church of Christ—the 'One Catholic and Apostolic Church.'

ISABELLA OF CASTILE. [FERDINAND V., of Castile.]

ISABELLA THE CATHOLIC, ORDER OF, a Spanish order of knighthood, founded by Ferdinand VII., in 1815, as a reward for the defence of the possessions of Spanish America. The sovereign is the head of the order, and it has the three classes of grand-crosses, commoners, and knights. It is now conferred for all kinds of services.

ISÆUS, one of the ten Athenian orators, was a native of Chalcis, or, according to other accounts, of Athens. The vigour of his talent belonged to the period after the Peloponnesian War, which ended B.C. 404, and he lived to the time of King Philip.

F F

He was a pupil of Isocrates, instructed Demosthenes, and enjoyed the society of the chief philosophers of his time.

Eleven of the orations of Isæus are extant, all treating of matters relating to wills and the succession to the property of testators, or persons intestate, or to disputes originating in such matters. From these orations we derive much information about the law of Athens on the disposition of property by will and in cases of intestacy, and also respecting many of the forms of procedure.

Dionysius says, that with Isæus originated that vigour and energy of style which his pupil Demosthenes carried to perfection.

The best edition of the text of Isæus is by Bekker. The translation of Isæus by Sir William Jones (1779, quarto) is somewhat deficient in critical accuracy, as well as wanting in force.

ISAIAH, one of the most celebrated of the Hebrew prophets, but of the time in which he lived little more is known than he has himself told us in the superscription of his book. It appears that he was the son of Amoz or Amotz, who, however, was not the prophet Amos, who prophesied in Israel in the reign of the second Jeroboam. It seems tolerably clear that he was a native of the kingdom of Judah; and that he resided at Jerusalem is evident from several passages of his prophecies; that he was married; and that he had two sons in the reign of Ahaz, to whom he gave names symbolical of important events in the future history of the Jews (vii. 3; viii. 1, 2). The Scripture says nothing further of him; but the uniform tradition of the Jews is that he was put to death in the time of Manasseh, by being sawn asunder.

The prophetic ministry of Isaiah was of long duration. The superscription acquaints us that he prophesied in the reigns of Uzziah, Jotham, Ahaz, and Hezekiah. The vision in chap. vi., which has every appearance of expressing an introduction to the prophetic office, is dated 'in the year that King Uzziah died.' Uzziah died in 759 B.C.; and as we have an explicit statement that Isaiah was engaged in his prophetic work till the fifteenth year of Hezekiah, in 712 B.C., we have an interval of forty-seven years, during which, at the lowest computation, Isaiah exercised his prophetic office. But it is probable that he lived much longer. Hezekiah himself lived fourteen or fifteen years after that date; and the statement in 2 Chron. xxxii. 32, that 'the rest of the acts of Hezekiah' were written 'in the vision of Isaiah,' seems to imply that he survived him, and wrote the history of his reign down to the time of his death. If he survived Hezekiah, he probably, as the tradition already alleged intimates, lived some time into the reign of Manasseh; but if we reckon only to the first year of that reign, the interval from the last year of Uzziah is sixty-two years, and supposing that Isaiah was not more than twenty at the commencement of that period, he must have been above eighty at the time of his death.

Regarded in the order of time, the writings of Isaiah would form the fifth of the prophetic books; for Joel, Jonah, Hosea, and Amos were his predecessors. Yet is this book most properly placed first in the collection, as well on account of the transcendent importance and the sublimity of the predic-

tions which it contains, as on account of its extent—the book of Isaiah being larger than any other prophetic book, and indeed exceeding in bulk the writings of all the twelve minor prophets taken together.

The peculiar sublimity of Isaiah's prophecies, both in their style and objects, has directed the attention both of Jews and Christians more strongly to this book than to any other in the prophetic canon of the Old Testament. It has the very important distinction of being more frequently quoted in the New Testament than any other of the sacred books, the Psalms excepted: and the distinct manner in which the divinely inspired writer speaks of the birth and sufferings of Christ, and the glories of his kingdom, has ever rendered it eminently instrumental in the conviction of the unbelieving, in confirming the doubtful, and in strengthening the faint-hearted. It should be added that eminent modern critics are of opinion that some portions of the book (especially chapters xii. and xiii.) are by a different writer, of the time of Jeremiah or even the later prophets.

Bishop Lowth's English translation of the Prophecies of Isaiah, first published in 1778, contains a large body of useful notes, and has been frequently reprinted.

ISATINE, a chemical compound, which forms orange-red or hyacinth crystals of a brilliant lustre, and is obtained by means of sulphuric acid and bichromate of potash, from oxidized indigo. This compound dissolves in caustic potash, and the liquid yields, on evaporation, isatite of potash as a crystalline salt. 'This salt gives with acetate of lead a white precipitate, isatate of lead, which, when decomposed by sulphuretted hydrogen, yields a solution of the acid. Isatic acid is decomposed from this solution by spontaneous evaporation, as a white powder.' (Turner.)

ISATIS. [WOAD.]

IS'CHIA, the ancient *Enaria*, an island situated at the northern entrance of the Bay of Naples, the smaller island of Procida lying between it and the promontory of Misenum on the mainland. It is mountainous, and abounds in most enchanting scenery. The highest summit, called Epomeo, which is an extinct volcano, rises about 2500 feet above the sea. Strabo calls this island *Pitheciusæ*, from *pithecus*, an earthen vessel, the clay of the island being used for earthenware from the remotest time. The soil is very fertile, and produces corn, abundance of superior wine, and all sorts of fruit. The hills are covered with chestnut trees. Sulphur is abundant, and the mineral springs at Casamicciola are annually resorted to by summer visitors. The island is about 20 miles in circuit, and contains 25,000 inhabitants, who are partly employed as fishermen, and in manufactures of alum, straw hats, baskets, and earthenwares. Ischia is divided into two cantons, and contains the small towns of *Ischia*, which is a bishop's see, and has a castle (population, 6545); *Foria*, which is the most commercial place on the island (population, 5791); and *Casamicciola*, near which there is excellent clay, of which a great quantity of pottery is made and sent to Naples. The latter place has thermal springs and baths, and the inhabitants number 3690.

ISEGHEM. [FLANDERS, WEST.]

ISER. [BAYARIA.]

ISÈRE, a department in France, formed out of a portion of Dauphiné, is bounded E. and N. by Savoy and the department of Ain, S.E. and S. by the department of Hautes-Alpes, S.W. and W. by those of Drôme and Rhône. It lies between $44^{\circ} 42'$ and $45^{\circ} 52'$ N. lat., $4^{\circ} 42'$ and $6^{\circ} 20'$ E. long.; its length from N.W. to S.E. is 94 miles; the average width is 41 miles. The area is 3200 square miles, and the population at the last census was 577,748.

General Aspect.—The department presents lofty Alpine mountains, peaks covered with snow that never melts, glaciers, dark pine forests, numberless steep, narrow, and abrupt gorges, torrents, waterfalls, and extensive plains towards the north and in the centre, the whole forming perhaps the most varied and picturesque scenery in France, ranging between the extremes of the bleakest barrenness and the most smiling and luxuriant fertility. The cols of Saix and Sept-Laux, and the peaks of Granier and Belledonne, rise respectively to the height of 10,968, 9742, 9840, and 9781 feet above the level of the sea. The mountains abound in grottoes of great extent, and are rich in stalactitic concretions. The lakes are numerous, but small. There are no navigable canals; but canals and rills of irrigation are employed very extensively in most of the valleys and plains. Every spot capable of cultivation is carefully tilled; the mountain sides are shaped into terraces, which are formed with carried earth, supported by walls of dry stones; and crops are grown at the height of 2700 feet above the level of the valleys.

The arrondissement of Grenoble contains no plains; the tillage is confined to the valleys and mountain slopes. The valley of Grésivaudun, remarkable for its extraordinary fertility and high cultivation, is watered in its whole length by the Isère, and extends from the point where that river enters France to its junction with the Drac in the neighbourhood of Grenoble, a length of 29 miles, with an average breadth of 3 miles. It is inclosed in its whole extent by two chains of mountains of great and varied beauty, the lower slopes of which are converted into corn fields, meadows, orchards, and plantations; the central parts are covered with forests of oak, chestnut, and pine, or clothed with pasture; while the summits and crests are covered with snow or with naked rocks. In this valley the walnut, mulberry, and vine flourish. Wheat, barley, maize, hemp, clover, &c., are produced in great abundance. Rye and oats are the chief crops in the mountain districts. Oxen are employed in farm-work. Numerous flocks from this and the neighbouring departments graze upon the mountain pastures during the summer. The arrondissement of St.-Marcellin presents towards the north a vast plain, known under the names of Bièvre and Côte-St.-André, consisting of a dry gravelly soil, which is tolerably fertile and well cultivated. The centre of this arrondissement is hilly, and contains some good wheat land. Another part of the arrondissement is the valley of Tullins, a prolongation of that of Grésivaudun, to which it yields neither in beauty nor fertility. The southern part of the arrondissement of La-Tour-du-Pin, known as the Terres Froides (cold lands), consists of high ridges divided by narrow vales, while the northern part consists of hills of moderate height, intersected by moist and marshy plains. In this part are the lakes of Paladru

and Lempis, and the extensive morasses of Bourgoin. The arrondissement of Vienne presents in its northern part a vast dry sandy plain, on which rye is the chief crop; in the central parts it is covered with hills, the lower slopes of which are well cultivated and very productive, while their summits are covered with wood; to the south this arrondissement comprises the extremely fertile plain of Valoir, which yields corn, wine, oil, and silk.

Rivers.—The department takes its name from its principal river, the *Isère*, which, rising on the western slopes of the Graian Alps in Savoy, flows in a general westerly direction to Montiers, whence its course is N.W. for a few miles, then S.W. to its junction with the Arc and as far as Montmeillan, where it becomes navigable. Here its course is nearly S. to Grenoble, where it is joined by the Drac from the left bank: below this point it makes another bend first to N.W., then to S.W., passing St.-Marcellin, below which town it enters the department of Drôme, and falls into the Rhône a few miles above Valence after a course of 150 miles, 90 of which are navigable. This river, though subject to disastrous floods, is of moderate width, but very deep; its waters are always of a blackish tint, owing to the débris which it receives from the slate quarries of the Tarentaise. Of the other streams, the most important are the *Drac* [*ALPES, HAUTES*]: the *Romanche*, which drains the south-east of the department and joins the Drac on the right bank, a few miles S. of Grenoble: the *Bourbre*, which rises S. of Virieu, and flowing past La-Tour-du-Pin and Bourgoin enters the Rhône on the northern boundary of the department; the *Guiers*, which is formed by the union of the *Guiers-Vif* and the *Guiers-Mort* (two streams that run down from the mountains of the Grande-Chartreuse), and flows along the frontier of Savoy from Les-Echelles to its junction with the Rhône, a few miles S. of Belley. The *Rhône* forms the northern and western boundaries of the department, and is navigable. Salt and other articles are conveyed in barges from the Rhône up the Isère; the transports down the latter are iron, hemp, linen, woollen cloth, &c.

Natural Products.—The department contains 2,078,799 acres, of which 38,276 are covered with rivers, lakes, canals, &c. The productions are of the most varied description, including wheat, rye, barley, maize, buckwheat, peas and beans, potatoes, fruits of all kind, almonds, medicinal plants, hemp, &c. Vines are mostly grown in the fertile valleys, trained either to greenwood supports of maples or cherry-tree, or to dry tall poles of chestnut wood; vines thus grown are called high vines (*hautains*). But on the hill slopes, in favourable situations and in the Rhône district, the low vines, as they are called when unsupported, produce a stronger better-keeping wine, and more fitted for transport. The produce of wine in ordinary years is about 5,500,000 gallons, the best of which is produced in the neighbourhood of the Rhône. Horses, asses, and cows are numerous, but small, the former being celebrated for their activity; mules of large size are reared in the mountains; sheep are bred in great numbers, and yield a fine silky wool; pigs, goats, and poultry are plentiful. The rivers and lakes abound in fish. Game is abundant; among the wild animals are the bear, boar, wolf, chamois, ibex, porcupine, weasel, red

and gray partridge, &c. The mulberry grounds are extensive.

The climate is healthy: cold in winter, very hot in the valleys and plains in summer. The prevailing winds are from the north and north-west; about eighty-five days in the year are rainy; hail-storms are sometimes very destructive.

In mineral wealth the department is very rich. Iron, lead, copper, and coal mines are worked; gold and silver mines have been worked, but are now abandoned. In the year 1837 a vein of platina was discovered in the valley of the Drac. White marble, granite, porphyry, gypsum, and slate are quarried; antimony, zinc, cobalt, rock-crystal, lithographic stones, lignite, vitriol, and sulphur are found.

Manufactures.—The industrial products consist of sailcloth, table and household linen, gloves, soldiers' uniforms, cannons, calicoes, printed cottons, oil, turpentine, liqueurs, and mineral acids. The gloves called Grenoble, from the place where they are made, bear a high reputation. There are iron, copper, and lead foundries, steel works, zinc and copper rolling factories, marble sawing mills, paper and vellum works, naileries, dyehouses, glass works, cotton yarn manufactories, and silk-throwing establishments.

Divisions, Chief Towns, &c.—The department is divided into four arrondissements, as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Grenoble, . .	20	212	216,462
La-Tour-du-Pin, . .	8	123	131,547
St.-Marcellin, . .	7	84	82,329
Vienne, . .	10	131	147,410
Total, .	45	550	577,748

Of the arrondissement of Grenoble and of the whole department the capital is GRENOBLE. *Allevard* stands in a high valley N.E. of Grenoble, watered by the Breda, a feeder of the Isère, and has 3180 inhabitants, who are chiefly employed in the neighbouring iron mines, forges, smelting furnaces, and foundries, the machinery of which is driven by the Breda. There are also some mineral springs, with a temperature of 96° Fahrenheit, but of small repute. *Bourg-d'Oysans*, S.S.E. of Grenoble, in the picturesque valley of the Romanche, which is hemmed in by high wooded mountains, echoing with numerous cascades, has an ecclesiastical college, and 2796 inhabitants, who manufacture cotton, and work in the lead and rock-crystal mines of the neighbourhood. *St.-Laurent-du-Pont*, 20 miles N. from Grenoble, is most picturesquely situated at the foot of very high and almost perpendicular mountains, on the road to the monastery of the Grande Chartreuse, which was founded by St. Bruno in 1084 in a wild and rocky defile; population, 1761. *Mens*, 25 miles S. from Grenoble, stands among the Trièves mountains, and has 1903 inhabitants, important linen manufactures, and glass factories. *La Mure*, S. of Grenoble on the road to Gap, situated at the extremity of the valley of the Matésine, which is inclosed by the Trièves mountains, has 3628 inhabitants, who manufacture coarse linen and leather, and work in the coal mines and marble quarries near the town. *Vif*, 10 miles

S. from Grenoble, has potteries, silk-throwing factories, and 2417 inhabitants. *Villard-de-Lans*, near the right bank of the Bourne, has a population of 2047. *Vizille*, in a fertile plain on the right bank of the Romanche, has an ancient castle now converted into a factory for printed cottons, and contains 3546 inhabitants. *Voiron*, N. of Grenoble, a well-built town of 9637 inhabitants, stands at the foot of a hill on the Morge, a small feeder of the Isère, which drives the machinery of several industrial establishments. The principal manufactures are cloth, chip hats, silk-stuffs, canvas, liqueurs, soap; there are also iron and steel works, paper and hemp mills, naileries, and tan-yards. *Voreppe*, S. of Voiron, has oil and corn mills, tan-yards, and 2887 inhabitants.

In the arrondissement of La-Tour-du-Pin the chief town, *La-Tour-du-Pin*, stands on the left bank of the Bourbre, on the road from Lyons to Chambéry, and has 2201 inhabitants, and some beet-root sugar factories. It was formerly important on account of its fortifications, of which some remains are extant. The tribunal of first instance is at *Bourgoin*, a town of 4851 inhabitants, situated among hills at the junction of three small rivers, and at the point where the Lyons road branches off southwards to Grenoble, and eastwards to Italy through Chambéry. Its situation is favourable for trade, but unhealthy on account of the marshes and bogs near it. Its manufactures are printed calicoes, canvas, cotton cloth and yarn, thrown silk, and beet-root sugar; there are also some paper mills. *Crémieux*, 6 miles N. from Bourgoin, has 2370 inhabitants, and is famous for its poultry. It stands at the foot of a chain of calcareous hills, in which is the famous grotto of *La Balme*, reckoned as one of the seven wonders of Dauphiné. The grotto consists of two long galleries, one facing the entrance, the other to the right, and both contain beautiful stalactites; in the former there is a lake of pellucid water, the transit of which to and fro occupies one hour, and is made by torch-light in a boat kept for the purpose. *Le-Pont-de-Beau-voisin* is on the Guiers, which divides the town into two portions, the largest of which is in Sardinia. The population on the French side is 1871; on the Sardinian, 1388—total, 3259. The river is crossed by a bridge of one arch.

In the arrondissement of St.-Marcellin, the chief town, *St.-Marcellin*, is situated 21 miles W. from Grenoble, in a pretty country at the foot of a vine-clad hill, at a short distance from the right bank of the Isère, and has a tribunal of first instance, a college, and 3295 inhabitants. The town is surrounded with walls pierced by four gates; it is well built, with straight streets, ornamented with fountains. *St.-Etienne-de-St.-Géoirs*, 10 miles N. from St.-Marcellin, on the Doleur, has a population of 1857. *Rives*, N.N.E. of St.-Marcellin, is situated in a smiling valley, watered by the Fure, and has 2506 inhabitants. This town is the centre of considerable manufactures of iron, steel, paper, crape, and silk handkerchiefs; the steel forges, of which there are a large number in the town and neighbourhood, are famous for the excellence of their products. *Roybon*, N.W. of St.-Marcellin, has manufactures of coarse woollens and 2128 inhabitants, partly engaged in steel-works. *Tullins*, formerly a well-fortified town, stands a few miles S. of Rives in a beautiful valley,

and has 4566 inhabitants. It is surrounded by iron forges, steel works, copper foundries, and hemp-dressing establishments. Arms and tools of various kinds are manufactured here. *Vinay*, 5 miles N.E. from St.-Marcellin, has iron works, silk-throwing establishments, and 3377 inhabitants.

In the arrondissement of Vienne the chief town is *Vienne*, the *Vienna* of the Allobroges, and the capital of the first and second kingdoms of Bourgogne. It stands in $45^{\circ} 31' 28''$ N. lat., $4^{\circ} 52' 11''$ E. long., at a distance of 45 miles N.W. from Grenoble, on the left bank of the Rhône, which is lined with quays and crossed by a suspension-bridge. The town has tribunals of first instance and of commerce, a consultative chamber of manufactures, a college, and, in 1861, 19,559 inhabitants. Hemmed in between steep hills and the river, Vienne has a much greater length than breadth; it is, like most ancient towns, ill-built, with narrow winding streets, with the exception of that traversed by the road from Lyons to Marseilles. It contains some Roman remains, among others a temple now converted into a museum, a triumphal arch, some vestiges of an amphitheatre on Mont-Pipet, and S. of the town, near the gate of Avignon, a pyramidal obelisk, called *Plan-de-l'Aiguille*, which is 46 feet high, and constructed with cut stone without cement. The modern structures of most note are the fine Gothic cathedral, the church and cloisters of the former abbey of St.-André-le-Bas, the cavalry barracks, the public library of 10,000 volumes, the college, which is one of the finest structures of the kind left by the Jesuits, the hospitals for the sick and poor, the corn market, and the abattoir. The Gère, which joins the Rhône at Vienne, drives the machinery of several factories. This town is one of the principal seats of the woollen manufactures in the south of France; common cloth, pasteboard, soap, leather, glass bottles, paper, chemical products, &c., are also made; and there are establishments for reeling and throwing silk, dye-houses, iron furnaces, steel works, sheet-copper and lead works, copper and brass foundries. The commerce of the town is composed of its industrial products, and of wine, zinc, &c. In its vicinity are lead and silver mines; and near it also, at Ampuis, the celebrated wine called *Côte-Rotie* is made. It has a station on the line of railway to Avignon. A council was held here in 1311, which abolished the order of the Templars. Vienne formerly had an archbishop of its own; but the archiepiscopal province is now united to that of Lyons. *Beaurepaire*, S.S.E. of Vienne, has cloth factories, corn and fulling mills, and 2661 inhabitants. *La-Côte-St.-André* stands at the foot of a hill, in a pretty situation on the Frette, 21 miles S.E. from Vienne, and has 4234 inhabitants, who manufacture the celebrated liqueur called *Eaux de la Côte*, pyroligneous acid, wax candles, and plate glass. *St.-Jean-de-Bournay*, 14 miles E. from Vienne, on the Veronne, a small stream that drives the machinery of several factories and then loses itself underground, has 3501 inhabitants, who manufacture sail-cloth, woollen plaids, beet-root sugar, and leather.

The department forms the see of the bishop of Grenoble; is included in the jurisdiction of the *Cour Imperiale* of Grenoble, and of the University Academy of Lyons; and belongs to the 22nd Military Division,

of which Grenoble is head-quarters. It returns four members to the Chamber of Deputies. (*Annuaire pour l'An 1866.*)

ISERNIA, a town in the province of Campobasso, South Italy, having 8584 inhabitants, some of whom are employed in manufactures of woollens, paper, and earthenware. It was nearly destroyed by an earthquake in 1805. It is the see of a bishop, and near it the first battle between the Sardinian and Neapolitan troops took place on the 17th October, 1860. The town is surrounded by scenery of most romantic beauty.

ISISIA, certain festivals held among the Romans in honour of Isis, the Egyptian goddess. They were originally brought from Egypt, but on account of their licentiousness were suppressed, u.c. 696; though they were restored by Commodus about 200 years afterwards. The priests were called *Isiaci*.

ISIDORE of Charax lived probably in the first century of our era. It appears from Athenæus ('Deip.' iii.) that he wrote an account of the Parthian empire, of which there is only a small part extant, entitled *Στασιαὶ Παρθίων*, or the 'Parthian Halting-places.'

ISIDORE, SAINT, of Pelusium in Egypt, lived in the beginning of the fifth century, and wrote, according to Suidas, '3000 epistles, explaining the divine Scriptures.' Upwards of 2000 are still extant. They have been published in Greek and Latin by Scholt, Paris, 1638. Dr. Heumann has published a 'Dissertation on Isidore' (Hanover, 1738, 4to.), in which he argues that most of the letters are fictitious, and not a real correspondence.

ISIDORE, SAINT, bishop of Seville, from 595 or 596 to 636, was born at Carthagena. He was considered by the Council of Toledo (650) as the most learned man of his age. The works of Isidore, which are numerous, have been published by Du Breul, Paris, 1601, and Cologne, 1617; at Madrid, 1778, and by Arevali, Rome, 1797, 1803.

ISINGLASS (German, *häusen-blase*, 'the air bladder of the sturgeon;') *colle de poisson*, is obtained from the air bag or 'sound,' as it is sometimes termed, of various fishes, many of which are still unknown. The finest kinds are produced by species of the *Acipenser* and some other genera, as the *Morrhua*, *Silurus*, and *Gadus*. The method of preparing the air bags for sale differs considerably, according to the country in which it is conducted. The commercial *pipe*, *purse*, and *lump* isinglass consist of the bag desiccated but unopened. The *leaf* and *honeycomb* kinds are examples of the bladder cut open and dried unfolded; in the staple and book varieties it is folded, while in the ribbon isinglass it is rolled out. It is picked or cut before importation into Great Britain.

The isinglass produced in the Russian empire is principally obtained from the sturgeon. These cartilaginous fishes constitute the genus *Acipenser*. But this is not the only genus from which isinglass is obtained in Russia, for it is also procured from the *Silurus glanis*, which Dr. Royle suggests may be the source of the Samovey isinglass of commerce. Brande thus describes the preparation of Russian isinglass:—The swimming bladder is cut open, washed, and then exposed to the air, with the inner silvery membrane turned upwards. The latter is then stripped off, and placed in damp cloths, or left in the outer covering and prepared or kneaded. It is then taken

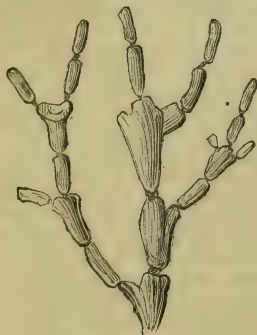
out of the cloths, and either merely dried (*leaf isinglass*) and twisted in a serpentine manner between three pegs into the shape of a horseshoe, heart, or lyre (*long and short staple*), or folded in the manner bookbinders fold printed sheets of paper (*book isinglass*). Several kinds of leaf isinglass are imported from Russia. The finest kind is that from Astrakhan, one variety of which is said to be from the Beluga, *Acipenser nuso*. These are imported from St. Petersburg. The Samovey leaf is an inferior kind from Taganrog. Sisane leaf is the produce of a small fish, each piece measuring only about two and a half inches each way, and weighing about a drachm; it looks like pieces of dried bladder, marked by two fibrous or muscular bands. Other descriptions are imported from Brazil, New York, Hudson's Bay, and the East Indies.

The more common kinds of isinglass, especially the coarse Brazilian, are used by brewers for fining beer. They are also employed for the clarification of wines and various other liquors.

In 1864 the quantity of isinglass imported into the United Kingdom was 2748 cwts., value 96,007*l.*; of which 1045 cwts. were from Russia, 686 cwts. from Brazil, 393 cwts. from Bombay, and 354 cwts. from Singapore. The Russian isinglass is worth three times as much as any other, being 56*l.* per cwt. In same year 261 cwts., value 9118*l.*, were exported.

ISIS, one of the chief deities of the Egyptians, the wife of Osiris, was represented as the Goddess of Fecundity, and the cow was sacred to her. The annual festival of Isis in Egypt lasted seven days, during which a general purification took place. The priests of Isis observed perpetual chastity, their heads were shaved, and they went barefooted. The goddess was often represented as a woman with the horns of a cow. She also appears with the lotus on her head and the sistrum in her hand; and her head in some instances is seen covered with a hood. Heads of Isis are a frequent ornament of Egyptian capitals on the pillars of the temples. By the Greeks she was generally identified with Ceres; by the poets and philosophers she was regarded as the type of Pantheistic divinity.

ISIS HIPPU'RIS, a genus of corals inhabiting the Indian seas, the axis of which is formed of a



Isis hippuris.

series of calcareous joints, united together by horny rings. It belongs to the family *Gorgonidae*, which constitutes the third family of asteroid polypes.

Most of the species possessing a horny axis grow in a more or less arborescent form. But in some species the longitudinal branches are united at regular intervals by a number of transverse pieces, which are composed of a continuation of the horny axis, and bear polypes like the main stem and branches. *Isis nobilis* is the name now generally given to the red coral of commerce (*Corallum rubrum*) found in the Mediterranean.

ISLAM. [MOHAMMED.]

ISLANDS. The formation of islands, at different periods, is among the most remarkable phenomena in the great history of nature. Some have arisen from the coral beds in the bosom of the ocean, and others from volcanic action, or the operations of the central fires of the globe, by which the primary rocks of the earth's crust, with their superincumbent depositions, have been raised from their innermost depths to the surface of the ocean. Of this, innumerable evidences have presented themselves both in ancient and modern times. Within the period of authentic history several small islands have been known to emerge from the depths of the Gulf of Santorin, in the Grecian Archipelago. Nearly two centuries before the Christian era the small island of Palaia Kameni made its appearance; and in the year 1573 the Little Kameni was thrown up, amidst a cloud of vapour and the discharge of pumice stone. In 1707-9 another island, the result of submarine volcanic action, suddenly made its appearance, called the New Kameni, which still sends forth sulphureous vapours. There is an instance, mentioned by Kircher, of an island connected with the Azores, which was thrown up in 1538; and another in 1587, when an earthquake agitated the island of St. George; and near its shores arose eighteen small islands. There are instances where islands, after suddenly rising into existence, have begun to subside, and then gradually disappeared, or remained as shoals just below the surface of the water. Of these temporary islands, the most curious is that of Sabrina, in the neighbourhood of the Azores, which, in 1811, emerged from the deep near the coast of St. Michael. It first arose from a depth of 240 feet, and formed a dangerous shoal. Then presenting itself above the surface of the water, it continued rapidly to emerge for several days, until it rose to the height of 300 feet, and formed an island of about a mile in circumference. In its centre there was a beautiful crater, from which hot water was poured into the sea. In a few months it began gradually to subside, and in February, 1812, no trace of the island remained; but in 1813, where Sabrina once stood, there was a depth of 500 feet. In the year 1783 an island was formed by elevation about seventy miles from Cape Reykiavik in Iceland. It consisted of lofty cliffs, which emitted smoke and fire, with immense quantities of pumice, that covered the sea for above a hundred miles around. The king of Denmark laid claim to this newly-formed territory, and called it 'New Island;' but before the expiration of a year it made its disappearance, leaving nothing but a rocky reef to denote the spot where it formerly stood.

The formation of many islands, which still remain to attest their volcanic origin, is within the records of authenticated history, while others are standing memorials of the many changes and convulsions

which have marked the different superficies of the globe for countless ages before history commenced its annals, or the wonderful phenomena of nature had any intelligent witness. In the great Indian and Pacific oceans these volcanic operations have been constantly at work; and islands have been thus formed where the great ocean had rolled for ages uncontrolled. Barren Island, in the Indian Ocean, has been considered as one of the most remarkable volcanic formations now in existence. It is about six leagues in circumference, and emits, from a central cone about 1800 feet high, showers of red-hot stones of three or four tons in weight, which are thrown to a distance of many hundred feet beyond the range of the island. The surrounding sea appears of unfathomable depth. In 1806 a new island arose, among the Aleutian group of the North Pacific, about four miles in circumference, which has remained immovable ever since; and in 1814 another isle made its appearance in the same neighbourhood, which, after rising 3000 feet in height, slightly subsided, and has ever since remained firmly fixed as one of the Aleutian group of islands; all of which, beyond the possibility of doubt, have originally emerged from the bosom of the ocean, though perhaps for ages before the records of history.

ISLAY. [HEBRIDES.]

ISLAY. [PERU.]

ISLE, River. [DORDOGNE.]

ISLE D'ALBI. [TARN.]

ISLE-EN-JOURDAIN. [GERS.]

ISLE, L. [VAUCLUSE.]

ISLE-MADAME. [CHARENTE-INFÉRIEURE.]

ISLE OF MAN. [MAN, ISLE OF.]

ISLE-ROYALE. [CAPE-BRETON; CANADA.]

ISMAELITES, or ISMAELIANS, were originally a branch of the Shiites, or followers of Ali ben Abi Taleb. Djafar Madeck, the sixth Imaum in a direct line from Ali, having lost his elder son Ismael, appointed his younger son Mousa to be his successor. This caused a schism among the Shiites in the second century of the Hegira. Those who contended that the office of Imaum ought to have descended to the posterity of Ismael, and not to his younger brother, were called Ismaelites. They established two powerful dynasties, one in Egypt, and another in the Irak Ajemi of Persia. The Ismaelites of Persia, Syria, and Arabia, had frequent wars against the Abbasside caliphs and the other Sunnee Mussulmans, until the dynasty of Casbin was overthrown by the Tartars about the middle of the thirteenth century. After that time the Ismaelites became scattered through Asia, maintaining their tenets and observing their rites in concealment and obscurity.

ISMAL, a town of Bessarabia, belonging to Russia, with a population of 25,000. It is strongly fortified, and under the Turks it had numerous mosques, bazaars, and large dwellings, but it has never regained importance since it was taken in 1790, after a long siege, and given over to military execution by the Russian general Suwarrow. The horrors of this famous siege have been described by Byron in his 'Don Juan.' [BESSARABIA.]

ISMAILA, a town in Lower Egypt, S.E. of Cairo, and situated about half-way across the Isthmus of Suez. It clusters upon the north shore of Lake Timsah, at the junction-point of the fresh-water

canal from Cairo and Zagazy with the grand ship canal, before the latter bends southwards to Suez. Travellers describe it as a busy and picturesque little place, with a church, mosque, hotel, shops, bazaars, and several handsome edifices. It owes its prosperity, and almost its existence, to the canal operations conducted by M. de Lesseps and the Suez Canal Company, and designed to unite the Red Sea with the Mediterranean. The fresh-water canal runs in front of it, and is bordered by trees and shrubs, making Ismaila quite an oasis in the desert.

ISNARDIA, a genus of plants belonging to the natural order *Onagraceæ*. There is one British species of this genus, *I. palustris*. *I. alternifolia* is a native of Virginia and Carolina, in marshy places. The root is used as an emetic.

ISOCARDIA, a genus of bivalve shells, or conchifers, placed by Linnæus under the form *Chama*, and by Brugnière among the *Cardita*. Lamarck places Isocardia as the last of the genera of his *Cardiacées*, separating it from *Chama*, as Mr. G. B. Sowerby thinks with good reason ('Genera of Recent Fossil Shells'). M. de Blainville alters the term into *Isocardium*, and inserts it as a genus between *Tridacna* and *Trigonia*, among his *Camacés*. M. Rang retains it in the same family, but restores Lamarck's original termination of the name, and places it between *Caprina* and *Tridacna*. Its true place is now (1866) acknowledged by conchologists to be in the class CONCHIFERA, as a genus belonging to the family *Cyprinidæ*.

The species are limited in number, and belong to the seas of Europe, India, and Australia. Example, *Isocardia Cor.* Europe.

Fossil *Isocardia* occur in the London Clay, in the Crag, and in the Tertiary Beds of Europe and America.

ISOCHROMATIC LINES are those coloured rings which appear when a pencil of polarized light is transmitted along the axis of a crystal, as mica or nitre, and is received in the eye after passing through a plate of tourmaline.

ISOCHRONOUS, ISOCHRONISM (*isos*, 'equal,' *χρόνος*, 'time'). Vibrations or oscillations which are performed in equal times are called isochronous; and isochronism is the name given to a remarkable property of all systems which are in equilibrium, namely, that when slight disturbance, be the same more or less, is given, the oscillations which take place are all performed in the same time, or so nearly in the same time, that any acceleration or retardation is totally imperceptible. Thus, when a pendulum is allowed to vibrate till it rests, it will be found that there is no perceptible difference between the vibrations of longer and shorter extent; of which any reader may satisfy himself by attaching a weight to a string, and observing the vibrations. But a still better proof may be found in a musical string. The finest ear cannot detect any difference between the pitch of a note made by a smart blow on the key of a pianoforte and that made by a gentle one; yet a very small difference in the number of oscillations per second would be perceptible, and the amount of disturbance from the position of equilibrium is twenty or thirty times greater in the first case than in the second.

When, under two different circumstances, the longer space is described in the same time as the

shorter, it must be that the force acting in the first case is greater than that in the second; and it is sufficiently known from experience that, the more a system at rest is disturbed, the greater is the effort which it makes to return. But, in order that there may be isochronism, it is not sufficient that the effort to return should increase with the amount of disturbance, but the increase must take place according to one particular law. This law is as follows:—The force of restitution must be always proportional to the disturbance, so that, whatever force begins to act when the disturbance is *a*, twice as much acts when the disturbance is twice *a*; and so on for all proportions. That this law does prevail when the disturbance is not great, either absolutely, or so nearly that its error is extremely small, may be proved both by theory and experiment.

ISOCRATES, one of the Greek orators commonly called the Ten, was born at Athens, 436 B.C. He studied rhetoric under Pródicus, Gorgias, Tisias, and Thérámenes, and became a master of his art. A certain timidity and feebleness in his delivery prevented him from speaking in public. He taught rhetoric both at Chios and at Athens, and his school was attended by numerous disciples, among whom were Xenophon, Ephorus, and Theopompus. Isæus, Demosthenes, and others, are said to have studied under him. The orations of Isocrates were either sent to the persons to whom they were addressed for their private perusal, or they were intrusted to others to deliver in public. He is said to have delivered only one himself. Isocrates treated of great moral and political questions; his views are distinguished by a regard for virtue, and an aversion to all meanness and injustice. He was a friend of peace; he repeatedly exhorted the Greeks to concord among themselves, and to turn their arms against their common enemy Persia. In his 'Panegyric Oration' (published about B.C. 379), which he wrote in the time of the Lacedæmonian ascendancy, he exhorted the Lacedæmonians and Athenians to vie with each other in a noble emulation, and to unite their forces in an expedition against Asia. He addressed Philip of Macedon in a similar strain after his peace with Athens (B.C. 346), exhorting him to reconcile the states of Greece, and to unite their forces against Persia. He displayed considerable courage on several occasions, as when he showed his sympathy for Theramenes, who had been condemned by the thirty tyrants. On the news of the battle of Chæronea, he refused to take food for several days, and thus closed his long career at ninety-eight years of age, B.C. 338.

There are extant eight orations of Isocrates of the class called judicial, or forensic, which are valuable for the subject-matter. Three of the orations of Isocrates—to Demonicus, to Nicoteles, and the oration entitled Nicoteles—belong to the prænetic or hortatory class, and the first two partake in some degree of the epistolary style. The 'Panathenæicus' is a panegyric of Athens, which he wrote when he was ninety-four years of age. ('Panath.,' c. 1.)

The style of Isocrates is perspicuous, but highly laboured, and somewhat diffuse. In Cicero's opinion it was he who first gave to prose writing its due rhythm. Dionysius has thus briefly summed up his

comparison between Lysias and Isocrates. 'As to the charm of composition, Lysias is superior to Isocrates in the same kind that a naturally handsome person is to one made so by art: the composition of Lysias pleases naturally; that of Isocrates aims at pleasing.' Twenty-one of his orations have come down to us, together with a few epistles, probably not genuine. The best edition of the Greek text is by Bekker. Isocrates was translated into English by Richard Sadleir, London, folio (no date); by Dinsdale, London 1752, 8vo.; and by Gillies, together with the 'Orations of Lysias,' London, 1778, 4to.

ISOCRINITES, a genus of *Crinoidea* (Goldfuss).

ISOETES, a cryptogamic genus of plants, belonging to the order *Lycopodiaceæ*. The species of *Isoetes* grow at the bottoms of ponds and lakes, and are said to afford excellent food for fish. They are called Quillworts from the rush or quill-like appearance of the leaves. *I. lacustris*, quillwort, is found in Great Britain, at the bottom of lakes and ponds in hilly districts. The structure of the fructification of this plant, and other species of the genus, is only imperfectly understood. It is on this account referred to *Marsilleaceæ* by some authors, and made to form an independent order by others. Lindley refers it to *Lycopodiaceæ*.

ISOMERISM. (Greek, *isos*, 'equal,' and *μερος*, 'part'.) Substances which contain the same elements in the same ratio, and yet possess physical and chemical properties quite distinct, are classed as *isomeric*, *polymeric*, and *metameric* substances. A striking instance of this relation between a number of compounds is seen in cyanic acid and its *isomers*.

Isomeric bodies are those which contain the same absolute and relative number of atoms of the same elements, and have consequently the same atomic weight.

Polymeric substances are those which contain the same relative but not the same absolute number of atoms of the same elements, and whose atomic weights are consequently unlike. Several carburets of hydrogen offer examples of polymerism.

Metameric substances are those which, while they contain the same absolute and the same relative number of atoms of the same elements, yet constitute substances belonging to an entirely different class of bodies, or a different order of chemical compounds. There are several substances of this kind.

ISOMORPHISM (*isos* and *morphe*). This term, employed in chemistry and crystallography, strictly signifies similarity of form, though chemists restrict it to such bodies as are not only similar in crystalline form, but also in chemical composition. Thus, diamonds, magnetic oxide of iron, and alum all possess the same crystalline form, that of the octohedron; yet they are not regarded as isomorphous, because they do not possess the same constituents. On the other hand, spinelle-ruby, magnetic oxide of iron, and chrome iron ore are termed isomorphous, because they not only crystallize in the same form, but resemble each other in their composition. The best work of reference on isomorphous groups and the doctrine of *dimorphism*, is Miller's 'Chemical Physics.' [ISONARDIA.]

ISONANDRA (Gr. *isos*, 'equal,' and *aner*), a genus which includes the Gutta-percha tree (*J.*

gutta), a forest giant of the Indian Archipelago, which attains a height of seventy feet, and a girth of three feet. The milky fluid which it yields is the well-known gutta-percha, and each tree affords about twenty pounds.

ISOPODA (*isos*, 'equal,' and *πους*, 'a foot'), Latreille's name for the fifth order of crustaceans. Some of these crustaceans are aquatic in their habits, others are terrestrial, and many of the aquatic species are parasitic. The feet are always fourteen in number, unguiculated, and without any vesicular appendage at their base. The two anterior feet are not annexed to the head, but, like the succeeding ones, depend upon their particular segment. The under part of the tail is furnished with appendages which are very apparent, and in the form of leaflets, or vesicular purses. Of these, the first two, or external ones, ordinarily cover the others, either totally or in great part. The body is generally flattened, and wider than it is thick. The mouth is composed of the same pieces as in the crustaceans which precede it in M. Latreille's system, but in the order before us those which answer to the two superior jaw-feet in the *Decapods* present more the appearance of a lower lip terminated by two palpi. Two of the antennæ, the mesial ones, are almost obliterated in the last genera of this order, which are all terrestrial, and differ besides from the other by their respiratory organs. The male sexual organs are pointed out most frequently by the presence of linear or filiform appendages, and sometimes by hooks placed at the internal origin of the first subcaudal laminæ. The females carry their eggs under the breast, either between the scales or in a membranous pouch, or sac, that opens to afford a passage for their young, which are hatched with the form and parts proper to the species, and only cast their skin as they increase in size. The greater number live in the waters. Those which are terrestrial have need, like other crustaceans that live out of water, of a certain degree of atmospheric humidity, in order that respiration may be carried on, and that their branchiæ may be in a fit state for performing this function. Latreille divides the Isopods as follows:—

1. *Epicarides*. Parasitical. Genus, *Bopyrus*.

2. *Cymothoada*. With four setaceous antennæ. Genera—*Serolis*, according to Dr. Buckland, allied to the extinct *Trilobites*, *Cymothoa*, *Ichthyophilus*, *Canolira*, *Aga*, *Rocinella*, *Conilira*, *Synodus*, *Cirolana*, *Nelocira*, *Euridice*, *Limnoria*.

3. *Sphæromides*. Genera—*Zuzara*, *Sphæroma*, *Næsa*, *Cilicæa*, *Cymodocea*, *Dynamene*, *Anthura*.

4. *Idoteidae*. Genera—*Idotea*, *Stenosoma*, *Arc-turus*.

5. *Asellota*. Genera—*Asellus*, *Oniscoda*, *Jæra*.

6. *Oniscidae*. Genera—*Ligia*, *Tylos*, *Philosocia*, *Oniscus*, *Porcellio*, *Armadillo*.

ISOPYRE, a mineral which occurs in granite. It is brittle, grayish black, translucent, and slightly magnetic. It consists of silica, alumina, lime, peroxide of iron, and oxide of copper, and it is found in compact masses in the granite of St. Just, near Penzance, in Cornwall.

ISOCELES (*isos*, 'equal,' *skelos*, 'leg'), a term applied to a triangle of which two sides, or legs, are equal.

ISOTELUS, a genus of fossil Crustaceæ (*Trilobites*) from the Silurian strata, especially of North America. (Green.)

ISOTHERMAL LINES (Greek, *isos*, 'equal,' and *therme*, 'heat'), are imaginary curves traced on the surface of the earth so that each may pass through a series of points at which the mean annual temperature of the air is the same. The situations of such points were first determined by M. Humboldt from the registers of observed temperatures in Europe, and from the numerous observations made by himself and other travellers in different regions of the world. The mean annual temperatures of places remain nearly the same, but they decrease in going from the equatorial regions towards either geographical pole. At the level of the sea the value of the mean annual temperature is expressed by $M + E \cos 2L$; where L is the latitude of the place, M is the mean temperature on the parallel of 45° , and $M - E$ is that at the equator.

In the northern hemisphere, as we proceed eastward and westward from the meridians of Greenwich or Paris, it is found that the mean temperature on any parallel of latitude becomes continually less, and the severity of the winter greater than in this part of the world; and M. Humboldt found that between the parallels of $28^\circ 25' N.$ and $41^\circ 53' N.$ the difference between the latitudes of a place in Europe and a place in North America, having the same mean temperature, is about 7° .

The period during which a traveller remains in any one place will seldom allow him to make a sufficient number of observations for determining its mean annual temperature by the process above mentioned; and therefore it may be useful to know that, according to Humboldt, the mean temperatures for the months of October and April are very nearly equal to the annual mean temperature; also that the half sum of the temperatures at sunrise and at 2 P.M. is nearly equal to the mean temperature for the day. It may be proper to remark also that travellers, in making observations relating to temperature, should be careful to place their thermometers at some distance above the surface of the ground, and in situations where they may be unaffected by the reflection or radiation of heat from buildings, or from terrestrial particles in the atmosphere. The very high temperatures which have been occasionally observed in sandy deserts are probably owing in part to the latter circumstance.

The isothermal line of 32° passes about 4° southward of Nain, a Moravian settlement on the coast of Labrador; and continuing eastward through a point about $1^\circ N.$ of Umea in Sweden, it there makes a remarkable inflection. After ascending as high as North Cape in Lapland, it abruptly returns southward, and attains its lowest limit in the eastern parts of Asia. Proceeding westward from Labrador, the curve descends towards the south, and crosses the lower extremity of Hudson's Bay, from whence it again tends northwards to the great Slave Lake. The positions of the other curves seem to be influenced in some measure by that which has been just mentioned. In their progress from the western coast of Europe to the eastern coast of America they incline towards the terrestrial equator, yet so that the southern curves approach very near to parallelism with that great circle of the earth. At about 10°

eastward of the meridian of Greenwich the curves have their convexities turned northwards; and farther eastward they descend towards the equator. The isothermal line of 54.5° has been traced nearly round the earth: commencing at the mouth of the Columbia, on the western coast of North America, it passes near the city of Washington with its convexity towards the south; and, after crossing the Atlantic, it runs through Bordeaux, from whence it continues to the city of Pekin, at which place it again becomes convex towards the equator. From the observations of Sir Edward Parry and Sir John Franklin, it appears that there are in the northern hemisphere two poles of maximum cold; both, conformably to the determination of Sir D. Brewster, are on the 80th degree of N. lat.

But in every country the mean temperature varies with the height of the place above the level of the sea; and Mr. Atkinson, in the 'Memoirs of the Royal Astronomical Society,' from a comparison of many observations, makes the diminution equal to 1° Fahr. for every 251.5 feet. He has also shown that the differences of temperature between summer and winter begin to diminish at the height of about 21,000 feet above the surface of the earth.

The curves formed by connecting, on the isothermal lines, points at which the mean temperature of summer is the same, are called *isothermal lines*; and those formed by connecting points at which the mean winter temperature is the same are called *isothermal lines*: both these systems of lines deviate more than the isothermal lines from the parallels of terrestrial latitude. Curve lines connecting points on the ground at which the mean temperatures of the soil are equal, are called *isogeothermal lines*; and according to Sir D. Brewster, these are always parallel to the isothermal lines.

It was supposed that the mean temperature of the southern hemisphere was much lower than that of the northern, but recent observations afford good reason to believe that there is little difference between the mean annual temperatures of places similarly situated in the two hemispheres.

M. Humboldt considered the mean annual temperature at the equator, at the level of the sea, to be equal to 81.4° Fahr.: but Mr. Atkinson ('Memoirs of the Royal Astronomical Society,') ascertained that the mean temperature is there at least equal to 84.5° .

Of the point or points of maximum cold in the southern hemisphere, we as yet know positively nothing.

It is found, on boring into the earth, that the temperature increases at the rate of 1° (Fahr.) for every 50 feet in depth. In the arctic regions the temperature of the ocean increases, but between the tropics it is found to decrease, with the depth. At certain distances below the surface of the ground, which in Europe is between 50 and 100 feet, the temperature is found to be invariable. (Johnston's *Physical Atlas*; Humboldt's *Cosmos*, &c.)

ISPAHAN. [PERSIA.]

ISRAEL, TRIBES OF. [JUDEA.]

ISSOIRE. [PUY-DE-DÔME.]

ISSOUDUN. [INDRE.]

ISSUE is an ulcer artificially formed for the purpose of maintaining a constant purulent discharge from the body. It is usually made by placing one

or more beads or peas on an incision through the integuments in one of the limbs, or in the neighbourhood of a diseased part, and there retaining them by adhesive plaster, so as to prevent the wound from healing, and keep it in a constant state of suppuration. Other issues are made by rubbing caustic potash, or potash and quicklime, on a part of the skin till it is destroyed and sloughs, and by keeping open the ulcer thus formed, either with peas or very stimulant dressings. Setons are another form of issue, made by passing a broad flat needle beneath a portion of the skin, and retaining in the passage thus formed either a skein of silk or a flat band of caoutchouc. The moxa and the actual cautery are also sometimes employed with the same view.

Issues are sometimes had recourse to in order to restore an habitual discharge which has been checked by the cure of any chronic local disease, and the cessation of which has seemed to give rise to congestion of the head or of any internal organ. But the principal value of issues is as counter-irritants, by establishing a disease which is of itself unimportant in the neighbourhood of one which by its situation is more serious; and hence they are amongst the most important means in the cure of chronic inflammations of many internal organs, and especially of those of the joints and of the spine.

ISSUE. (Law.) [PLEADING.]

ISSUE PEAS are round bodies employed for the purpose of maintaining irritation in a wound of the skin which is called an issue. It is a matter of indifference of what substance the peas are composed, so long as they do not introduce poisonous matters into the wound. The common garden pea is frequently used. It is, however, more common to use the young unripe fruits of the common orange. The fruits are dried and afterwards turned in a lathe before they are used as issue peas. The unripe oranges, dried, are sold under the name of *orangettes* or *Curaçoa oranges*. The root-stock of the *Iris Florentina* is also formed into peas and used for keeping up the discharge from issues.

ISTHMIAN GAMES were one of the four great national festivals of Greece, the others being the Olympian, Pythian, and Nemean. They were celebrated under the presidency of the Corinthians, near Corinth, on the isthmus which connects Peloponnesus with the continent, and were celebrated at intervals of three or four years—authorities being at variance on this point—so that each year had its solemnity. The crowns for the victors were of pine leaves. [OLYMPIAN GAMES.]

ISTIU'RUS (Gr. *iston*, 'a sail,' and *oura*, 'a tail'), a genus of Saurian reptiles, of the family *Iguanida*.

ISTRES. [BOUCHES-DU-RHÔNE.]

ISTRIA. [ILLYRIA.]

ITAKA WOOD, the timber of a tree indigenous to British Guiana, *Mackærium Schomburgkii*. It affords a beautifully mottled wood much employed in cabinet work.

ITALY (Lat. and Italian, *Italia*; French, *Italie*; German, *Italien*), one of the most fertile and extensive countries in the south of Europe, though formerly separated into numerous subdivisions, is evidently marked out by nature for one great whole. It consists partly of islands and partly of mainland.

The continental portion extends from 47° to 37° N. lat., and from $7^{\circ} 21'$ to $13^{\circ} 30'$ E. long. On the W. and S. its shores are washed by the Mediterranean. On the E. it is bounded by the Adriatic; on the N., N.E., and N.W., the lofty chain of the Alps, including the Pennine, Rhetian, and Carnic systems, separate it from the rest of Europe by an almost impassable barrier. Towards the N.E., however, its boundary is more exactly defined by the River Isonzo, which, rising in the Carnic Alps, flows onward to the Gulf of Trieste, at the head of the Adriatic. Its extreme length, as thus developed, is about 590 miles; its breadth, in the N., where it is greatest, 311 miles; but it so rapidly diminishes as it shoots towards the south, that while in the centre it is only 150 miles wide, at its narrowest southern point it does not exceed 15 miles.

The whole of Italy, with the exception of the Papal territory and Venetia, is now united into one kingdom under the rule of a constitutional sovereign; but previous to the great war of 1859 it consisted of several independent states, whose names it seems desirable to preserve, for the convenience of reference. These divisions were—

1. Austrian Italy, or Lombardo-Venetian kingdom, including Lombardy, now belonging to the kingdom of Italy, and Venetia, still under the rule of the Hapsburgs. [LOMBARDY.]
2. Kingdom of Sardinia, including Piedmont, Sardinia, and Savoy, the latter now belonging to France, being the price which Italy paid for the assistance rendered by the Emperor Napoleon in her struggle with Austria.
3. Kingdom of Naples and Sicily, now included in united Italy.
4. The Papal States, restricted in area since the war of 1860.
5. Grand Duchy of Tuscany, including Lucca.
6. Duchy of Parma.
7. Duchy of Modena.
8. Republic of San Marino. And
9. Principality of Monaco.

The latter, a small and insignificant state, still preserves a nominal independence.

The following are the leading divisions and principal towns of Modern Italy:—

Chief Divisions.	Cities and Towns.
Piedmont, ...	Turin, Asti, Alessandria, Novara, Cuneo, Genoa, Port Maurice, Susa.
Lombardy, ...	Milan, Pavia, Cremona, Brescia, Bergamo, Como, Sondrio.
Æmilia, ...	Parma, Piacenza, Modena, Carrara, Reggio, Bologna, Ferrara, Ravenna, Forlì.
The Marshes, ...	Ancona, Ascoli, Urbino, Pisano, Maurata.
Umbria, ...	Perugia.
Tuscany, ...	Florence, Leghorn, Pisa, Sienna, Arezzo, Lucca.
Neapolitan Territory, ...	Naples, Pozzuoli, Castellamare, Gaeta, Reggio, Taranto, Foggia.
Island of Sicily, ...	Palermo, Messina, Catania, Marsala, Siragusa, Girgenti.
Island of Sardinia, ...	Cagliari, Sassari, Oristano.

The Pontifical Territory includes the cities and towns of Rome, Ostia, Civita Vecchia, Viterbo, and Tivoli.

Venetia—Venice, Padua, Verona, Vicenza, Mantua, Peschiera, Legnago, Chioggia, and Treviso.

Physical Features.—Every schoolboy is familiar with the old comparison of the Italian peninsula to a boot; a comparison which is far more accurate than most of these fanciful similitudes. The broadest, or northern portion, forms the mouth; the central portion, the leg; and the southern, the foot. This southern portion is divided into two small peninsulas, which respectively terminate in the capes of Spartivento and Di Leuca; and between these two notable headlands lies the Gulf of Tarento (anciently Tarentum). Cape Nau, or Colonne, projects on the western side of the entrance to the Tarentine Gulf. Cape Gargano, on the promontory of San Angelo, is thrown out into the waters of the Adriatic, on the eastern side of the peninsula; while on the western coast project the capes of Palinuro, Campanello, Circello, Monte d'Argenturo, and others, famed in song, legend, and history.

Numerous islands stud the Italian seas. Of these the largest are—Corsica, celebrated for its romantic scenery and the ardent spirit of its inhabitants, no less than for the birth of the great Napoleon; it belongs to France: Sardinia, formerly an appanage of the House of Savoy, whose natural resources are considerable, and have only been imperfectly developed: and Sicily, off the Neapolitan coast, one of the fairest and richest of the isles of Europe. Less important are the Lipari Islands, north of Sicily; Malta and Gozo, belonging to England, midway between Gibraltar and the peninsula; Elba, once celebrated for its iron mines; and various groups of islets in the Adriatic. The total area of Italy, including these outlying portions, but without Corsica, is 122,867 square miles, a magnitude which is about one-seventeenth part greater than the United Kingdom of Great Britain and Ireland.

In the N. and S. Italy is a mountainous country; in the centre it spreads into vast levels, and an extensive plain also lies between the Adriatic, the Alps, and the Northern Apennines. The Apennines divide Italy into two distinct regions: one, lying to the N., is the plain already spoken of, and chiefly occupied by the basin of the Po and its numerous affluents; the other, which is the real peninsula, stretches in a south-eastern direction for above 500 miles. The Apennines and their lower ranges form the backbone of this peninsula, extending its whole length, and terminating on the coast of the Strait of Messina. On each side lies a narrow belt of level ground, watered on the W. by some important rivers—the Arno, the Tiber, the Garigliano, and the Volturno.

General View of the Surface.—It will assist the reader to form a correct conception of the features of the country, if he supposes himself placed in a balloon at a moderate height, and proceeding slowly from N. to S. At the outset of his aerial journey he will see beneath him the huge bulk and snowy pinnacles of the great Alpine chains, spreading in a vast semicircle of rock, avalanche, and glacier from the head of the Gulf of Trieste, on the E., to the extremity of the Gulf of Genoa, on the W. These

chains include the Carnic Alps, N. of Venetia; the Rhetian Alps, north of Lombardy; the Lepontine, and the Pennine Alps, to the N.; the Graia, Cottian, and Maritime Alps, to the W. of Piedmont. Their crests rise above the limit of perpetual snow, and their flanks, as they descend into the fertile plain of Lombardy, exhibit every charm of scenery and every variety of vegetation. Formidable, however, and apparently insuperable as such a barrier appears, it cannot daunt the enterprise of men, and the 'iron horse' will shortly break through it. A railway, to be completed in 1875, is being carried across Mount St. Gothard, and another, to be opened in 1871, is slowly ascending the difficult acclivities of Mont Cenis.

Now before the aeronaut spreads the vast plain of Lombardy, with a gradual slope towards the head of the Adriatic, and encircled by a network of fertilizing waters—the Po and its numerous tributary streams. The lower part of the plain is almost a perfect level, smiling with crops and vineyards, rich in luxurious pastures and mulberry groves, which are largely cultivated for the sake of the silkworm—the most fertile and populous portion of the Italian peninsula. The mountain-chains which encircle it sweep upwards with a steep acclivity, and embosom among their spurs numerous fair and tranquil valleys. Here are situated the beautiful Italian lakes, Guarda, Como, and Maggiore, each distinguished by a peculiar loveliness of its own.

To the W. lies Piedmont (*i.e.*, at the foot, *pied*, of the mountain, *mont*), a finely varied and fertile plain, intersected by the Po, which rises in Monte Viso, and traverses it from W. to E., throwing off numerous arms, to the great facility of intercommunication and the infinite advantage of the agriculturist.

Keeping along the western side of the pine-clad Apennines, we find an extensive undulating district, stretching along the shores of the Mediterranean for nearly 200 miles, from Pisa to the ancient stronghold of Terracina, and varying in breadth from ten to upwards of thirty miles. Except in the immediate vicinity of Pisa and Leghorn, this considerable region is characterized by desolation and decay, and too often infested by roving bands of robbers. The Tuscan portion of this unpleasant tract is known as the *Maremma*, and unfavourably celebrated for the pestilence which, from April to October, broods over its swamps and valleys. The whole region is, however, more or less subject to malaria for a considerable portion of the year. Along the borders of the Apennines exist very different conditions. The scenery is full of nooks and corners which might charm an artist; the population is industrious; the earth offers abundant treasures of marble and copper, and the olive is extensively cultivated.

In the neighbourhood of Rome the coast district forms the well-known Campagna di Roma, the greater portion of which is cursed with malaria, and hence has been abandoned by men as well as neglected by nature. It is equally bare of trees and human habitations. Adjoining its south-eastern extremity spread the Pontine Marshes, which extend for 22 miles along the coast, and from 6 to 12 miles inland. They have been partially drained, and are capable of extensive cultivation, but their extreme unhealthiness deters the agriculturist from attempting their reclamation.

Further to the southward we pass into a sunlit land—the Neapolitan Provinces, rich in the choicest gifts of nature, where, with little labour, the bountiful soil abundantly yields the grape, the olive, Indian corn, and every variety of legumes and fruit. Scarcely a spot which does not present some picturesque and romantic landscape; scarcely a spot, it may be added, which is not hallowed by some classical or legendary association. Here, too, rise numerous volcanic peaks, and, conspicuous among all, towers the famous Vesuvius, raising its crest of fire above the beautiful Bay of Naples and the sites of the ruined cities of Pompeii and Herculaneum. With Sicily, the south-western portions form the earthquake region of Italy, which has been frequently devastated by shocks of appalling violence.

Traversing now the eastern side of the Apennines, we observe that a considerable plain—the Capitanata, or Terra de la Puglia—stretches from the neighbourhood of Otranto to the bold bluff promontory of San Angelo. Its southern part is dry, barren, and generally treeless; northward, it improves in character, and furnishes some extensive pastures.

Still further north we come to the old historic city of Ravenna, surrounded by ancient woodland, which Byron, Boccaccio, and Dante have celebrated in immortal song. Of old it supplied the Romans, and, at a later time, the Venetians, with timber for their fleets. The forest extends about 28 miles along the shore, and inland from 1 to 3 miles.

'Various the trees and passing foliage there,
Wild pear, and oak, and dusky juniper,
With briony between in trails of white,
And ivy, with the suckle's streaky light:
And still the pine, long-haired, and dark, and tall,
In lordly right, predominant o'er all.'

Byron, who spent two years at Ravenna, has referred to the changes which this part of the Italian coast has undergone since the pre-historic age:—

'Sweet hour of twilight! in the solitude
Of the pine forest, and the silent shore,
Which bounds Ravenna's immemorial wood,
Rooted where once the Adrian wave flow'd o'er,
To where the last Cæsarian fortress stood—
Evergreen forest!'

But our aerial voyage terminates at Venice, 'a glorious city in the sea,' situated on a number of islands that lie in the midst of extensive lagoons, and are connected by many bridges. The Venetian territory, as at present constituted, lies between the Tyrol and the Adriatic, and is separated from the Italian kingdom by the lower course of the Po and the stream of the Mincio, one of its principal affluents. The territory thus inclosed covers about 9500 square miles, whose surface is finely contrasted: fertile plains, clustering groves, beautiful vales, and Alpine spurs combining to form a richly attractive picture. Besides the Mincio and the Po, it is watered by the Adige, the Brenta, the Piave, and the Tagliamento, which are linked together by an admirable system of canals. The whole of the maritime region, and a portion of the interior, constituted the celebrated republic of Venice, which was founded in the fifth century by the fugitives driven to the littoral marshes by the furious irruptions of Attila.

Hydrography.—The principal Italian rivers are the Po, the Adige, the Arno, and the Tiber. Of these, the only one important in volume or extent is

the Po—the classic Eridanus—which is capable of navigation throughout its whole course, though subject to frequent changes in the rapidity of its current, when its numerous tributaries are swollen by violent rains, or the melting of the mountain snow. The father, or king of rivers, as the Italians euphoniously call it, rises in Monte Viso, one of the Cottian Alps, and flows rapidly eastward, as a mountain torrent, until it develops at Lombriasco into a majestic stream. Turning to the north it passes Turin, and taking an easterly direction, reaches the borders of Lombardy, and receives the Ticino. It then gladdens Piacenza and Cremona with its waters, forms the old frontier of the so-called Papal States, throws off several branches, and finally, dividing into two principal arms, the Po-di-Maestra, and the Po-di-Goro, enters the Adriatic by two mouths, about 12 miles distant from each other. Its direct course is 270 miles, including windings, about 450 miles. It carries down with it a large amount of sediment, but is well stocked with fish, especially shad, salmon, and sturgeon.

The Tiber (anc. *Tiberis*; Ital. *Tevere*) rises in the Apennines, in the province of Florence; flows first S., then S.S.E.; crosses the Papal States; traverses immortal Rome, with whose glories it is inseparably associated; flows S.W., and, separating into two branches, the Fiumano and the Fiumara, falls into the Tyrrhene Sea by two mouths: length, about 240 miles. Its waters are always loaded with a yellowish mud, whence Horace terms it 'flavus Tiber,' the tawny Tiber.

The Adige (anc. *Athesis* or *Atisius*) rises in the Rhetian Alps, about 46° 30' N. lat., and, after a sinuous course of about 180 miles, chiefly S. and W., falls into the Adriatic at 45° 10' N. lat., and 12° 20' E. long., entering the sea with the Po by a delta common to both. Its principal affluents are the Eisack, the Novi, and the Avisio.

The Arno (anc. *Arnus*) is a Tuscan river, and one of the largest in Italy. Its sources lie in Monte Fallarina, among the Apennines. Its general direction is westward. After passing through Florence it becomes navigable, and about seven miles below Pisa falls into the Mediterranean, after a course of about 155 miles.

The Ambrone, in Tuscany, is a considerable stream; the Garigliano and Volturno are of less importance.

The largest lakes are those of Maggiore, Como, and Garda.

The Lago Maggiore, or Verbano, in Tessin, Piedmont, and Lombardy, is about 40 miles long, with a maximum breadth of 5½ miles, and a mean breadth of 2 miles. Depth, 2625 feet; height above the sea-level, 638 feet. It is surrounded by landscapes of exquisite beauty, in which the Alpine heights form a notable feature.

But far lovelier, richer, and more varied is the Lake of Como, which lies at the base of the Lepontine and Rhetian Alps, 700 feet above sea-level. It is mainly formed by the river Adda, and is divided into three basins by projecting spurs of land. It is altogether about 15 miles in length, and its general breadth does not exceed 2 miles. Throughout its whole extent the banks are formed of steep and well-wooded mountains, 3000 to 4000 feet in height.

The Lago di Garda (or Benaco) is another beautiful expanse of inland water, 33 miles long, and 3 to 11 broad, and 213 feet above the sea-level. It receives the Sarca, and is drained by the Mincio, which issues from its south-eastern extremity, near the stronghold of Peschiera. It teems with fish. Greatest depth, 902 feet.

In southern Italy lie some lakes, or rather lakelets, of less extent, but generally of infinite loveliness, such as the Lago di Albura, and the lakes of Perugia and Fusino.

Mountains.—These are divided into two great systems—the Alpine and the Apennine. The former may more properly be considered under the head of SWITZERLAND, though some of the principal peaks look down upon the fair Italian plains. The Apennines run down the whole length of the Peninsula, and though attaining no very remarkable elevation, are so broken in outline, and so richly wooded, as to present some most delightful and romantic points of scenery. Their chain chiefly consists of limestone, which furnishes admirable building materials, and also marble of excellent quality; the pure white Carrara marble being especially prized by sculptors. Granite occurs in Calabria, at the southern extremity of the range. Among the principal heights may be enumerated:—

Monte Vellino, 7851 feet; Termenillo Grande, 7212 feet; Monte Amaro, 9110 feet; Monte Vettore, 8020 feet; Monte Prùre, 7847 feet; Monte della Sitilla, 7260 feet; and Monte Maceria della Morte, 6690 feet.

The principal *Volcanic Mountains* are those of Vesuvius, Etna (in Sicily), and Stromboli (in the Lipari Isles). Of the first-named, which rises to 3792 feet in height, a traveller furnishes the following description:—

'Vesuvius,' he says, 'has been prodigiously higher than it now is, for the Monte Somma, a peak about 800 yards north of the present cone, and Ottarcina, on the south, are apparently peaks remaining of the circumference of the base of some vast ancient cone. These three remaining peaks, of which Monte Somma is the highest, belong to one mountain-base, although divided above by chasms of the vast extinct crater, and by ravines below, and the whole mountain-mass is a single independent elevation on a vast plain, and unconnected with the Apennines.'

Its flanks, towards the summit, are black and rugged with lava, ashes, and scorix, but near the base they teem with vineyards, groves, and orchards.

Mount Etna, whose eruptions have almost equalled those of Vesuvius in violence, is situated in Sicily, about 60 miles S.W. of Messina. Its loftiest peak is 10,874 feet above the sea-level, and its enormous base occupies an area of nearly 90 miles in circumference. Sulphurous vapours are continually ascending from its crater; and in the spring of 1865 a terrible explosion occurred, which caused great havoc in the surrounding country.

Stromboli (anc. *Strongyle*), is one of the Lipari Isles, about 35 miles north of the coast of Sicily. It is about 9 miles in circuit, and consists entirely of a single volcanic mountain, whose crater-summit rises about 2500 feet above the sea-level. As it is continually sending forth shafts of flame and clouds of smoke, and as its burning crest is visible for many

miles at sea, sailors have appropriately named it the Lighthouse of the Mediterranean. No actual explosion, however, has occurred since the commencement of the Christian era.

Geology.—The geological structure of Italy is necessarily connected with the comparative fertility of its various portions. The volcanic formations, by the decomposition of their lavas, yield soils of amazing fertility; but in the immediate vicinity of the Alps and the Apennines, where granite and primitive rocks abound, the country is generally barren, and tasks all the science and industry of the agriculturist in its improvement. The sedimentary rocks are of recent date. At the bottom lies the Jura limestone, stretching from the frontiers of Tuscany into the Neapolitan provinces, while in Lombardy it extends from Lago Maggiore to the coast of the Adriatic. Chalk, which lies upon the limestone, stretches in a narrow band along the western shore, from the Gulf of Genoa to the glittering headland of Cape Santa Maria di Leuca. Above this accumulate the tertiary sandstones, travertine, and marl, chiefly on the E. coast, but also developed largely in Tuscany and Piedmont. And finally, the upper crust, which continually increases, consists of alluvial and diluvial deposits, occupying the greater part of the basin of the Po.

Climate.—Generally speaking, the Italian climate is warm and dry, but it is necessarily affected by differences of elevation and position with regard to the mountains and seas. While in Naples and Sicily ice and snow are unknown, except on the lofty brow of Etna, north of the Apennines snow falls in winter, and the broad lagoons at the mouths of the rivers freeze. In Central Italy the olive, orange, and lemon flourish luxuriantly, and throughout the year the ground is mantled with verdure. In the southern provinces a tropical vegetation covers the low warm plains, such as the sugar-cane, the papyrus, the Indian fig, and the date-palm. In summer the heat is intense, and the fell breath of the sirocco frequently scorches the earth. The rains fall with great violence at particular seasons; but on the whole the atmosphere is wonderfully transparent, and the sky of that glowing and intense azure which has become proverbial. From morn till eve it remains without a cloud; darkly, deeply, beautifully blue, except when the glories of the sunset enrich it with a thousand combinations of colour, like flashes of rare jewellery—emerald, and topaz, and ruby—all fading softly and slowly into the 'clear obscure' of night.

Dr. Burgess, however, is of opinion that the Italian climate is not favourable to invalids. 'It is a mistake,' he says, 'to suppose that a warm, humid, relaxing atmosphere can benefit pulmonary disease. Cold, dry, and still air appears a more rational indication, especially for invalids born in temperate regions. The climate of Naples is the most dangerous in Italy for persons suffering from affections of the respiratory organs. Genoa, Florence, and Pisa are scarcely less prejudicial; and the two safest localities would seem to be Como and Venice.'

Natural Products.—The mineral wealth of the peninsula is extensive and varied. Tuscany possesses rich mines of lead, copper, quicksilver, cinabar, and sulphur; and the mines of Elba export large quantities of iron ore daily. Boracic acid is supplied

from the Tuscan mines to most of the European manufacturers. Its existence was first discovered in 1777, and it is now largely substituted for the borax of India. It is procured from the lagoons of Monteccevoli, which consist of a countless number of small volcanoes and springs constantly in violent action; the ground, which quakes and glows beneath the feet, is covered with crystallizations of sulphur and other minerals.

The alum pits of Tuscany afford an unfailing supply. In Southern Italy and Sicily occur extensive beds of sulphur; and Sicily exports nearly all that is consumed in Europe, producing as much as 70,000 tons annually. The salters and brine springs in the marshes afford large quantities of salt. Limestone, marble, alum, alabaster, lava, nitre, granite, are among the treasures which Italy derives from her mountain masses.

We have already hinted at the luxuriance and variety of Italian vegetation in the more fortunate districts. The plains and lower slopes of the hills bloom with the mulberry, the vine, the olive, the myrtle, the laurel, and numerous fruits and evergreens. At a greater altitude wave extensive woods of chestnut, oak, beech, pine, and the silver fir; the latter a tree highly valued by the ancients, and immortalized by Virgil—

'Hills clad with fir, to guard the hallowed bound,
Rise in the majesty of darkness round.'

The vine is of universal cultivation. The plants begin to bear fruit in the third year, and the vintage commences at the end of September. Figs, almonds, and cucumbers thrive in the south, as well as tobacco and cotton. Rice is grown in the marshy districts, and the liquorice root in the Calabrias. The best olives are those which flourish at Venapo, and are locally known as the *Sergia*; the oil which they yield is famous for its sweetness and purity.

Agriculture.—Scientific farming, in the British sense, is almost unknown in Italy, and nature steps in to supply the want by providing a genial soil and a warm climate. A very important branch of industry is the culture of the mulberry tree for raising silkworms; and the silk exported from the Lombardo-Venetian provinces alone produces an annual revenue of 5,000,000*l.* About 2,000,000 lbs. of cotton are grown in Southern Italy and Sicily every year. The corn crops are extensive, and afford an excellent grain. Not more than two-thirds, however, of the entire area of Italy is cultivated; the rest lies waste. The average value of cultivated land is 3*l.* 2*s.* per hectare, and in some parts of the northern provinces 5*l.* The annual income arising from real estate is computed at 40,320,000*l.*, but the mortgages upon this amount are very heavy.

Italy possesses at the present time 3,355,590 cows or oxen, 1,000,000 horses, mules, and asses, upwards of 40,000,000 goats, and 3,129,500 pigs. Its natural history differs but little from that of the rest of southern Europe, except that it includes among insects the asp, scorpion, and tarantula. There are 250 species of birds in Central Italy alone, and every copse and grove thrills with music. Among the wild animals found in the forests may be named the wolf, the lynx, the stag, the marmot, the badger, and the wild boar. Foxes and hares abound, and in the south of Italy the crested porcupine. The

ivers and lakes abound in fish, and on the coast are numerous important fisheries, especially the tunny, anchovy, and sardine. Goats are numerous in most districts of Italy. Throughout the country oxen are universally used for the plough, and in many parts buffaloes, though not so readily tamed. In the neighbourhood of Milan, Pavia, and Lodi immense herds of cattle are reared, and great quantities of cheese—especially that which is so well known in Europe as Parmesan—are annually produced.

Tuscany yields several kinds of wine, of a superior quality, which the poet Redi celebrated in his glowing dithyrambic of 'Bacco in Toscana.' That of Montepulciano he styles the 'king of all wines,' *d'ogni vino è il re*—it is known commercially as the Aleatico, or red muscadine, has a brilliant purple colour, and a delicious keenly aromatic flavour. The Columbano, the Trebbiano, and the Vernaccia are also highly esteemed.

Area and Population.—The new kingdom of Italy, as constituted in 1860, contains a population of 21,777,334 souls (according to the census of 1864), distributed over an area of 98,784 square miles. If Venice and the Papal States were included, Victor Emmanuel would rule over a population of 26,000,000. It is divided into sixty provinces and 193 'circondarii,' or administrative districts, subdivided into 1597 'mandamenti,' embracing about 8000 parishes. It contains on an average 220 inhabitants to the square mile—a higher figure than that of France and Germany, but lower than that of England, Belgium, and the Netherlands. The greatest average is obtained in Lombardy and Sicily. Italy now ranks as the fifth power in Europe, being superior in population to Spain and Prussia.

Military and Naval Services.—It is unfortunate for the new kingdom that its non-recognition by Austria, and the ardent desire of the Italians to complete its unification by the addition of Rome and Venetia, compels the maintenance of a military establishment which presses heavily on its already burdened resources. The army, even on a peace footing—as constituted in 1863—numbers 157 generals, 15,337 officers of all ranks, and 227,250 rank and file. The cavalry includes 36,728 horses. In time of war, this force could be raised to 400,000 men.

The military organization of Italy is founded upon the old Sardinian law of conscription. A certain portion of all the young men who have attained twenty-one is levied annually for the standing army, while the rest are entered in the reserve, which, though required to muster annually for forty days' practice, can only be called out permanently in case of a war. This system is being gradually put into operation throughout the kingdom.

The Italian navy, in 1865, consisted of 98 steamers, of 20,760 horse-power, and 2160 guns; and 17 sailing-vessels, carrying 279 guns: in all, 115 men-of-war, with 2439 guns. The list, to which several additions have since been made, enumerated,

	Horse-power.	Guns.
5 iron-clad frigates, of	800 ...	60
1 screw-steamer of the line, of	450 ...	70
18 screw steam frigates, of	5800 ...	575
14 paddle steam frigates, of	4300 ...	102
4 screw steam corvettes, of	888 ...	108
20 paddle steam corvettes, of	1,880 ...	65

Revenue, Expenditure, and National Debt.—The national debt of Italy, in 1864, amounted to 152,698,839*l.*, with a yearly interest of 7,896,689*l.* This heavy burthen has originated in various causes, which have been clearly set forth by a writer in the *Fortnightly Review*. 'By a rough application of force,' he says, 'half a dozen states were welded into one. That involved heavy expenses. The liberators took payment in money as well as in kind; and Italy lost provinces, and was saddled with a big debt. More than this; as she took over states, she took over also liabilities, and had to adopt not only the debts of kingly and ducal and imperial governments, but the civil services of half a dozen heretofore independent states. The war debts and the huge army of civil placemen are eating into the heart of her taxable resources. Nor is this all. Two dangerous issues, Rome and Venetia, remain unsettled, and necessitate the maintenance of a large army.' To restore order to the finances of Italy, and place them on a sound basis, is the task that will now try the mettle of her statesmen and the patience of her people.

The budgets of the kingdom of Italy for the two years 1864 and 1865 exhibited the following calculations:—

In 1864.	
Total estimated revenue,	£25,844,749
Total estimated expenditure,	35,214,417
Deficit,	9,369,668
In 1865.	
Total estimated revenue,	£25,020,101
Total estimated expenditure,	34,152,761
Deficit,	9,132,660

Now, let us look at the actual state of affairs. The revenue yielded in 1864 only 23,436,566*l.*, and the expenditure amounted to 38,519,788*l.*, leaving a deficiency of 15,083,222*l.* We may, therefore, reasonably calculate the deficits of 1864 and 1865 as amounting to an equal sum. And it is this difficulty—this annual excess of expenditure over income—which lies in the way of Italy's national progress. A more favourable prospect, it is true, now gladdens the hearts of Italian statesmen, and the minister of finance hopes to obtain a less unsatisfactory balance of revenue and expenditure for the year 1867. The expenditure he estimates at 928,000,000 lire (nearly 35,000,000*l.*), and the revenue at 848,000,000 lire (about 29,000,000*l.*); leaving a deficit of only 6,000,000*l.*

Manufactures, Trade and Commerce.—Italy is not generally a manufacturing country, but the production of silk goods is carried on to a large extent, and gives employment to a vast number of the population in most of the towns of Lombardy, and to a less degree in other parts of the country. In Piedmont this branch of industry has greatly progressed of late years, and the silk manufactures of Turin now almost rival those of Lyons. Coarse woollen goods are also made both in Lombardy and elsewhere, and supply the ordinary clothing of the peasantry. Milan is celebrated for its manufacture of weapons, and iron work of all kinds is extensively carried on there. The making of cotton fabrics, straw hats, paper, parchment, leather, glass, porcelain, and musical

instruments, is also pursued in various parts of the country; but the main wealth of Italy consists in its raw produce. The chief supply of manufactured articles, whether of luxury or necessity, is derived from abroad. Though the Italian kingdom is still in a transition state, and the full development of her resources is impeded by the causes already mentioned, her foreign trade assumes considerable dimensions. France appears to be her best customer, as might be supposed from the propinquity of the two nations, and Great Britain stands second in order. She herself imports from Great Britain large quantities of cotton stuffs, yarn, railway iron, guns, and ammunition. From Odessa and Alexandria she imports corn, wool from the Levant, and wines from France and Spain. Leghorn is the great commercial dépôt of Italy, and the seat of the most extensive foreign trade, but great activity prevails both at Genoa and Naples.

The exports consist of olive-oil, wines, silk, kid and lamb skins, borax, alum, sulphur, marble, straw hats and plaits, cheese, fruits, oak and cork bark, timber,

potash, charcoal, choral, anchovies, sardines, wax, essences, perfumery, liquorice, macaroni, porcelain, majolica, musical instruments, cloth of gold and silver, mosaics, and carvings in stone and wood.

The commercial intercourse of the new kingdom with the chief European states in 1863 is shown in the following table:—

	Imports.	Exports.
France, . . .	£7,033,984	£5,720,629
Great Britain, .	5,903,233	2,355,583
Austria, . . .	1,872,222	1,205,875
Switzerland, .	1,341,033	2,268,281
Netherlands, .	916,443	153,279
Russia, . . .	601,906	814,581
Belgium, . . .	561,280	84,360

The commercial intercourse of Italy with the United Kingdom is shown in the subjoined statement, which gives the value of the imports from the four territorial divisions of that country into the United Kingdom, and of the exports of British and Irish produce and manufactures to Italy in the five years 1860–64.

IMPORTS FROM ITALY INTO THE UNITED KINGDOM.

Years.	Two Sicilies.	Sardinia.	Tuscany.	Adriatic Ports of Ancona and the Romagna, and Papal Ports on the Mediterranean.	Total for the Kingdom of Italy.
1860	£1,867,904	£265,713	£575,064	£39,843	£2,748,524
1861	1,540,453	260,344	560,917	118,350	2,480,064
1862	1,865,239	263,198	441,088	48,786	2,618,311
1863	1,448,218	281,191	558,471	70,328	2,358,208
1864	1,522,466	227,512	388,712	42,410	2,181,097

EXPORTS OF HOME PRODUCE FROM THE UNITED KINGDOM TO ITALY.

1860	1,321,339	1,864,338	1,034,435	294,175	4,514,287
1861	2,071,521	2,198,948	1,062,881	447,719	5,781,069
1862	1,528,904	2,143,772	935,426	495,218	5,103,320
1863	2,309,273	2,114,380	1,073,669	430,658	5,927,980
1864	2,454,645	1,910,111	951,153	354,176	5,670,085

The chief articles of import from the Two Sicilies are olive oil and brimstone, the first amounting in 1864 to 430,915*l.*, and the second to 292,362*l.* From Sardinia and the Adriatic and Papal ports the imports are miscellaneous, olive oil amounting in 1864 to 43,578*l.*, marble to 10,448*l.*, and cream of tartar to 16,585*l.* The only articles of importance from Tuscany were olive oil 84,442*l.*, marble 62,515*l.*, and boracic acid 48,774*l.* Cotton goods form the staple export of the United Kingdom to Italy. In 1864 the Two Sicilies took 622,163*l.* worth, Sardinia 362,945*l.*, Tuscany 279,421*l.*, and the Adriatic ports 88,752*l.* The other principal articles were coal, copper, iron, linen and woollen manufactures. With the Papal States the intercourse is very slight, the total British exports thereto only amounting to 26,868*l.* in 1863, and 72,589*l.* in 1864.

In addition to the above, the exports to Italy of foreign and colonial produce and manufactures from the United Kingdom in 1864, were valued at 1,070,673*l.*, making the total amount 6,740,758*l.*

The total number of ships engaged in the foreign commerce of Italy during the year 1862 was 40,692; tonnage, 5,801,843; of which 20,188 entered, and

20,576 cleared out of, the ports of the kingdom. The coasting trade employed 173,695 vessels, tonnage 8,495,802; and the steamers arriving numbered 7441, tonnage 1,534,507. The coasting trade is almost wholly carried on in native bottoms; the proportion of foreign ships engaged in it not exceeding 16 in 1000, but of every 100 steamers, 19 are foreign.

The number of seamen employed amounted in 1862 to 948,819; of whom 259,669 were engaged in the foreign commerce, and 689,150 in the coasting trade. The foreign seamen numbered 201,080, and the native 747,739. The number of fishing-boats was 8835.

With the exception of Great Britain, therefore, Italy possesses the largest mercantile navy in Europe, and her seamen are distinguished for skill, activity, and courage. In the event of a European war, if she became the ally of France, she would reinforce her with a great accession of maritime strength.

The Italian steam mercantile navy, inclusive of the Austrian Lloyd's Company, numbers 125 vessels, with an aggregate of 47,092 tons. The extent of coast is large in comparison with the superficial area of Italy—viz., 3353 English miles.

Italian Government and Constitution.—Italy is a constitutional monarchy, and the legislative power is

exercised by the king and two houses of parliament—namely, the Senate (or Upper House), and the Chamber of Deputies (answering to our House of Commons). The Senate consists of the royal princes (when of age), and of other members, unlimited in number, who are nominated by the king for life, and must have attained the age of forty years. The members of the Chamber of Deputies are chosen by the qualified electors throughout the kingdom. A deputy must be thirty years of age, must have a slight property qualification, and cannot be declared elected unless at least one-third of the electors of the district have cast their votes at the election. For the purpose of choosing deputies, the whole kingdom is divided into districts, and every male who pays taxes to the amount of 30s. is a voter. The term of election is five years, and the Parliament sits for the same period, unless dissolved by the king. Sessions must be held annually. The Chamber of Deputies contains 443 members, or one to every 50,000 inhabitants.

The king is advised by a ministry, who are responsible to the Parliament. Each of the chambers has the right of introducing new bills, the same as the government; but all money bills must originate, as with us, in the Lower House. The ministers have the right to attend the debates of both the upper and lower houses, but cannot vote unless they are members. Both chambers hold their sittings in public, and no sitting is valid unless an absolute majority of the members be present.

Religion and Education.—The established religion of Italy is the Roman Catholic, but all creeds are now tolerated in the kingdom in conformity with the laws. Protestantism is making considerable progress, thanks to the efforts of many earnest and devout men. In 1864 no fewer than 30,000 bibles and testaments were sold in Italy, besides about 75,000 religious books and pamphlets of a Protestant character. The Roman Catholic hierarchy consists of 45 archbishops and 198 bishops. All those dignitaries are appointed by the pope, on the advice of a council of cardinals—the congregation 'De propagandâ fide.' But the royal sanction being necessary to the installation of a bishop or archbishop, and this having been frequently withheld of late years, there were recently no less than thirty-five vacant sees, about one-seventh of the whole number. On the death or removal of a prelate, the clergy of the diocese elect a vicar-capitular, who exercises spiritual jurisdiction during the vacancy. In case of old age or infirmity, the bishop nominates a coadjutor to discharge the episcopal duties in his stead. The recommendation is generally approved by the pope, and the bishop-coadjutor is appointed and consecrated, and takes his title from some imaginary oriental diocese, which he relinquishes on succeeding to an actual bishopric. As long as he retains the oriental title, he is styled a bishop 'in partibus infidelium,' or, as usually abbreviated, a bishop 'in partibus.'

The immense wealth of the Italian clergy has been greatly reduced since the year 1850, when Siccardi's bill for abolishing the immunities of the clergy and ecclesiastical jurisdiction passed the Sardinian chambers. This law was extended, in 1861, over the whole kingdom. It is intended, also, to introduce great reforms into the monasteries and convents still

existing, and which escaped the suppression-movement of 1861. The total number of Roman Catholic clergy in Italy may be computed at 500,000, and they necessarily exercise a very considerable influence, especially in the southern provinces. In the Waldensian valleys of Piedmont—the scene of Simon de Montfort's sanguinary crusades—about 20,000 native Protestants cherish the simple faith of their forefathers; and scattered over the country are about 50,000 Jews, chiefly engaged in commercial pursuits.

Education is at a low ebb in Italy. The mass of the adult population exhibit a deplorable amount of ignorance, and many even of the upper orders can neither read nor write. But since the establishment of the new government, great efforts have been made to remove this stigma from the national character. A great part of the property which belonged to the suppressed monastic institutions has been devoted to the furtherance of public education, and for the same noble object an annual credit of 600,000*l.* is set apart by the Parliament. Numerous normal and model schools, on British principles, have been organized; but although much has been done, more remains to do, for in the Neapolitan provinces alone 3000 large parishes have no school whatever.

The universities of Italy have declined from that palmy state of splendour and reputation which they occupied in mediæval days, when their enlightening influence extended into every civilized country. They are now fourteen in number:—Bologna, founded in 1119; Naples, 1244; Padua, 1228; Rome, 1244; Perugia, 1320; Pisa, 1329; Sienna, 1349; Pavia, 1390; Turin, 1412; Parma, 1422; Florence, 1443; Catania, 1445; Cagliari, 1764; Genoa, 1783.

To these may be added the high schools of Palermo, Camerino, and Maurata. The University of Modena was closed in 1849.

Italy contains a great number of public libraries, many of which are exceedingly opulent in ancient manuscripts and rare old books, though generally deficient in works of science and modern literature. Galleries of art and museums flourish in most of the principal towns, and those of Florence, Rome, and Naples enjoy a world-wide reputation. Every palace contains art-treasures of priceless worth, and the churches are enriched with masterpieces of painting and sculpture.

National Character and Present Condition of the Country.—'The Italian population,' says a trustworthy writer, 'is unquestionably far behind the British in the enjoyments of civilized life, in the useful arts, in civil and political liberty, in wealth, intelligence, industry, and in its moral condition. But the character of the nation exhibits the most surprising contrasts in different provinces. The Celt is not more widely opposed to the Saxon than the industrious and free-thinking Piedmontese to the careless, indolent, and ignorant Neapolitan, or the subtle and ingenious Florentine. Many years must elapse before these different elements can be welded into one homogeneous nation, but from the progress Italy has already made, her well-wishers cannot but augur favourably for her future. Her people are quick, vivid, and ardent; her natural resources are almost inexhaustible. Under a constitutional government what may not be expected from the wise development of the one, and the steady advancement, moral

and intellectual, of the other? Genoa, Venice, Florence, Rome—those great and illustrious cities may yet attain to a degree of prosperity which shall surpass all the glories of their historic past.'

History.—The annals of ancient Italy are comprised at the outset in those of Etruria, and afterwards in those of Rome. In our limited space it would be impossible to do justice to a subject so extensive; and the reader will do well to consult the numerous valuable authorities existing in the English and German languages—Niebuhr, Arnold, Merivale, Heeren, Mrs. Hamilton Gray.

The modern history of Italy begins with the downfall of the Western empire, whose last feeble ruler, Romulus Augustus, was dethroned by his Prætorian guards. Odoacer, their leader, assumed the title of King of Italy, and thus the country was separated from the Roman empire. The sovereignty founded by Odoacer lasted no longer than 493, when it was overthrown by Theodoric, king of the Ostrogoths. A period of confusion followed, which the reader may study in the elaborate pages of Gibbon, and which was only terminated by the establishment of the power of the Lombards in northern Italy. This brave and sagacious people soon spread their influence over the whole of the country, and menaced the independence even of Rome itself, whose popes, in their frequent alarms, generally solicited the assistance of the Frankish kings, and rewarded them with numerous privileges.

At the prayer of Pope Leo III., Charlemagne made war upon Desiderius, king of the Lombards, took him prisoner in his capital, and united his kingdom to his own vast empire. In return, the pope crowned him King of the Romans and Emperor of the West. Under the feeble rule of his successors the counts, marquises, and other great feudatories of the Western empire established their independence, and divided Italy into several distinct principalities. The Roman pontiffs gradually increased their influence and their possessions, and finally asserted their secular supremacy in the person of Innocent III., about 1200. The union of the temporal with the spiritual power enabled them to gain a complete ascendancy over the clergy and laity of all Europe, and in due time the Roman bishop was transformed into the infallible Head of the Church.

Still further to complicate the internal divisions of Italy the principal towns, as they grew in wealth and augmented in population, threw off the yoke of the feudatory princes, and declared themselves independent commonwealths. Thence arose a dark series of intestine tumults; of wars between the towns and the great lords; of the towns with each other; of the great lords among themselves; and, finally, of the towns and lords against the German sovereigns, who professed to be the successors of Charlemagne, and proclaimed themselves kings of Italy and emperors of the West. Out of this ferment and disorder eventually rose several powerful and prosperous states, the various stages of whose growth are recorded in the pages of Sismondi: such as the Papal hierarchy, the Norman kingdom of Sicily and Apulia, the republics of Venice, Florence, and Genoa, and, lastly, the duchy of Milan. In the north of Italy the house of Savoy acquired extensive possessions. Genoa and Venice thrived as great naval powers, the latter sur-

living until the outbreak of the French revolution; and Florence becoming the centre of art, literature, and commerce, dowered the world with the genius of Dante, Machiavelli, and Michael Angelo. It was afterwards merged in the Grand Duchy of Tuscany, and about the close of the seventeenth century Italy was divided into the seven leading states enumerated at the commencement of this article: Austrian Italy, Piedmont, Duchies of Parma, Modena, and Tuscany, the Papal States, and Kingdom of the Two Sicilies.

Such was the division existing when Napoleon entered upon his meteor-like career, and poured his troops into Italy in 1791. A succession of rapid movements and brilliant victories compelled the king of Sardinia to purchase the safety of his throne by the cession of Savoy and Nice. Austrian Lombardy was overrun and conquered, and the Roman pontiff and the duke of Parma only secured a temporary immunity from invasion by heavy sacrifices.

In 1797, Napoleon formed the Cisalpine republic out of Milan, Mantua, Modena, portions of Parma, Bologna, Ferrara, and Romagna—a republic which could only flourish under the shadow of French bayonets. In the following year Naples was constituted into a Parthenopean republic, and various other changes in the partition of unhappy Italy threw it a bound and helpless victim at the feet of revolutionary France. Thus it remained until Napoleon assumed the imperial purple, when he flung aside all pretence of respecting Italian liberty, and founded the kingdom of Italy, placing the iron crown on his own brow, and appointing his stepson, Eugene Beauharnois, viceroy. This did not include Naples, which was erected into a separate sovereignty for the dashing cavalry leader, *le beau sabreur*, Joachim Murat; nor Tuscany, which, as a grand duchy fell to the lot of Napoleon's sister Eliza. In 1809 the secular authority of the pope was declared at an end, and the States of the Church occupied by the French. Rome became the second city of the empire, and a pension of 2,000,000 francs was assigned to the 'Holy Father.'

With the fall of Napoleon, Italy returned in most respects to its normal condition, except that Austria was enriched and strengthened by considerable territorial accessions, notably those of Milan and Venice. The growth of liberal opinions and the rise of a national spirit, however, soon disturbed the seeming tranquillity of the peninsula, and in 1830, stimulated by the success of the French revolutionists, Modena, Bologna, Parma, and other states, broke out into revolt. As they derived no assistance from any European power, Austrian bayonets quickly restored the expelled princes, who were virtually lieutenants of the Austrian emperor. But the desire of independence, and the bright dream of Italian unity, had taken too firm hold of the minds of the Italians to be readily annihilated, and as this desire increased—as this dream developed—so grew a bitter hatred against the tyranny of Austria, which was fomented by the exhortations and encouragements of one who, if often mistaken, must nevertheless be considered the foremost and most persevering of Italian patriots, Giuseppe Mazzini.

At this crisis the king of Sardinia stepped forward to lead the new movement in the character of a constitutional monarch, and Pope Pius IX. having inaugurated his pontificate with various liberal measures, the prospects of Italian liberty seemed to

have suddenly brightened. The first outbreak took place in Lombardy in March, 1848, and resulted in the evacuation of Milan by the Austrian army. A provisional government was established, who straightway issued an energetic proclamation, summoning all Italians to arm for the holy cause of Italian independence. Charles Albert, king of Sardinia, immediately led his forces to the assistance of the insurgents, and at first was successful in every encounter. But the Austrians soon mustered in great strength, and the command-in-chief was conferred upon one of the ablest soldiers of his age, Marshal Radetzky, a veteran with whom Charles Albert was wholly unable to cope. Even then the united armies of the Italian states might have prevailed against the enemy, had not the Pope, alarmed at the progress of the revolutionary spirit which he had helped to evoke, suddenly deserted the national cause. The Neapolitan soldiers were immediately recalled, but for a while the revolution still made head. Rome declared itself a republic, and proclaimed Mazzini its Dictator, compelling the pope to seek refuge in an undignified flight. But the Austrian arms soon turned the tide of battle, and at Novara the Piedmontese were totally defeated (March, 1849), despite of the most energetic valour. Charles Albert, on the evening after the fight, abdicated in favour of his son, Victor Emmanuel, and withdrew, with broken heart and blighted hopes, to die in a few brief months at Oporto.

Rome still held out; but the French republic, in defiance of its own principles, and out of an insatiable greed of conquest, marched an army into Central Italy, and compelled the Eternal City to surrender, after enduring all the horrors of pestilence and famine. This event was followed by the restoration of the pope, who returned to Rome on April 12, 1850, and has since reigned over a discontented people, through the assistance of French bayonets.

The revolution was over, and it seemed as if that vision of an united Italy, which had once animated the song of Petrarch and the eloquence of Rienzi, could never again be revived. But a new character now appeared on the scene, Count Camillo Cavour, a statesman of the highest intellect and most resolute purpose, who, called to the administration of affairs in Piedmont, took advantage of his position to keep alive the hopes of his countrymen, and to build up, stone by stone, the stately structure of their independence. Happy the nation which, in the crisis and agony of its fate, can turn to no noble a spirit and determined a genius for the guidance it stands in need of! By developing in Piedmont a constitutional government he rallied the more enlightened and moderate Italians of all classes and parties round Victor Emmanuel, and accustomed them to look to him as their future leader. When the Russian war broke out, he despatched a contingent to serve with the allied armies in the Crimea, by which means he gave Piedmont a place among the European powers. Meanwhile, the other Italian states were wretchedly misgoverned, and the rich gifts of nature neglected by incompetent rulers. A spirit of discontent pervaded all Italy, which was finally fanned into indignant wrath by the atrocious cruelties practised in the dungeons of Naples, and exposed by the eloquent pen of Mr. Gladstone. At length, in 1859, the French emperor, partly from personal motives, and partly

from a desire to conciliate the 'nationalities' of Europe, suddenly stepped into the arena as the champion of Italy, and in the great battles of Magenta and Solferino so humbled the Austrians that they were compelled to sue for peace. A treaty was signed at Villafranca, by which Austria agreed to surrender Lombardy, and consented to the formation of an Italian confederacy under the protection of the pope. The different states, however, would listen to no such compromise, and Parma, Modena, the Æmilian provinces, and Tuscany threw off the yoke of their respective rulers, and voluntarily annexed themselves to Piedmont. Nor could France openly break up this unexpected arrangement, as Great Britain supported it with all her influence, and vehemently urged the new political doctrine of 'non-interference.'

The southern provinces, though in a state of chronic disorder, still remained under the rule of Francis II., when Garibaldi, already distinguished by his patriotism, courage, and popularity, suddenly invaded Sicily with a small band of intrepid red-shirted followers (May, 1860), roused its inhabitants against the Neapolitan yoke, and drove the royal troops from point to point, until the entire island accepted Victor Emmanuel as king. He then crossed over to the mainland, and with wondrous daring entered Naples, which immediately declared in favour of union with Piedmont, and compelled its sovereign to retreat in hot haste to Gaeta, and from thence to Rome. The Sardinian army meanwhile had entered the Papal territories, and gained several victories, which resulted in the incorporation of Ancona and Umbria with the Piedmontese territories. Soon afterwards Victor Emmanuel formally declared himself King of Italy, and Cavour addressed himself to the task of consolidating the new kingdom.

In 1861, Garibaldi, in his eager desire to establish the seat of Italian government in that glorious city which for so many centuries was the actual 'mistress of the world,' raised a small body of volunteers, and invaded the Papal states. In hazarding this bold enterprise he probably believed that he had the secret approval of his sovereign, but Cavour recognized the danger to be apprehended of a collision between the Garibaldini and the French army—a collision which would have shaken the unstable foundations of Italian unity to the ground—and despatched a body of the royal troops to oppose his progress. At Aspromonte his small force was compelled to surrender. He himself was wounded in the ankle, but he refused to allow his followers to fire on the royal soldiers, as from the outset he had expressed his devotion to and his confidence in Victor Emmanuel.

Both Cavour and the king regretted this untoward event, and a general amnesty was immediately proclaimed.

Since that date affairs in Italy have remained *in statu quo*, except that by the death of Cavour in the early part of 1861 she has lost her most sagacious and moderate statesman—a master-mind not easily replaced; and that in pursuance of a convention between France and Italy, the Italian capital has been removed from Turin to Florence. The emperor has agreed to withdraw the French army of occupation from Rome in September of the present year (1866), while Victor Emmanuel has undertaken not

to attack the present territory of the pope, and to prevent by force any attack upon the said territory proceeding from the exterior—conditions which it is doubtful if his subjects will allow him to fulfil.

So—with arms in her hands; with heart still elate and hopeful; and with eager eyes fixed wistfully on Rome and Venetia, as necessary to the full development of her resources and the completion of her internal organization—Italy waits!

For information on Italian history, the reader should consult Botta, 'Storia d'Italia'; Muratori, 'Annales d'Italia'; Machiavelli, 'Istorie Fiorentine'; Gibbon, 'Decline and Fall of the Roman Empire'; Sismondi, 'Rise of the Italian Republics'; Hazlitt, 'History of Venetian Republic'; Trollope, 'Florentine History'; Ranke, 'History of the Popes'; Hallam, 'History of the Middle Ages'; Denina, 'Rivoluzioni d'Italia'; Daru, 'History of Venice'; Roscoe, 'Lives of Leo X. and Lorenzo de Medici'; Ellesmere, 'War of the Sicilian Vespers'; Dyer, 'History of Modern Europe'; Dicey, 'Count Cavour'; &c.

Italian Language, Literature, and Art.—The language called Italian is the written language of Italy, and exhibits the same analogy to the spoken language of Rome and Tuscany as the written language of England to the dialects spoken in its various counties. Several Italian dialects, however, exist, of which we may enumerate the principal:—1. The Milanese, spoken at Milan and in its vicinity, and cultivated by Maggi, Parini, Grossi, Porta, and other writers; 2. The graceful Venetian, exemplified in the works of Lamberti, Goldoni, and Buratti; 3. The Mantuan, illustrated by the eccentric writings of the monk Folengo; 4. The Piedmontese, in which Calvo has written; 5. The Genoese, whose peculiarities may be seen in Cavallis and Foghetta; 6. The rough and uncouth Bolognese; and 7. The Neapolitan, remarkable for its humorous character, and its adaptation to the purposes of imitative harmony. The latter has been cultivated by numerous writers.

It has justly been observed that we must not consider these dialects as corruptions of the written Italian, but as independent languages which were anterior to it, and arose from an amalgamation of the Latin with the relics of the tongues spoken by the various tribes that at different times invaded and colonized the peninsula. Owing to various causes, the Tuscan dialect first attained polish, *verve*, and completeness, and gradually became the language in which the sages and poets of Italy thought and sung. The great writers of the fourteenth century—Pandolfini, Sacchetti, Villani, Petrarca, Boccaccio, and the immortal poet of the 'Divina Commedia,' Dante—were all Tuscans, and their genius has impressed on the Italian language the stamp of the true Tuscan metal.

The writers of the fourteenth century—or first period of Italian literature—are called by the Tuscans the *Trecentisti*, and are considered by many as the finest models of Italian composition. Among them were Petrarca, Boccaccio, Dante—three names in themselves sufficient to give permanency and renown to a national literature.

The *second period*, from 1400 to 1500, embraces the age of Lorenzo de Medici, who was the friend of

poets, and himself a poet of no mean pretension. It was illustrated by the splendid intellects of Poliziano, author of the 'Orfeo,' the earliest classic Italian drama; Luigi Pulci, author of the 'Morgante Maggiore'; and Boiardo, the author of the 'Orlando Innamorato.' Many of the learned men and women of this age, however, elected to trammel themselves by writing in Latin: such as Alberti, Bracciolini, Bruni, Filelfo, Panormita, Platina, Pontana, Valla, Ficino, and Sannazaro.

From 1500 to 1600 is the *third period* of Italian literature, and a golden age of poetry, second only to the era of Dante. It is true, as Longfellow remarks, there appeared in it no one production that can bear a moment's comparison with

The poem sacred,

To which both heaven and earth have set their hands;' but it produced more great poems than any other period, such as the 'Orlando Furioso' of Ariosto, and the 'Gierusalemme Liberata' of Tasso. It was also distinguished by the labours of Michael Angelo in sculpture, Machiavelli in history, and Vittoria Colonna in letters generally.

From 1600 to the present time forms the *fourth period*. To the brilliant era of the Cinquecentisti succeeded the affectations and frivolities of the Sexcentisti, which ushered in the present age. The Italian mind, it has been said, contented or weary with the triumphs of the previous century, now found its chief expression in odes and sonnets, marked by conceits and exaggerated prettinesses of style.

The greatest poetic names of this period are Marini, Chiabrera, Redi, Filicaja, Maffei, Goldoni, Gozzi, Metastasio, Alfieri, Monti, Pindimonte, Ugo Foscolo, Manzoni, Parini, Mesillini, Silvio Pellico, Grossi, and Berchet. Mightiest among these stands Alfieri, a grand example of the power of a strong will and a fixed purpose. 'He is the last great sign in that celestial zodiac of Italian song, which encircles the earth with its glory, and of which Dante, in the majestic procession of the ages, was the first to appear above the horizon, chasing the darkness before him, and, like Sagittarius, filling the whole heaven with his golden arrows.'

Many of these names are associated with various branches of literary labour; and others, not enumerated above, are crowned with enduring fame. Thus, in criticism, we must not forget Zeno, Baretti, Gozzi, Mazzuchelli, and Cesarotti; the fine arts occupied the acumen and industry of Lanzi, Vasari, Bottari, and Milizia; Martini and Tartini are connected with the history of music; Verri, Neri, Carli, and Galiani wrote on political economy; Tiraboschi, Bettinelli, and Corniani, on Italian literature; Buonafede, on the progress of philosophy; Beccaria, Filangieri, and Mario Pagano, on jurisprudence; Vallisnieri and Spallanzani contributed important discoveries to our knowledge of the laws of nature and the conditions of animal life; Volta and Galvani are associated with the wonders of electricity and galvanism; Denina illustrated Italian annals; and Alfieri created the Italian tragedy.

Among the principal writers of the present century we may record—the historians Botta, Balbi, Arnari, Scopoli; the tragedians Miolini and Pellico—the latter the author of the well-known 'Picciola'; the romantic poets Grossi and Sestini; the didactic poet

Arici; the satirist D'Elci; the dramatist Grisi, and novelist Manzoni, author of the 'Promessi Sposi'; the novelist Rossini; and the dramatist Nota. Micali has written the annals of Italy prior to the palmy days of Roman glory; Bossi, a general history of Italy; Vacani, the services of the Italian troops employed in Napoleon's wars; Colletta and Cuoco, the story of Naples; Pignotti, the history of Tuscany; Manno, that of Sardinia; and Serra, that of Genoa. Cicognara has carefully compiled a history of sculpture; Ugoni and Lucchesini have criticized the Italian literature of the eighteenth century; Gioja has employed himself on political economy and legislation; Romagnosi and Tamburini have written on jurisprudence; Brocchi and Breislak, on geology and mineralogy.

What shall we say of Italian art? We can but refer to its great schools of painting—the Florentine, the Venetian, the Roman, and the Bolognese; to its triumphs in sculpture and music; and to the names of Raffaele, Michael Angelo, Perugino, Cimabue, Guido, Salvator Rosa, the Caracci, Giotto, Titian, Canova, Rossini, Bellini, Donizetti, among a thousand others which 'the world will not willingly let die.'

ITALIAN ARCHITECTURE. [CIVIL ARCHITECTURE.] Instead of comprising buildings of every style and class to be met with in Italy, the term Italian Architecture is generally restricted to signify that generic style formed by the revival of the Roman orders, and the adaptation of them, and other features derived from works of the same age, to buildings of every kind, domestic as well as public.

Different orders, or repetitions of the same order, being applied to the several stories of buildings whose fronts were pierced with windows, it became unavoidably necessary to abandon all proportion of intercolumniation, and to space the columns according to the breadth of the piers and the apertures between them; which in turn left hardly any other alternative than to engage the columns themselves, that is, to attach either half or three-quarter columns to the walls.

One defect attending this practice of giving a separate order to each story is, that the columns become insignificant, both in proportion to the entire front and to the windows between them, more especially when the columns are further shortened by being placed on pedestals. In fact, windows and doors are generally the predominant features in Italian composition, even where two series are comprised within one order, being generally more prominent in their cornices and pediments than the other projections. They are often decorated with smaller columns or pilasters, and Palladio has sometimes loaded them by recumbent figures on the raking cornices of their pediments. Probably the Italian style exhibits itself to most advantage where columns have been discarded, and windows and arches made the chief features in the composition, and the façade crowned by a bold and rich *cornicione*.

The Italian style was for a long time predominant in England, and many of our finest public buildings are good examples of it; but of late years a reaction has fortunately set in, under the auspices of the late Sir C. Barry, G. G. Scott, Ferrey, and others, in favour of the Gothic, which, when properly treated, is better adapted to our climate, and, it may be added, seems more in harmony with the national genius.

ITALIAN DRAMA. After the long sleep of the true dramatic and theatrical spirit in the middle ages, the first endeavour to imitate the ancients in their theatre, as in other departments of art and poetry, was made by the Italians. The earliest represented drama in a modern language was probably the 'Orfeo' of Poliziano, acted at Mantua in 1483; and next in point of date was a translation of the 'Amphitryo' of Plautus, produced at Ferrara in 1486.

It is needless to trace a long series of now unknown names of persons who wrote plays, or translated them from the ancient classic authors. It will be sufficient to state that the Italians never had a national drama in the higher sense of the word. The comedies of Porta possess some merit, and the plays of Alfieri are admirable and powerful works, but they have no pretence to nationality, though written with the desire to promote freedom among his countrymen. The Italians, however, were fond of theatrical representations, and Boiardo, Ariosto, Bibiena, Aretino, and Ludovico Dolce all wrote comedies in imitation of the antique.

Among the successful comic poets of this period, the most distinguished was Giambattista de la Porta, who flourished at the close of the sixteenth century and the beginning of the seventeenth. Though most of his comedies were of the familiar species, and some of them even bordered on farce, yet a few rose to the noble and pathetic tone: of the latter kind are 'La Furiosa,' 'La Cintia,' 'Le Due Fratelli Rivali,' 'La Sorella,' and 'Il Moro.' But the Spanish theatre was now approaching the meridian of its glory; and the political influence of Spain on the Italian territory being at its height greatly favoured the introduction of the Spanish taste in dramatic composition. It was probably the first extravagances of this dramatic innovation that induced Tasso, in his latter days, to compose, as a burlesque of the new romantic taste, a play entitled 'Love Intrigues' (GI' Intrichi d'Amore), which was acted in 1598 and printed in 1604. We find a curious evidence of the transitional state of the public taste at this time in the productions of a poet of high name who thought fit to try his powers in each of the rival species. This was Michael Angelo Buonarroti the Younger, nephew of the great Michael Angelo, who composed two comedies entitled 'La Tancia' and 'La Fiera.' 'La Tancia' is a rustic comedy, in which nearly all the characters speak the country dialect of Tuscany. 'La Fiera' (the Fair) is a connected series of five plays in five acts each, which were performed at Florence on five successive nights. A vast variety of characters are introduced for the purpose of exhibiting instances of the technical terms used in the various trades of Tuscany. [BUONAROTTI.]

Ottavio Rinuccini introduced the *opera per musica*, which we now briefly term the opera. The magic power of this union of music with the romantic drama made it the chief theatrical favourite among the Italians of the seventeenth century. At the same time the public continued their favour to a species of comedy, or rather comic recitation, which in Italy seems to have been in all times peculiarly national. This was called the *commedia a soggetto* or *commedia dell'arte*. It consisted of the mere outline of a dramatic composition, wherein the parts very slightly sketched were assigned to the several

performers, who were to fill them up extemporarily. These sketches were called *scenarij*, from their containing merely the argument of each scene: those of Flaminio Scala were particularly celebrated.

The task of classicizing the musical drama was undertaken first by Apostolo Zeno, and afterwards, with more success, by the Abbate Metastasio. The first endeavour to restore what the classicists denominated the *true comedy* was made by Luigi Riccoboni, a theatrical manager, who made an unsuccessful attempt, on the Venetian stage, to revive the 'Scolastica' of Ariosto. Better fortune awaited Carlo Goldoni, a Neapolitan, who displayed such abundant nature and fertility in painting the manners and the follies of his own age and country, that at length he brought the comedy of *character* into vogue. He was for a time driven out of the field by the fantastic dramas of Gozzi (which were fairy tales adapted to the stage, and sometimes Spanish plays remodelled), but was speedily reinstated in Italian favour, and from his pen we have about a hundred and fifty pieces. Among the comic dramatists of his own country he still occupies the highest place.

In the latter part of the last century, Alfieri inaugurated a new era of Italian tragedy. He adhered to the established classic school, took his subjects chiefly from ancient story, and was a strict observer of the unities. As a dramatist, he has been the most successful in painting, as in his 'Virginia,' the public life of the Roman republic; and in his tragedy of 'Saul' we find, with a certain oriental splendour, great lyrical sublimity of expression. Since Alfieri, that nobler and more masculine-spirited Italian tragedy, of which he is regarded as the founder, has been cultivated by several distinguished writers with a less rigid adherence to antique subjects and to classic forms. Among the most estimable of these productions we may particularize the 'Aristodemo,' the 'Cajo Gracco,' and the 'Galeotto Manfredi,' of Vicenzo Monti; 'Il Conte di Carmagnola,' and 'L'Adelchi,' of Alessandro Manzoni; and the 'Antonio Foscarini,' the 'Giovanni da Procida,' the 'Ludovico Il Moro,' and the 'Nabucco' of Giovan Battista Niccolini. For some years, however, Italy has produced no great dramatist, and her theatrical genius has mainly been devoted to operatic compositions. Nor can we regret the absence of new Alfieris and Goldonis while she supplies us with a Rossini, a Bellini, a Donizetti, and we may even add, a Verdi. For the early history of the Italian drama, consult Hallam's 'Introduction to the Literature of the Middle Ages.' No comprehensive work exists on modern Italian dramatic literature, but some interesting papers have appeared at intervals in the *Foreign Quarterly Review* and *Blackwood's Magazine*.

ITIHASAS, a name given to the two great Hindu poems, the 'Ramayana' and 'Maha Bharata,' which boast a venerable antiquity.

ITIS, a termination which, added to the root of the Greek name of an organ or part of the body, implies its inflammation; as *bronchitis*, inflammation of the bronchia.

IULUS, a genus established by Linnæus for such *Insecta Myriapoda* as now form the order *Chilognatha* (χιλός, γνάθος) the first division of *Myriapoda* in the arrangements of Leach and Latreille. The

Chilognatha have crustaceous and usually cylindrical bodies, formed of numerous unequal segments, very short feet, each terminating in a single hook; a vertical rounded head, furnished with two mandibles, which are either thick and robust, or united with the labium and elongated. They have no palpi. The antennæ are two, very short, either slightly thickened towards their extremities, or filiform throughout, and composed usually of seven, more rarely (as in the genus *Sphæropæus*) of six joints. Their eyes are smooth, and vary greatly in number. These animals move slowly and with a gliding motion. When disturbed, they roll themselves up spirally, or into a ball. They feed on decomposing animal and vegetable matter.

The chilognathous Myriapoda are found in all parts of the world, certain genera, however, affecting certain geographical divisions. Thus the species of *Glomeris* are European; those of *Spirastrepus* and *Sphæropæus*, African and Eastern. *Iulus terrestris* is a familiar British example.

IVES, ST. [CORNWALL; HUNTINGDONSHIRE.]

IVINGHOE. [BUCKINGHAMSHIRE.]

IVIZA. [BALEARIC ISLANDS.]

IVORY (Lat. *ebur*), the name given to the substance of the tusks of elephants, and of the walrus or sea-horse, is extensively used for the handles of knives and forks, and for making or embellishing numberless small articles in general use. Each male elephant, when arrived at maturity, has two tusks; these are hollow at the root, tapering, and of various sizes, depending chiefly on the age of the animal. The best sort comes from Africa, and is of a closer texture and of a better colour than that brought from the East Indies. The medium weight of a tusk may be taken at 60 lbs. The Chinese are very ingenious in working, and especially in carving, ivory; their concentric balls, ivory boxes, and chessmen are far superior to those constructed by any other race of people. The Chinese market is principally supplied with ivory from Malacca, Siam, and Sumatra. For making artificial teeth the ivory of the walrus is preferred. The principal supplies of elephants' tusks to this country are from the west coast of Africa and from Ceylon. The remaining imports are from Bombay, the Cape of Good Hope, Madagascar, and Siam. The quantity imported in 1864 was 11,497 cwts., valued at 361,384*l*.

IVORY BLACK. [CHARCOAL, ANIMAL.]

IVORY COAST. [GUINEA.]

IVORY PALM, one of the finest productions of the vegetable kingdom (the *Phytelephas macrocarpa* of botanists), sometimes called *Vegetable Ivory*. It is an inhabitant of the Magdalena, in New Grenada; and the seeds constitute a substance so much like ivory, that they have become an important article of commerce.

IVRY. [EURE.]

IVY (Anglo-Saxon, *ifig*). [HEDERA.]

IXORA, a genus of rubiaceous plants of the tribe *Chinchonaceæ*. The species are numerous, and chiefly confined to India and the Oriental Archipelago. They form shrubs or small trees. The flowers are in terminal corymbs, and are usually red, but sometimes white, and are generally highly ornamental, whence several are cultivated in our hot-houses, where they require to be kept in a moist heat.

J.

J in the English language has a sibilant sound, closely connected with that of the syllable *di* before a vowel. It has a similar, though not the same, sound in the French tongue; but in German it is pronounced like our *y* before a vowel. Though it is generally said that its power with the Romans was the same as with the Germans, there is reason for thinking that our own sound of the letter was not unknown to the ancient inhabitants of Italy. The name of Jupiter was undoubtedly written originally *Diupiter*, so Janus was at first *Dianus*, just as the goddess Diana was called by the rustics *Jana*. [D and I.] The argument might be strengthened by comparing the Latin *jungo* with the Greek *ζωγνυμι*, Jupiter with *Ζευ πατρις*, &c., and also by referring to the modern Italian forms, *giogo*, *giovare*, *giovenco*, &c. Two pronunciations may have co-existed in the same country. As to the form of the letter *j*, it was originally identical with that of *i*, and the distinction between them is of recent date.

In the Spanish language *j* represents a guttural, and is now used instead of *x*, which had the same power: thus *Jeres* rather than *Xeres* is the name of the town which gives its title to the wine called by us sherry. For the changes which *j* may undergo see D, G, and I.

JA'BIRU, the name of a genus of Grallatorial or Wading Birds, *Mycteria* of Linnæus, and thus characterized:—Bill long, conical, smooth, robust, compressed, and pointed; upper mandible trigonal and straight, the lower thicker and turned up. Head and neck more or less bare of feathers. Anterior toes united at the base by a membrane. Size gigantic. Is found in South America, Western Africa, and Australasia. Habits almost entirely the same as those of the Storks. There are three species known, distributed geographically as above.

JACANA (*Parra jacana*), a species of bird belonging to the order *Grallæ*, and to the family *Palamedidæ* (Gray), or Waders. The members of the genus *Parra* are noted for their short bills, thickened and advanced at the base, and their long and slender toes. They are found in the tropical regions both of the Old and New World, frequenting the marshes and rivers. Their food is chiefly vegetable. The common Jacana is a native of Brazil and the West Indies. It frequents the Amazon and other rivers, where it may often be seen walking on the enormous leaves of the Victoria regia, and other water-plants.

JACAR. [CASTILLA-LA-NUEVA.]

JACCHUS, or **IACCHUS**, the name of a genus of monkeys applied by Geoffroy, Desmarest, and others to the form denominated *Hapale* by Illiger, *Ouistitis* of the French, the type of which may be considered to be *Simia Jacchus* of Linnæus.

Upper intermediate incisors larger than the lateral ones, which are isolated on each side; lower

JACKAL.

incisors elongated, narrow, and vertical, the lateral ones longest; upper canine teeth conical and of moderate size; two lower ones very small.

Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6} = 36$.

Size small, muzzle short, facial angle about 50°. Head round, prominent at the occiput; the five fingers armed with claws, with the exception of the thumbs of the posterior extremities, which are furnished with nails; thumb of the anterior extremities in the same direction as the fingers; fur very soft; tail full and handsome. A native of South America.

The species are all of diminutive size, rather numerous, and are generally known by the name of *Marmosets*. Habits squirrel-like. The food consists of fruits, roots, seeds, insects, eggs, small birds, and nestlings.

JACK, in the British navy is a small union flag composed of a field of blue, bearing a St. George's cross over a St. Andrew's cross, both of which are red and have a margin of white.

JACK. The Jewish *Jacobus* was corrupted through Jacquemes to *Jacques* in France, and *James* in England; and Jacques being the commonest Christian name in the former country, was used as a contemptuous expression for a common man. (*Jacquerie*, an insurrection of the peasantry.) The introduction of the word in the same sense into England seems to have led to the use of Jack as the familiar synonym of John, which happened to be here the commonest name, as Jacques in France. The term was then applied to any mechanical contrivance for replacing the personal service of an attendant, or to an implement subjected to familiar usage—as boot-jack, jack-boots, jacket.

JACKAL, or **TSCHAKKAL**, the name of a section of *Carnivora*, placed by most naturalists within the pale of the genus *Canis*, and of which the Common Jackal is an example. This animal is the *Chacal* or *Loup doré* of the French; *Adivé* of Buffon; *Canis aureus*, Linnæus.

Description.—Yellowish gray above, whitish below; thighs and legs yellow; ears ruddy; muzzle very pointed; tail reaching hardly to the heel (properly so called). The colours sometimes vary, and the back and sides are described as of mixed gray and black, and as abruptly and strikingly distinguished from the deep and uniform tawny of the shoulders, haunches, and legs. The head nearly of the same mixed shade with the upper surface of the body. Odour offensive.

Geographical Distribution.—India, other parts of Asia, and Africa. Cuvier says that Jackals are met with from India and the environs of the Caspian Sea to Guinea, but that it is not certain that they are all of the same species.

Habits nocturnal and gregarious, hunting in packs, and the nests of the countries where they are found, and where they burrow in the earth. In their huntings the Jackals will frequently attack the larger quadrupeds, but the smaller animals and poultry are their most frequent prey. Their cry is very peculiar and piercing. Captain Beechey notices it as having something rather appalling when heard for the first time at night; and he remarks that, as they usually come in packs, the first shriek which is uttered is always the signal for a general chorus. 'We hardly know,' continues the captain, 'a sound which partakes less of harmony than that which is at present in question; and indeed the sudden burst of the answering long-protracted scream, succeeding immediately to the opening note, is scarcely less



Jackal (*Canis aureus*).

impressive than the roll of the thunder-clap immediately after a flash of lightning. The effect of this music is very much increased when the first note is heard in the distance (a circumstance which often occurs), and the answering yell bursts out from several points at once, within a few yards or feet of the place where the auditors are sleeping. These animals are said to devour the dead on the battlefield, and to scratch away the earth from the shallow graves in order to feed on the corpses.

The story of the Jackal being the lion's provider may have arisen from the notion that the yell of the pack gives notice to the lion that prey is on foot, or from the Jackal being seen to feed on the remnants of the lion's quarry.

JACKASS, LAUGHING. [KINGFISHER.]

JACKDAW. [CORVIDÆ.]

JACKSON, ANDREW, President of the United States of North America, was descended from a Scottish family which had settled in Ireland, whence his father, Andrew Jackson, with a wife and two sons, emigrated in 1765 to South Carolina, where his third and youngest son, Andrew, was born, March 15, 1767. The father died soon afterwards.

Andrew appears to have been his mother's favourite; and his original destination was to be a clergyman. With this view, he studied theology for some years; but when the War of Independence commenced the young Jacksons did not hold back. Andrew is recorded to have fought when little more than thirteen. And from this time he shared in every campaign as long as the war lasted. In 1784 he placed himself under an advocate to be instructed

in the law. This new study he prosecuted with so much success, that in 1787 he was appointed solicitor for what was then called the Western District of North Carolina, and is now the state of Tennessee; but he did not entirely throw off his military character, and he served with distinction, though only as a private, against the Indians, who had become troublesome to the state.

Having acted as one of the members of the convention for establishing a constitution for the state of Tennessee, he was, in 1796, elected to a seat in the House of Representatives. The next year he was chosen a senator, but resigned his seat after holding it for one session, and was nominated by the legislature of Tennessee a judge of the Supreme Court in that state, having also been shortly before appointed a major-general of the state forces. But he resigned his judicial office, and lived in retirement on a farm, a few miles from Nashville, on the Cumberland river, till the breaking out of the war with England in 1812.

His first command was that of a body of between two and three thousand volunteers, with whom he proceeded down the Mississippi for the defence of the lower country in November, 1812. The next year he greatly distinguished himself by a campaign against the Creek tribes.

In 1814 Jackson was appointed a major-general in the service of the United States. He captured Pensacola on November 7, and raised himself to the highest point of reputation and popularity among his countrymen by the famous repulse of the British forces in their attack on New Orleans, January 8, 1815. The next military command which he held was in the war against the Seminole Indians of Florida in 1818.

General Jackson was commissioner on the part of the United States in the negotiation with Spain for the transference of Florida; and after the arrangement he was, in 1821, appointed the first governor of the province. He held this post for a year, and was then again elected a member of the senate for the state of Tennessee.

When the election of a new president took place at the end of 1824, General Jackson was a candidate along with Mr. Adams, Mr. Clay, and Mr. Crawford. Mr. Adams became president on this occasion, but General Jackson was elected in 1828, and again in 1832; so that he was at the head of the government of his native country for the eight years from 1829 to 1837.

General Jackson survived his presidency about eight years, and died at his seat called the Hermitage, near Nashville, in Tennessee, June 8, 1845. He was married, but had no issue.

JACKSON, JOHN, R.A., was born in 1778, at Lavingham, in Yorkshire, and was apprenticed to a tailor; but Lord Mulgrave and Sir George Beaumont having seen his imitation of a picture by Reynolds, and some other proofs of his talent, they encouraged him, purchased the unexpired term of his apprenticeship, and sent him to London in 1794 to study in the Royal Academy.

He first attracted notice as a portrait painter in oil about 1806, and in 1817, when he was elected a member of the Royal Academy, his reputation was little inferior to that of Lawrence. In the summer

of 1819 he visited Rome in company with Chantrey, and there painted for him a portrait of Canova. His best works are the portraits of Lady Dover, of Flaxman, and of himself, both painted for Lord Dover, and the portrait already mentioned. Jackson died June 1, 1831.

JACKSON, PORT. [SYDNEY.]

JACKSON, WILLIAM, was born in 1730, at Exeter, of which place his father was a respectable tradesman. He was placed under the tuition of the organist of the cathedral, and completed his studies in London, under the celebrated Travers, of the Chapel-Royal. He returned to and settled in his native city, and in 1777 was appointed sub-chanter, organist, lay-vicar, and master of the choristers of the cathedral. He died in 1803.

Jackson first made himself known as a composer by the publication of 'Twelve Songs,' which immediately spread his fame throughout the kingdom. His reputation was maintained by many other works. His 'Twelve Canzonets for Two Voices' were once the delight of every musical circle. Of these, 'Time has not thinned my flowing hair,' and 'Love in thine eyes for ever plays,' have lost none of their charms. Of three dramatic compositions, 'The Lord of the Manor' alone survives.

JACOBI, FRIEDRICH HEINRICH, was born at Düsseldorf, in 1743, and died at Munich, 10th March, 1819. He was distinguished, not so much as the author of a peculiar system of philosophy, as for the critical acumen and forcible eloquence with which he detected and exposed the incoherences and defects of the prevailing systems. His earliest publication was a philosophical poem, entitled 'Friendship and Love,' which first appeared in 1777, afterwards republished under the title of 'Woldemar.' In 1781 he commenced an able controversy with Mendelssohn, in his work 'On the doctrine of Spinoza,' which he further prosecuted in his 'Observations on Mendelssohn's Apology for the doctrine of Spinoza.' By the essay, entitled 'David Hume, or Idealism and Realism,' he provoked the hostility of the followers of Kant, and that of the admirers of Fichte by his 'Sendschreiben an Fichte.' When the troubles arising out of the French Revolution extended to Germany, Jacobi retired to Holstein, whence he removed successively to Wandsbeck and Hamburg; from the latter he was called, in 1804, to Munich, to assist in the formation of the new Academy of Sciences, of which he was appointed president in 1807. This dignity Jacobi resigned in 1813, upon attaining his seventieth year. Shortly before, his work 'On Divine Things and on Revelation' (Leipzig, 1811), had involved him in a bitter controversy with Schelling. Jacobi's complete works have been published in 6 vols., Leipzig, 1812-24.

JACOBINS is the name of a faction which exercised a great influence on the events of the French Revolution. This faction originated in a political club formed at Versailles, about the time of the meeting of the first National Assembly, and which was composed chiefly of deputies from Brittany, who were most determined against the court and the old monarchy, and some also from the south of France, among whom was Mirabeau. When the National Assembly removed its sittings to Paris (October 19, 1789), the Breton club followed it, and

soon after established their meetings in the lately suppressed convent of the Jacobins, or Dominican monks, in the Rue St. Honoré. From this circumstance the club and the powerful party which grew from it assumed the name of Jacobins. During the year 1790 the club increased its numbers, and obtained such influence and power, especially in 1792, as to control the legislature. The attack on the Tuileries in August, 1792, the massacres of the following September, the suppression of royalty, and most of the measures of the reign of terror, originated with the club of the Jacobins. After the fall of Robespierre in July, 1794, the convention passed a resolution which forbade all popular assemblies to interfere with the deliberations of the legislature, and the club was finally suppressed in 1794. The more violent Jacobins were called *Cordeliers*; the more moderate, *Feuillants*.

JACOBITES. [EUTYCHIANS; STUART FAMILY.]

JACOB'S LADDER is a rope ladder with wooden steps or spokes. It is also the name of a perennial plant with large blue flowers, which grows in bushy places in the north of England and south of Scotland.

JACOB'S STAFF is a mathematical instrument employed for taking heights and distances.

JACQUARD, JOSEPH-MARIE, was born at Lyons, on July 7, 1752, of humble parents, both of whom were employed in operations connected with weaving. His parents died, leaving him a small property, which he employed in the attempt to establish a business in the weaving of figured fabrics. The undertaking failed, and he was compelled to sell his looms in order to pay his debts. He subsequently married, and occupied himself with ingenious schemes for improvements in weaving, cutlery, and type-founding, which produced nothing for the support of his family. In 1792 he assisted in the defence of Lyons against the army of the Convention. Being denounced after the reduction of Lyons, he was compelled to fly. When he was enabled to return, and his native city began to rise from its ruins, Jacquard applied himself with renewed energy to the perfection of the beautiful apparatus for figured weaving bearing his name. [WEAVING.] He had conceived the idea of it as early as 1790, and now succeeded, though imperfectly, in accomplishing his end. His machine was presented, in 1801, to the national exposition of the products of industry, the jury of which awarded him a bronze medal for its invention. In the same year he obtained a patent, or 'brevet d'invention,' for a term of ten years.

About this time the attention of Jacquard was accidentally directed to the construction of a machine for weaving nets for fishing and maritime purposes. He accomplished the desired object, but having amused himself and his friends with his contrivance, he threw it aside. His machine-made net, however, fell into the hands of the préfet at Lyons, and the result was that, according to the arbitrary fashion of the time, he and his machine were placed under arrest and conveyed to Paris, where the invention was submitted to inspectors, amongst whom were Napoleon and Carnot, and a gold medal was awarded to him in February, 1804.

In 1804 Jacquard returned to Lyons, where he was long engaged in superintending the introduc-

tion of his inventions for figured weaving and for making nets, in which he was powerfully aided by Camille Pernon, a rich manufacturer. For some years Jacquard had to struggle against much opposition and prejudice on the part of the Lyonese weavers, who conspired to discourage the use of his machinery, and his personal safety was at times endangered. At length, however, the value of the invention was acknowledged, and it was brought very extensively into use, not only in France, but in Switzerland, England, Germany, Italy, and America. It is now, however, being superseded by looms of a more delicate and simple construction.

Jacquard continued to reside at Lyons, where he exerted himself in promoting the use of his great invention until, having lost his wife, he retired to Oullins, a village near Lyons, where he spent his latter years in retirement, and died August 7, 1834. During his life he received the cross of the Legion of Honour, and in 1840 a public statue was raised to his memory at Lyons.

JADE. [NEPHRITE; SAUSSURITE.]

JAEN, a province of Spain, with an area of 5179 square miles, and (at the last census) 845,879 inhabitants. It is a hilly district, but the soil in the valleys is extremely fertile. The produce is wine, oil, corn, honey, silk, vegetables, and fruits of every kind. The mountains abound with rich pastures; sheep and a fine breed of horses are bred in the country. *Jaen*, the capital of the province, is an episcopal town, and has two cathedrals and 18,054 inhabitants. It is most picturesquely situated, and surrounded by old Moorish walls, surmounted by numerous towers and pinnacles. The town was formerly noted for its silk manufactures, but they have entirely died out, and although situated in the midst of plenty it is now very poor. [ANDALUCIA.]

JAFFA. [SYRIA.]

JAFFNA, or JAFFNAPATAM, a town situated at the northern extremity of the island of Ceylon, is defended by a fort, regularly formed with five bastions, a broad moat, and a glacis. The town is about half a mile E. from the fort. The streets are regular, the houses neat and clean, and the population about 8000, mostly of Dutch descent. Jaffna has communication with the sea by a river. Ships unload in the roadstead, and the cargoes are conveyed to the town by boats. The trade is principally in tobacco and Palmyra timber. The town has long been an American mission station.

JAGGERY, the name given to sugar in its coarse state, as produced in the East Indies. It also refers to the inspissated juice of the Palmyra tree.

JAGUAR. [LEOPARDS.]

JAH, one of the titles of Jehovah.

JAIL FEVER. Prior to the philanthropic labours of Howard, the disease known as the jail fever was very prevalent in the prisons of England. It was caused principally by defective sanitary arrangements, and it often spread to persons in the court where the prisoners were tried. Such was especially the case at the fatal BLACK ASSIZE at Oxford in 1570; and even so recently as 1750 the lord mayor, aldermen, two judges, and many of the spectators were fatally infected with the disease at the Old Bailey assizes. It is not now considered

to have been a distinct malady, but merely a severe form of typhus fever.

JAINAS, or JAINS, a religious sect of the Hindoos. They are most numerous in the southern and western provinces of Hindustan, where they are principally engaged in commerce, and from their wealth and influence form a very important division of the population of the country. The history and opinions of this sect are also interesting from their striking similarity to the chief peculiarities of the religion of Buddha. They are divided into two sects, which have a great dislike to each other. They have many temples in Hindustan, one of which Bishop Heber was permitted to inspect. ('Journey to the Upper Provinces of India,' vol. i. p. 385.) The most complete account of the Jains is given by Professor Wilson, in his 'Sketch of the religious sects of the Hindoos.' ('Asiatic Researches,' vol. xvii.)

JALAP. The imports of Jalap into the United Kingdom in 1864 amounted to 45,344 lbs., value 9142*l.*, or about four shillings per lb. Mexico supplied 31,187 lbs. In the same year 87,563 lbs., value 7513*l.*, were exported. [CONVOLVULUS JALAPA.]

JALAPA, or XALAPA, is a city in Mexico, 50 miles W.N.W. of Vera Cruz. There are 12,000 inhabitants, who trade in maize, fruit, sugar, and honey, and manufacture some pottery. This city is built at an altitude of 4350 feet, and the medicinal weed *jalap* grows here wild, whence its name.

JALOOFS. [SENEGAMBIA.]

JAMAICA, one of the greater Antilles, and the most important possession of the British in the West Indies, extends from 76° 11' to 78° 19' W. long., and from 17° 45' to 18° 30' N. lat. Its length from E. to W. is nearly 150 miles, and its width may on an average be 40 miles. The entire area is about 6400 square miles, so that it is a little larger than Yorkshire. Its aboriginal name was Xaymaca, 'the land of wood and water,' which very fairly described its own aspect.

The surface of the island is very uneven. The eastern part is almost entirely filled up by the Blue Mountains, whose principal ridge occupies the middle of it, and runs nearly east and west. This range varies from 5000 to 6000 feet in elevation, and it has numerous offsets on each side. The western boundary of this mountain region is formed by a ridge which runs across the whole island from south-east to north-west, and rises in some places to a height of 4500 feet. The greatest plain in the island is that of Liguanea, which begins a few miles east of Kingston, and extends westward to a distance of about 30 miles; its average breadth is about 5 miles. Another level spot is the Plain of Vere, separated from the former by a low range of hills; and minor ranges exist in other parts of the island, which inclose numerous valleys.

The central heights are said to be remarkably favourable to longevity, and after having long been a sanitarium for the residents themselves, have lately begun to attract invalids from the United States. The rainfall varies in different years from 60 to upwards of 120 inches.

Near the central line of the island, the hills present the characteristics of the limestone formation, of which they consist. Caverns occur in several

places, and some of them are very extensive. The water which runs down from the hills forms small rivers; these flow for a short distance and then disappear in holes, and sometimes come again to the surface and again sink. These districts are only provided with running water during the rains, and the inhabitants are obliged to have recourse to tanks or cisterns, in which they collect the rain-water for the dry seasons. In other districts, Jamaica has the advantage of being well watered by numerous rivers, rivulets, and springs. None of the rivers are navigable except the Black River; but as Jamaica contains 500 miles of sea coast and nearly 100 harbours, bays, creeks, and coves, the want of river navigation is not much felt.

The climate of Jamaica is considered exceedingly hot; but this is only the case in the lower plains along the southern coast. Snow has never been observed, even on the most elevated peaks; hail is not a rare occurrence on them, but it melts as soon as it reaches the ground. There are two rainy and two dry seasons. The rains last from about May to July or August, and during October and November. The dry seasons occur between these periods. The July rains are most copious and long-continued, and are accompanied by excessive heat. Earthquakes are frequent; hurricanes less so than in the other West India islands.

The minerals of Jamaica are very numerous, consisting of the ores of iron, copper, lead, zinc, cobalt, and manganese, together with limestone, sulphate of barytes, iron pyrites, marble, gypsum, and lignite. Valuable quarries of lithographic stone were discovered in 1855, and traces of coal were also found.

The staple articles of the island are sugar, rum, and molasses, which form by far the most important articles of export. The sugar plantations are very numerous and extensive, especially in the lower and warmer tracts of the island. On the hills and their declivities coffee is cultivated to a great extent. Next to these the pimento plantations supply the most important article of export. Arrowroot, indigo, cotton, and cocoa were formerly much more cultivated than at present; ginger and turmeric are also produced, and a little tobacco. Indian corn is universally grown, and yields an abundant produce; two and even three crops of it can be raised within the year. Guinea-corn and rice are cultivated, as are also yams, cassava, sweet potatoes, artificial grasses, and a great variety of delicious fruits. The forests contain mahogany, satinwood, cedar, fustic, logwood, bamboo, cocoa, and various other trees.

The horned cattle are numerous. The horses are of a middle size, hardy and active, but only fitted for the saddle and harness. Mules are employed on the sugar estates. Sheep, goats, and hogs abound. All kinds of poultry are raised in the greatest abundance, excepting geese and ducks. The plantain, banana, sweet potato, &c., compose the principal food of the blacks.

Jamaica was possessed by the Spaniards from 1510 to 1655, and during the 150 years of their occupation the inhabitants, including Africans and Europeans, had not attained the number of 3000. Within about the same period of English rule (from 1655 to 1801) the number was 340,000—80,000 whites, 10,000 free people of colour, and 300,000

slaves. At the census of 1861 they had increased to 441,264, of whom only 13,816 were whites, so that there are at present thirty-two blacks to every white in the island. The two races have the same rights and privileges, and many of the coloured inhabitants were formerly members of the local legislature.

Since the passing of the Slave Emancipation Act the trade and productiveness of the island have very much declined, although it is only fair to add that even before the new order of things the commercial crops had been steadily decreasing. For instance, in the last three years of the slave trade, 1805–7, the quantity of sugar produced averaged fully 144,000 hogsheads; in the four years before the commencement of the abolition of slavery, 1831–34, it was under 91,000; in the four years of gradual abolition, 1835–38, about 70,000; and in the first four years of perfect freedom, 1839–42, less than 42,000. According to the returns of 1834 and 1863, the principal exports were as follow:—

	1834.	1863.
Sugar (cwts.), . .	1,500,000 ...	560,481
Rum (gallons), . .	2,697,324 ...	1,554,243
Pimento (lbs.), . .	3,605,400 ...	6,228,478
Coffee (lbs.), . .	17,725,731 ...	8,184,849

But while the exports have diminished, the imports, more particularly of food, have largely increased. In 1863 the value of all articles imported was 1,087,529*l.*, 581,227*l.* having been sent from England. The exports in the same year were 1,007,924*l.*, a decrease as compared with 1862 of more than 100,000*l.* In the article of sugar alone there was a falling off in value of 83,746*l.*, and in rum 57,319*l.*; but on the other hand there was an increase of 51,562*l.* in coffee.

Sugar plantations are now few in number as compared with former times; for, as the negro obtains with little exertion the means of subsistence from the bounty of nature, he is unwilling to devote himself to onerous agricultural toil. By the roadsides, on the edge of the wood and jungle, the gardens and provision grounds of the African may be seen (pleasant enough looking spots), where cocoa and bread-fruit trees are cultivated, with oranges, mangoes, plantains, and yams. Some of them pay a trifling rent, but the majority have squatted on the waste lands, asking no man's permission. So far has the disinclination of the freed negro to regular labour extended, that for many years coolies from Calcutta and liberated Africans have been introduced to work on the plantations. In 1863 there were altogether 4067 coolies and 1656 captured negroes in the island.

Jamaica is politically divided into three counties, Surrey, Middlesex, and Cornwall; it contains one city, Kingston, and thirty-three towns and villages. The counties are subdivided into parishes.

1. The county of Surrey extends over the eastern portion of the island, and contains Port Antonio, Morant Bay (the scene of the rising against the whites in 1865, suppressed with terrible severity), and the fine harbour of Kingston. Kingston is a considerable city, but exhibits many signs of decadence. It is regularly built, and contains many good houses, churches, charitable institutions, two Jews' synagogues, and schools. The greatest part of the

produce of the southern districts is sent here, and hence exported to Europe or America. The population is about 32,000. A railway from Kingston to Spanish Town was completed and opened in 1846. The harbour, a land-locked basin, available for the largest ships, is inclosed southward by a long tongue of land, at the extremity of which is *Port Royal* (15,000 inhabitants), once the capital of the island, which has been repeatedly destroyed by earthquakes, hurricanes, and fire, but is still a considerable place, as its harbour is the station for the ships of war, and it contains the naval arsenal, dockyard, and good fortifications. Morant Bay, between Port Royal and Morant Point, prior to the late insurrection, carried on a considerable trade. Antonio has a fort and a good harbour, but little trade. A cast-iron lighthouse has been erected on Morant Point, in lat. $17^{\circ} 56' N.$, long. $76^{\circ} 11' W.$

2. The county of Middlesex occupies the central part of the island. On its southern coast are Port Henderson and Old Harbour; but they are only visited by small vessels, which carry the produce of the country to Kingston. On the northern shores are Annotto Bay, Maria, and St. Ann's Bay, which carry on some commerce by sea. On St. Catherine's plain is built the town of S. Jago de la Vega, commonly called *Spanish Town*, which is considered the capital of the island, being the seat of government. It contains the governor's residence, the public offices, the superior law courts, and many institutions. The population is about 6000. The town is ill-built and unhealthy.

3. The county of Cornwall extends over the western part of the island. The two most frequented harbours on the southern shores, Black River and Savanna la Mar, have little trade; but on the northern coast are three thriving towns, *S. Lucia*, *Montego Bay*, and *Falmouth*.

Of the inhabitants of Jamaica, the Maroons were originally runaway slaves, partly from Jamaica itself, partly from Cuba, who lived in the forests on the northern side of the island. In 1738 a tract of land was granted to them in those parts, which they cultivated, and on which they built two small towns; and though a portion of them forfeited their privileges by a rebellion, others have preserved them to this day. They are loyal to the British government, but exhibit on all occasions a bitter hostility to the negro. No traces of the native population of the island existed when it was taken by the English from the Spaniards. In 1852 the cholera destroyed 40,000 of the population.

Jamaica was discovered by Christopher Columbus on his second voyage, the 3rd of May, 1494, but was not settled by the Spaniards before 1510. In 1655 it was taken from the Spaniards by the English, who for some time did not appreciate its value. Since 1655 it has remained in the undisputed possession of the British, but its internal peace has been seriously disturbed on several occasions. On February 22, 1745, about 900 negro slaves were detected in a conspiracy to destroy all the white inhabitants of the island. In 1795 the Maroons revolted, and were not reduced to subjection till March 11th, 1796. But the most alarming outbreak took place on December 22nd, 1831, when the island was placed under martial law, and most stringent measures and

numerous executions followed. In 1865 another negro insurrection took place in Morant Bay, in which many whites were most barbarously murdered; but owing to the prompt measures adopted the rising was speedily quelled. Its suppression, however, was attended with acts of cruelty and injustice which were considered to reflect discredit on the fair fame of Britain, and the voice of the British public loudly demanded a strict inquiry into all the circumstances attending the outbreak and termination of an *emeute* which seemed so mysterious. For this purpose a commission was appointed by the government to proceed to Jamaica, examine witnesses, and deliberately investigate the whole affair, and at the head of this commission was placed Sir Henry Storks, well known as an able and honest administrator. The result of their inquiries would seem to be, that the conduct of the island authorities was marked by deplorable severity, arising to some extent from an unjustifiable panic (1866), and that wanton and cruel excesses were unhappily committed both by the civil and military officials.

The executive was formerly in the hands of the governor, who, as well as the council, consisting of fifteen persons, was appointed by the Crown. The governor held the chief civil and military authority; his council constituted the Upper House. The Lower House, or the Assembly, was composed of forty-seven members, two from each of the parishes. Spanish Town, Kingston, and Port Royal sent one member each.

The political franchise was fixed at such a high rate that there were only about 2500 voters in a population of 440,000. It consisted, first, of a clear annual income (after paying all debts) of 150*l.* from lands held by voter or voter's wife; second, a clear annual income of 200*l.* arising partly from lands and partly from any income from office or business (deducting all charges or expenses of such office or business); third, a clear annual income of 300*l.*, arising from office or business; fourth, the payment annually of taxes to the value of 10*l.*

But this organization has been put aside by an Act of Parliament of the present session (1866), which vests the supreme authority in the hands of the Crown, and abolishes the houses of legislature. Jamaica will henceforth be administered as a Crown colony, by a governor solely responsible to the home authorities.

The supreme court in Spanish Town, and courts of assize in each county, sit three times yearly.

There is a bishop of Jamaica, whose see comprises the Bahamas and Honduras. Besides the clergy of the Established Church, who have the care of the several parishes, there are Scotch Presbyterian, Wesleyan, Baptist, and Moravian ministers.

The annual income and expenditure of the colony is each about 300,000*l.* per annum, besides which in 1863 England spent 156,660*l.* in military expenditure, as against 2845*l.* expended by the colony for the same purpose. The public debt of the island amounts to about 800,000*l.*

After being more than 200 years in the possession of Great Britain, the capabilities of Jamaica are still very inadequately developed. It has almost virgin sources of wealth and plenty in its pastures and its fisheries; and instead of buying, as it does, a large

share of its means of subsistence, it might either sell the same to others, or maintain twice or thrice its present population. This is due to the *régime* that has so long prevailed, and which placed the island entirely under the control of the planters; but it may be expected that the new government will inaugurate a new era—an era of commercial prosperity which will render this fertile island one of the brightest gems of the British crown.

JAMES I., King of Scotland, was a younger son of King Robert III. His elder brother, David, having been made away with, it is said, by the duke of Albany, the king caused James to be sent secretly to France, to preserve him from a similar fate. The vessel was taken by an English ship of war, and the prince carried prisoner to London. His father was so affected by the news that he died of a broken heart. The duke of Albany was thereupon made Regent of the kingdom. James, now in the thirteenth year of his age, was on April 14, 1405, conducted to the Tower, and he afterwards resided in Nottingham Castle and in Windsor Castle, where he first saw and loved Lady Jane Beaufort, whom he afterwards married, and whose charms he has celebrated in his 'King's Quhair.' Henry IV. caused him to be well educated, and in 1417 Henry V. took him with him on his second expedition to France. The duke of Albany died in 1419, and from that time measures began to be taken seriously for his release. He ascended the throne in 1424, and immediately took active measures to restore the kingdom to order, by putting a check to the ambition of the Albany family and its adherents. He also adopted wise provisions for the government of the country, and ordered the statutes of Parliament, for the first time, to be regularly enrolled. At a later period of his reign James evinced great energy and promptitude in suppressing the disturbances in the Highlands and Isles. The rebels made an unconditional surrender, and the Lord of the Isles was obliged to make his submission on his bended knees at Holyrood House.

The king's vigour and determination proved so obnoxious to the nobles, that they formed a conspiracy against him, under the duke of Athol, the king's uncle, and on February 21, 1437, he was murdered, in the forty-fourth year of his age.

James was distinguished for his literary and poetic talents: three pieces of his have come down to us, 'Christ's Kirk on the Green,' 'The King's Quhair' (or book), and 'Peebles at the Play,' all displaying considerable intellectual power, and much humour.

JAMES II., King of Scotland, only son of James I., succeeded to the crown when about seven years old. The turbulence of the nobles, to which his father fell a sacrifice, continued undiminished throughout his reign, and he was little more than a tool in the hands of a faction. To add to the calamities which the country suffered, it was visited by plague and famine. The king was also attacked from England, and at the siege of Roxburgh, which was occupied by the English, he was killed by the bursting of a cannon. This was in the year 1460, and in the twenty-ninth year of his age.

JAMES III., King of Scotland, was, like his father James II., about seven years old at his accession to the throne, August 3, 1460. He had to contend at the beginning of his reign with the Lord

of the Isles, who allied himself with Edward IV. of England for the conquest of the kingdom. While this rebellion convulsed the north, the minor offices of magistrates and common-councilmen in the several burghs were objects of tumultuous contest; and the Act 1469, c. 29, was passed, the foundation of the *close system* that existed till the Burgh Reform Act for Scotland. The king appears to have been the slave of his ecclesiastics, and attached to low favourites, who involved him in a quarrel with his son and his nobles, terminating in the encounter at Bannockburn. The king fled from the field, and falling from his horse was, it is stated, killed, and his body carried off, nobody knew where. This happened in June, 1488, in the thirty-fifth year of his age.

JAMES IV., King of Scotland, son of James III., was about fifteen years old at his accession to the throne, June 11, 1488. He was of an active disposition, and the commerce and literature of the country flourished under his encouragement. But he became melancholy and superstitious, and in 1494, by the direction of the pope's legate, bound about his waist an iron belt, to be worn day and night for the remainder of his life, as a penance for his participation in the rebellion against his father. In 1512 a great council of the clergy was held at Edinburgh, where the famous *Valor Beneficiorum*, called 'Bagimont's Roll,' was made up. The following year, the king, taking up the French cause against the English, entered, with the flower of the kingdom, on the fatal field of Flodden, where he was slain.

JAMES V., King of Scotland, son of James IV., was little more than a year old when the crown devolved upon him, in 1513. The regency of the young king was long an object of ambition. The slaughter of so many noblemen at Flodden had, however, given a decided advantage to the clergy. Gavin Dunbar, who had been the king's preceptor, was made archbishop of Glasgow in 1524; in 1528 he was appointed lord chancellor; and in four years afterwards the Court of Session was erected—a court of general and supreme jurisdiction under the chancellor. When Cardinal Beaton succeeded to that office, its vast powers were exercised with such force as to threaten the extermination of every authority in the kingdom but his own and the papal. Much discontent was hence created, and in the course of a war which ensued with the English, the Scottish barons and their troops refused to obey the orders of the king, and attack the enemy, but, on the contrary, 10,000 men surrendered without striking a blow. These vexations had such an effect on James, that he died in the thirty-third year of his age, in December, 1542, leaving a daughter, the unfortunate Mary Stuart, only a few days old. James patronized literature and architecture, and is said to be the author of one or two songs yet popular in Scotland.

JAMES I. of England, and VI. of Scotland, the only offspring of Mary, queen of Scots, by her second husband Henry Stuart, Lord Darnley, was born in the castle of Edinburgh, 19th June, 1566. The murder of Darnley took place February 18, 1567, and was followed by Mary's marriage with Bothwell, and her forced resignation of the crown in favour of her son, who was crowned at Stirling on the 29th

of June, 1567, as James VI., being then little more than a year old.

Before his mother's marriage with Bothwell he had been committed by her to the care of the earl of Mar, who had retired with his charge to Stirling Castle. Here he continued to reside during the regencies of the earl of Murray, of the earl of Lennox, of the earl of Mar, and of the earl of Morton. Morton was compelled to resign the regency at Edinburgh, March 10, 1578. Affairs were now nominally administered by the king, assisted by a council composed of twelve of the nobility. The new government, however, soon became unpopular, and Morton contrived to regain his former power. But in the midst of his success the regent was accused by the king's favourite, Esmé Stuart, brother of the earl of Lennox, and Captain James Stuart, afterwards created earl of Arran, of having been accessory to the murder of Darnley. He was immediately committed to prison, and, after trial, executed at Edinburgh, June 2, 1581. The two favourites then became the rulers of the kingdom. In August, 1582, occurred the Raid of Ruthven, the immediate consequences of which were the expulsion of the favourites, and the restraint, amounting to imprisonment, of the king, by the faction headed by the earls of Mar, Gowrie, and Glencairn, Lord Lindsay, and others, for about ten months. At last, having been permitted to go from Falkland to St. Andrews, June 27, 1583, he contrived, with the assistance of some friends, to throw himself into the castle there, and to maintain his position till his enemies gave up the contest. One of the king's first acts after he recovered his liberty was to release Arran, and again to commit to him the management of affairs. Though James had visited Gowrie and granted him a pardon, yet he now caused him to be executed. On the 29th July, 1585, a treaty of intimate alliance was concluded between Queen Elizabeth and the Scottish king, and an annual pension of 5000*l.* was settled by the queen upon James. Through the instrumentality of a new court favourite, the eldest son of Lord Gray, Elizabeth now sought to overthrow Arran. With her connivance, the lords who had been banished on account of the Raid of Ruthven entered Scotland at the head of a force of 10,000 men, in the end of October, 1585. Arran and his late associates were all dismissed from power, he himself being besides stripped of his titles and estates. The new settlement of the government was followed by the conclusion, July 8, 1586, of another treaty offensive and defensive with England.

In October of the same year, the unfortunate Mary, after her imprisonment of nearly twenty years, was at last brought to trial, and on the 8th of February following she was put to death. Between her condemnation and her execution, James made considerable exertions to save her, but was very soon pacified, and continued on the same terms of friendship with Elizabeth as before. Gray, however, who had betrayed James' interest at the English court, where he had been sent to negotiate on behalf of Mary, was disgraced and dismissed.

In 1589, James was married to the Princess Anne, the second daughter of Frederick II., king of Denmark. He proceeded in person to Upsal in

Norway, and did not return to Scotland till May 20, 1590. The first memorable event that then occurred was a daring attempt by his relation, Francis Stuart, lately created Earl of Bothwell, a grandson of James V. by his son John, prior of Coldingham, who collected a force of his retainers, and on the night of December 27, 1591, entered Holyrood House, set fire to several of the apartments, and had nearly made his way to the king's chamber; he failed, but succeeded in making his escape, and fled to the north. Bothwell and all his adherents were soon after attainted in Parliament. In the beginning of 1593, a new conspiracy of Huntly and the other heads of the popish faction was detected; and a few months later, Bothwell, having failed in another attempt to seize the royal person at Falkland, suddenly returned from England, where he had been protected by Elizabeth, and on July 24, 1593, entered the palace with a band of armed followers, and made the king his prisoner. James was obliged both to grant a full pardon to the traitor and to dismiss the Chancellor Maitland and his other chief ministers; and he remained in durance till the beginning of September. Disturbances, however, were again and again excited in the course of this and the two following years by the factions of Bothwell and the popish lords, who, at length joining their forces under the conduct of the earls of Huntly and Errol, encountered the royal army, commanded by the earl of Argyll, at Glenlivet in Aberdeenshire, October 3, 1594, and put it completely to the rout. But in consequence of an expedition into the northern districts, conducted by James in person, the popish lords were forced to make their submission, and allowed to retire beyond seas. Bothwell fled to France, from whence he withdrew to Italy, where he professed himself a convert to popery, and spent the rest of his days in obscurity and indigence.

These commotions had scarcely been quieted when James became involved in new troubles in consequence of a contest with the clergy of the Presbyterian church, which had been established as the national form of religion by an act of the Scottish Parliament in 1592. By an unusual exertion of vigour and firmness James was enabled to crush the insurrection, and to turn the occasion to account in bringing the church into full subjection to the civil authority. In the course of the following year, 1598, the substance of episcopacy, in a political sense, was restored by seats in Parliament being given to about fifty ecclesiastics on the royal nomination. Even the General Assembly was gained over to acquiesce in this great constitutional change.

The most memorable event in the remainder of James' Scottish reign was the very mysterious affair known in history by the name of the Gowrie conspiracy, an attempt to seize the king, by Alexander Ruthven, a younger son of that earl of Gowrie who was executed in 1584.

James at length became king of England by the death of Elizabeth, March 24, 1603. The conspiracy of Sir Walter Raleigh, Lord Cobham, and others, to place on the throne the Lady Arabella Stuart, James' cousin, was the first affair of interest. The next was the settlement of the disputes between the Church and the Puritans. James' first Parlia-

ment met on March 19, 1604. In his speech to the House he zealously urged the union of England and Scotland into one kingdom; but nothing came of this proposal for the present. James, however, of his own authority, now assumed on his coins and in his proclamations the title of king of Great Britain.

Peace with Spain was concluded August 18, 1604. The great event of the year 1605 was the Gunpowder Plot. [FAWKES, GUIDO.] In 1612, the death of James' eldest son, Henry, prince of Wales, in the nineteenth year of his age, spread a general grief through the nation.

The death of Prince Henry was followed, February 14, 1613, by the marriage of James' daughter, the Princess Elizabeth, with Frederick the Elector Palatine. James caused great discontent in the country by the favourites whom he successively encouraged. Of these the chief were Carr, or Ker, earl of Somerset, who married the countess of Essex, and, together with her, was convicted of the murder of Sir T. Overbury; and George Villiers, who, after having been knighted, was created successively Earl of Buckingham, Marquis of Buckingham, and Duke of Buckingham, and who continued to be the first favourite and ruling minister during the remainder of the reign. [BUCKINGHAM.]

In the summer of 1617 James paid a visit to Scotland, and having summoned a Parliament, succeeded in obtaining the assent of that body, and also of the General Assembly, to such regulations as brought the Scottish church very nearly to the model of the English.

The year 1618 was disgraced by the execution of Sir Walter Raleigh. The public indignation at the king's subserviency to the court of Spain was roused to a high pitch by the events of the two following years. Austria, assisted by Spain, attacked the Bohemians, who had chosen the Elector Palatine for their king, and James refused to take part with his son-in-law and the Protestant interest on the Continent, and even to acknowledge his new regal title. In the Parliament which was called in 1621 after an interval of six years, memorable among other things for the impeachment of Bacon [BACON, FRANCIS], the first decided step was taken by the Commons in their contest with the crown by their famous protest, passed December 18, 1621, in reply to the king's assertion that their privileges were derived from the grace and concession of his ancestors and himself,—‘That the liberties, franchises, and jurisdiction of Parliament are the ancient and undoubted birthright and inheritance of the subjects of England.’ This resolution, which the king tore from the Journals with his own hand, was followed by the immediate prorogation and soon after by the dissolution of the Parliament, several of the leading members of the House of Commons being at the same time sent to the Tower or to other prisons. As the public clamour for the recovery of the Palatinate still continued, another Parliament was assembled in February, 1624, which eagerly granted supplies for the attainment of that object by force of arms; war was in consequence declared against Spain, and an army under Count Mansfeldt was sent into Germany in the latter part of the year. But this expedition turned out an utter failure.

James' reign of nearly fifty-eight years in Scot-

land, and rather more than twenty-two in England, was terminated by his death on March 27, 1625.

His children by his queen, Anne of Denmark, born 12th December, 1574, married 24th November, 1589, died 2nd March, 1619, were:—1. Henry Frederick, born at Stirling Castle, 19th February, 1594, died 6th November, 1612; 2. Robert, died in infancy in Scotland; 3. Charles, who succeeded his father as king; 4. Elizabeth, born 19th August, 1596, married to Frederick V., Elector Palatine, 14th February, 1613, died 8th February, 1662; and three daughters who died in infancy.

James I. was a voluminous author; his works have been partially enumerated by Harris, in his ‘Historical and Critical Life,’ and by Horace Walpole, in his ‘Royal and Noble Authors;’ but the fullest account that we have met with is given by Dr. David Irving, in his ‘Lives of the Scottish Poets.’ A collected edition of his works was published in folio, in 1616, by James Montague, bishop of Winchester. The best known are his ‘Counterblast against Tobacco’ and Treatise on Witches. It ought not to be forgotten that the authorized translation of the Bible was commenced and completed under his auspices.

The character of this monarch has been the subject of much critical discussion, the general result of which is decidedly unfavourable. The reader may compare the elder D'Israeli's vindication with the works of Lingard, Froude, Hallam, Mignet, and Agnes Strickland.

JAMES II. of England, and VII. of Scotland, was the second surviving son of Charles I. by his queen, Henrietta Maria of France, and was born October 15, 1633. He was immediately declared duke of York. After the surrender of Oxford to Fairfax in June, 1646, the duke, his younger brother Henry, and his sister Elizabeth, were committed by Parliament to the care of the earl of Northumberland. They continued under his care till April 21, 1648, when the duke made his escape from St. James' Palace, and took refuge in Holland with his sister Mary, princess of Orange. After various adventures and changes of locality, he settled at Paris; and here he chiefly resided till he attained his twentieth year, when he received a command in the French army, and served under Marshal Turenne. The peace concluded with Cromwell, however, in October, 1655, compelled him, with his elder brother, to quit France; upon which he retired to the Low Countries, and entered the Spanish service under Don John of Austria.

At the Restoration (May, 1660) the duke of York returned to England with the king, and was made lord-high-admiral and lord-warden of the Cinque Ports. In September, 1660, he secretly married Anne, the eldest daughter of the Chancellor Hyde. [HYDE.] In promoting the war with Holland he was very active, and assumed the command of the fleet, which he eventually resigned, as well as his office of high-admiral, on the passing of the Test Act, which required all officers, civil and military, to receive the sacrament according to the usage of the Established Church. On November 21, 1673, the duchess of York having died two years previously, he married Mary Beatrice Eleanora, daughter of Alfonso IV., duke of Modena, then only in her fifteenth year.

On November 4, 1677, the duke's daughter Mary, then in her sixteenth year, was, greatly to the public satisfaction, married to her cousin William, prince of Orange.

During the excitement produced by Titus Oates' Popish Plot, in 1678-79, the duke of York, by the advice of his brother, retired to the Continent. While he was absent, the famous bill for his exclusion from the throne was twice read in the Commons, and ordered to be committed, by large majorities, and was only prevented from being passed in that House by the prorogation of the Parliament, May 27, 1679. On his return he became involved in the discreditable affair of the Meal Tub Plot. The share which he had in this business only added to the dislike in which he was held by the great body of the nation, and which was still further increased by the severity of his administration of affairs in Scotland. On again taking up his residence at the English court, he became his brother's chief counsellor, and, much more than Charles himself, the mainspring and director of the conduct of public affairs. To his instigation are chiefly attributed the general attack upon corporations, the executions of Russell and Sidney, and the other violent and despotic acts of the two closing years of Charles' reign. A new exclusion bill which had been brought into the House was twice defeated by the dissolution of Parliament.

On the death of his brother, February 6, 1685, no opposition was made to the accession of James. His first act was to issue a proclamation ordering the customs and excise duties to be paid as usual; he went openly and in great state to the illegal celebration of the mass, and lost no time in sending an agent to Rome to make his submissions to the pope.

He determined, however, to call a Parliament, as he said, simply to humour the English people, he himself being at the same time resolved to make himself independent of its authority, and to dissolve it when it opposed his wishes. In reply to an indirect appeal to the French king, that monarch transmitted to James 500,000 livres, and it was readily agreed, in requital, that the chief obstacle in the way of the seizure by the French king of the Spanish Netherlands should be removed, by the existing treaty between Spain and England being held to have terminated with the death of Charles.

These details of its commencement supply the key-note to the whole course of James' disgraceful reign. The Parliaments of England and Scotland met, and responded with the utmost submission to all the king's demands. While they were sitting, both England and Scotland were invaded, the former by the duke of Monmouth, the latter by the earl of Argyre, both of whom had for some years been exiles in Holland. Argyre, after the dispersion of his few followers, was apprehended and executed at Edinburgh, on June 30, 1685. Monmouth was defeated July 5, in the decisive battle of Sedgemoor, and, being two days after found concealed in a ditch, was brought to London, and delivered to the executioner on the 15th of the same month. The suppression of Monmouth's insurrection was followed by the savage military vengeance of Colonel Kirke, and the more revolting enormities of the western 'campaign,' as it was jocularly called by the king, of Chief-justice Jeffreys.

Among the arbitrary measures next taken by James, on his own individual authority, were—the abandonment of the legal test of conformity with the Established Church, and of the penal laws against Dissenters; the extinction of the liberty of the press; the bestowal of nearly all public employment upon Catholics; the sending of an ambassador, the earl of Castlemaine, to Rome; and the reception of a nuncio from the pope. To some of these measures Parliament offered a feeble resistance, while others were quietly submitted to; but on the publication of a second declaration of indulgence to Dissenters, April 27, 1688, which was commanded to be read by the clergy immediately after divine service in all the churches, Sancroft, archbishop of Canterbury, and six bishops, Lloyd of St. Asaph, Ken of Bath and Wells, Turner of Ely, Lake of Chichester, White of Peterborough, and Trelawny of Bristol, met in the archbishop's palace at Lambeth, May 18, and drew up a petition to the king, representing their aversion to obey the order. For this they were all, on June 8, sent to the Tower, and afterwards, on the 29th, brought to trial before the Court of King's Bench, on the charge of publishing a false, fictitious, malicious, pernicious, and seditious libel, when a verdict of Not Guilty was pronounced by the jury, which was received with acclamations by the whole kingdom. This defeat, however, in no degree checked at the moment the infatuated king. He issued orders to prosecute all those clergymen who had not read his declaration, that is, the whole Church of England, two hundred excepted; he endeavoured to force a Roman Catholic president on Magdalen College, Oxford; and in the midst of this great contest with the Church and the nation, on June 10, a son was announced to have been born to James.

James' son-in-law, the prince of Orange, had not been an unobservant spectator of what was passing in England; and to him the hopes of the English people were now very generally turned. In compliance with the invitation of the heads of the parties in the state, he landed, November 5, 1688, with about 14,000 men, at Torbay in Devonshire. Before the end of that month James found himself nearly deserted by everybody. In the night of December 12, having previously sent over the queen and the young prince to France, he embarked with a single attendant in a boat at Whitehall Stairs, from which he was forced the next day to land at Feversham, and thence returned on the 16th to Whitehall. On the 17th the prince of Orange, having arrived in London, desired James to leave the palace: he proceeded to Rochester, and on the 23rd embarked on board a frigate, and was conveyed to Ambleteuse in Brittany. Thence he repaired to St. Germain's, where Louis XIV. gave him the château of St. Germain's for his residence, and bestowed on him a small revenue.

Meanwhile the English crown was settled upon the prince and princess of Orange as King William III. and Queen Mary. [WILLIAM III. and MARY.] In the beginning of March, 1689, James sailed from Brest, landed at Kinsale, and immediately marched to Dublin, with a small force supplied by the French king. A few weeks after he laid siege to Londonderry, which, however, he was not able to reduce. After various military operations, his cause was

finally ruined by the defeat he received from King William in person at the battle of the Boyne, fought on July 1, 1690. He soon afterwards returned to France, and resided at St. Germain's till his death, September 6, 1701.

By his first wife, Anne Hyde, James II. had eight children, all of whom died young except MARY and ANNE, afterwards queens of England. By his second wife, Mary of Modena, he had James Francis Edward, prince of Wales, styled the elder Pretender, born June 10, 1688, died at Rome, December 30, 1765; one son, Charles, who died an infant; and four daughters. He also left several illegitimate children, the most distinguished of whom was James Fitz-James, duke of Berwick.

The principal portion of the papers formerly belonging to the Stuart family, which were obtained by George IV. when regent, has been printed under the title of 'The Life of James the Second, King of England, &c., collected out of Memoirs writ of his own hand; together with the King's Advice to his Son, and his Majesty's Will. Published from the Original Stuart Manuscripts in Carlton House, by the Rev. J. S. Clarke, LL.B., F.R.S., Historiographer to the King, Chaplain of the Household, and Librarian to the Prince Regent.'

JAMES, GEORGE PAYNE RAINSFORD, a most voluminous and popular writer of novels, was born in London in 1801. His father was a physician. At an early age G. P. R. James commenced authorship by some anonymous contributions to the press. In 1822 he wrote a 'History of the Black Prince,' and in 1825 his first and best novel, 'Richelieu,' which was so favourably received by the world of novel readers that the author soon sent forth a second venture, 'Darnley.' Thenceforth, for a period of more than thirty years, a ceaseless flow of romantic fiction issued from the literary workshop of this prolific novelist. In the reign of William IV. James was made historiographer of Great Britain, a post which he afterwards resigned. The grounds of such an appointment may possibly be found in his 'History of Charlemagne,' 1832, 'Life and Times of Louis XIV.,' 1838, and 'Richard Cœur de Lion,' 1841. He also wrote four of the five volumes in Lardner's Cyclopædia containing 'Lives of Foreign Statesmen.' The principal of his novels, in addition to those already mentioned, are, 'Gipsy,' 'De L'Orme,' 'Philip Augustus,' 'Henry Masterton,' and 'Mary of Burgundy.' In 1850 he was appointed British consul for the state of Massachusetts, and in 1858 consul-general at Venice for the Austrian ports in the Adriatic. In that city he died, 9th May, 1860.

JAMES, JOHN ANGELL, an eminent Independent minister, was born at Blandford, Dorset, in 1785. He studied for the ministry at Gosport academy, and in 1805, at the early age of twenty, was ordained to the pastoral charge of Carr's Lane Chapel, Birmingham, where he remained till his death, October 1st, 1859. He was one of the most celebrated and influential of the nonconformist ministers of his day. He took a prominent part in all religious and benevolent enterprises, and was a most zealous and liberal supporter of educational and missionary schemes; but his most conspicuous service to the cause of religion was rendered by his

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numerous works, which have obtained a vast circulation. His 'Anxious Inquirer' has been translated into all the continental languages, and has probably been more extensively read than any other English work except the Pilgrim's Progress. The jubilee services which commemorated the completion of the fiftieth year of Angell James' ministry in 1855, afforded a striking proof of the estimation in which he was held, not only by his congregation and fellow-townsmen, but by the evangelical clergy of the Church of England and dissenters of all denominations.

JAMES' PALACE, ST., was originally a hospital for lepers, and made by Henry VIII. a sort of adjunct to Whitehall, the Park (which he inclosed) connecting both. Very little of the original palace remains except an ugly gate-tower and a Gothic fireplace. Everything else has been patched up in brick, very barbarously as regards the exterior, though the chief apartments are found to answer better than those of Buckingham Palace for holding drawing-rooms and levees, almost the only purpose to which this building is now applied. The British Court is usually called the Court of St. James'. The park adjoining the palace contains 87 acres, and has during the last few years been so much improved as to render it one of the greatest ornaments of London.

JAMES' POWDER. A diaphoretic medicine, consisting chiefly of antimonious acid and phosphate of lime.

JAMES RIVER. [VIRGINIA.]

JAMES, SAINT, THE EPISTLE OF, one of the books of the New Testament. There are at least two individuals of the name of James mentioned in the New Testament.

1. *James*, one of the apostles, son of Zebedee, and brother of the Apostle John, who was chosen with Peter and John to accompany Christ to the Mount of Transfiguration. He was beheaded at Jerusalem by order of Herod Agrippa, about A.D. 44. He could not have been the author of the epistle, since it bears marks of being written at a later period.

2. *James 'the Less'* as he is called in Mark xv. 40, the son of Alphaeus and Mary, was also one of the apostles.

There is likewise mentioned in the New Testament a James, a brother of Jesus (Matt. xiii. 55; Mark vi. 3), who is generally admitted to be the same person as James the Less, for the Greek word translated 'brother' was often used in the sense of 'cousin.' The epistle is almost universally attributed to this James by the Fathers and modern critics; it was probably written shortly before he was put to death by Ananias the high priest, about A.D. 62 or 63.

JAMESONE, GEORGE, called by Walpole the Vandyck of Scotland, was the son of Andrew Jamesone, an architect, and was born at Aberdeen in 1586. Jamesone and Vandyck were about 1616 fellow pupils of Rubens at Antwerp. When Charles I. visited Edinburgh in 1633, he sat to Jamesone, and presented him with a diamond ring from his own finger. His career is not exactly known, but it must have been a successful one, for he left his wife and family well provided for at his death in 1644; and he bequeathed also much in other directions.

H II

JAN MAYEN, an island in the Arctic Polar Sea, lying between $70^{\circ} 49'$ and $71^{\circ} 9' N.$ lat., and between $7^{\circ} 26'$ and $8^{\circ} 44' W.$ long. It extends from south-west to north-east about 30 miles, and is in no place above 9 miles in breadth. On the northern extremity, where the island is widest, stands the mountain called Beerenberg or Bear Mountain, a snow-capped peak rising to 6870 feet above the sea-level. Even in the beginning of August all the high lands are covered with snow and ice. The coast has several roadsteads with good anchorage in 5 to 10 fathoms water, black sandy ground, but no harbour for a ship. There are foxes and white bears. Water-fowl are numerous. The vegetation is very scanty, and limited to a few plants scattered widely about among the volcanic minerals. The island was discovered in 1611 by a Dutch navigator called Jan Mayen, and was much visited up to about 1640 on account of the great number of whales, which, however, afterwards retreated to other parts of the Arctic Sea. A graphic account of it occurs in Lord Dufferin's 'Letters from High Latitudes.'

JANEIRO, RIO DE, the capital of the empire of Brazil, is situated in $22^{\circ} 54' S.$ lat., $43^{\circ} 9' W.$ long., on the western shores and near the entrance of the Bay of Rio de Janeiro, which extends N. and S. a length of 17 miles, with a breadth of from 4 to 11 miles, and, being inclosed by high hills, forms perhaps the finest, safest, and most capacious harbour in the world. The entrance to the bay, which is about a mile in width, is defended by batteries and fortresses erected on the promontories on each side and on the island of Lagam.

The town extends along the shore about 3 miles on an undulating plain, the highest point of which is crowned with the church of Nossa Senhora da Gloria. The hills which surround the city are composed of gneiss, intersected by veins of granite. Only a small extent of the town stands S. of the hill da Gloria; the principal part is built north of this hill, on a rocky shore opposite the island das Cobras.

Rio possesses no imposing street architecture, but has some good public buildings in the European style. The private houses are not outwardly attractive, but villas in the environs evince great taste, and are rendered extremely lovely by tropical flowers, fruits, and foliage. An aqueduct 7 miles in length brings water to the city, and fountains are numerous. Churches and convents crown the top of almost every hill, but their condition proclaims the relaxed hold of the Roman Catholic faith on the population, which is also very apparent in every part of Brazil. Some have remained unfinished for half a century; others are dilapidated, and not a few are deserted. There are several public institutions for the sick and destitute, a theological seminary, a medical college, several banks, military and naval academies, the college of Don Pedro II., a national university, and the national library, containing 120,000 volumes, chiefly brought over from Lisbon. The English residents also have an extensive and valuable library, and a Protestant chapel, built in 1823.

Rio is so placed as to be deprived of the benefit of the land breeze by a range of mountains, and is exposed to suffocating heat, relieved only by the sea breeze in the middle of the day. The mean temperature of the year is 73.7° Fahr.

Rio de Janeiro contained a population at the last census of 296,136—comprising 77,989 native whites, 36,329 white strangers, 10,722 free coloured, and 78,835 slaves. Most of the inhabitants are engaged in commerce. There are numerous sugar refineries, tanneries, cotton factories, rum distilleries, train-oil factories, and diamond-cutting establishments.

The commerce of Rio is extensive, and on the increase. The principal exports are cotton, coffee, sugar, hides, rice, tobacco, rum, tapioca, ipecacuanha, timber, manioc flour, gold, diamonds, &c. The imports, more than one-half of which in value are derived from Great Britain, and nearly half of the remainder from France, include cotton, woollen, linen, and silk manufactures, wines, ironmongery, flour, meat, fish, butter, spirits, earthenware, paper, &c. The value of the whole in 1863 was 5,582,431*l*. The number of vessels which arrived at the port in the same year was 3000 (496,616 tons), and the departures 2980 (572,780 tons.) These figures are exclusive of the mail steamers from Southampton and Bordeaux. The total value of the exports in 1863 was 5,899,538*l*. The following are the chief articles:—Coffee, 1,350,109 bags of about 160 lbs. each; sugar, 9722 boxes; rum, 2734 pipes; horns, 283,237; hides, 63,944; tobacco, 23,907 packages. The countries which took the largest quantities were Great Britain, France, and the United States.

The British Consul at Rio, in his report for 1865, says that 'the city has progressed enormously in wealth and material improvement during the last twelve or fifteen years; indeed, I may well date that improvement from the final cessation of the African traffic in slaves. The large capital once directed to the barter and sale of human flesh in Africa has been more profitably employed at home; for when once that iniquitous trade no longer offered a safe investment to the men-stealers, the spirit of enterprise, as well as the improvement of the country, more especially of this capital, was commenced, and has ever since been vigorously prosecuted.' Several railways constructed by English labour already connect Rio with the interior, and others are in course of construction. The city also possesses eight steamboat companies, plying daily to various ports situated within the bay; four companies doing provincial coasting service; and the Brazilian Steam Navigation Company, carrying the mails twice a month to all the northern ports as far as Para, and a branch also twice a month to Rio Grande do Sul and Monte Video. The Rio de Janeiro City Improvements Company was established in London in 1862 with a capital of 850,000*l*, for the drainage of the city, and already several thousand houses have been completed.

Rio was first founded as a French colony in 1556, with the name of San Sebastian. It was intended to be the capital of a region to be called Antarctic France, but little more than ten years elapsed before the Portuguese took possession of the settlement.

Near Rio de Janeiro, and connected with it by railway, is the town of Petropolis, which has become important as the summer residence of the emperor, and most of the diplomatic body and the wealthier citizens. It is about 2500 feet above the level of the sea, surrounded with hills covered with the virgin forest. The population is 10,000.

(See Gardner, *Travels in Brazil*; Von Spix and

Von Martins, *Travels in Brazil*; Cazal, *Corografia Brazilica*; Hincheliff, *South American Sketches*; *Consular Reports*; Captain Burton, in *Frazer's Magazine* for 1865-66, &c.)

JANIZARIES, or JANISSARIES, is the name of a Turkish militia, once formidable, but now extinct. The origin of this body dates from the reign of Amurath, or Murad I., who, after having overrun Albania, Bosnia, Servia, and Bulgaria, claimed the fifth part of the captives, from among whom he chose the young and able-bodied, and had them educated in the Mohammedan religion, and for the military profession. Until the death of Solymán the Magnificent, the Janizary body was recruited exclusively from captives, but after that time by enrolment of Osmanlees. By the original laws of their body the Janizaries could not marry; the prohibition was at first evaded, and at last totally disregarded. They were formidable to the government from their numbers and union. They repeatedly mutinied against the sultans, and obliged them to change their ministers, or even deposed them. In more recent times they dethroned Selim; and in the beginning of the reign of the Sultan Mahmood they broke out into a dreadful insurrection which lasted three days. At last Mahmood resolved to abolish them, and issued a proclamation accordingly. A general attack was made upon them in May, 1826, in which about 25,000 are said to have perished. MacFarlane, in his 'Constantinople in 1828,' gives a vivid account of this catastrophe.

JANSENISTS, a sect which appeared in the Roman Catholic Church about the middle of the seventeenth century. They took their name from Janssen, or Jansenius, bishop of Ypres, in France, who published a book entitled 'Augustinus,' certain propositions in which, relating to Grace and Predestination, were decided to be heretical, and were condemned by a bull of Pope Innocent X., in the year 1653, as impious and blasphemous. The doctrine of the Jansenists was somewhat similar to that of Calvin, and they appealed to the writings of St. Augustine as their authority. A great controversy ensued, which caused a schism in the church. The persecutions with which the Jansenists were visited made many fanatics, but the paroxysm subsided after a few years, and Jansenism, as a sect, never afterwards revived, although they still have a few churches at Utrecht and Haarlem.

JANSEN, CORNELIUS, was born at Amsterdam, and lived several years in England. He was employed by King James I., and painted several fine portraits of that king and of his children, as well as of the principal nobility. His colouring is clear and natural; the carnations are soft, and except in freedom of hand and in grace, he was esteemed equal to Vandyck. He died in 1665.

JANSENS, ABRAHAM, born at Antwerp in 1569, was a competitor with Rubens. In colouring he was only inferior to that painter. His compositions are spirited, his drawing correct, his pencil decided, and his draperies natural.

JANSENS, VICTOR HONORIUS, born at Brussels in 1664, was for four years painter to the duke of Holstein, by whom he was sent to Italy, where he took Albano for his model, and became superior in his own style to all his contemporaries.

Most of the palaces and churches of his own country are adorned with his compositions. He died in 1739.

JANTHINA, or IANTHINA, Lamarck's name for a genus of turbinated testaceous molluscs. Cuvier assigns to the *Janthina* a place among his *pectinibranchiate Gastropods*, between the *Pyramidellæ* and the *Neritæ*.

Omitting the anatomical characters of the mollusc, the generic characters may be thus detailed:—Shell ventricose, globular or conoid, very fragile, with a low spire, and the last whorl larger than all the rest together; aperture large, subtriangular, with disunited borders; the columella straight and long, forming the whole of the left border or lip, right border or lip trenchant, and often notched in the middle; colour of all the species hitherto discovered violet, more or less intense. Operculum modified into a vesicular appendage, which serves to suspend the animal at the surface of the water, and which adheres to the posterior and fleshy part of the foot.

Geographical distribution very extensive, the form having been met with in the four quarters of the world, floating on the ocean or driven on the shores by tempests. It has occurred on the coasts of our islands; but there is reason for thinking that it is not to be found in very cold latitudes. In warm climates it is very plentiful.

Examples, *Janthina fragilis* and *Janthina globosa*.

JANUARIUS, ST., a martyr of the Christian faith in the latter part of the third century. Tradition says that he was bishop of Benevento, where he was seized during the persecution of Diocletian and carried to Nola. After being tortured, he was taken to Pozzuoli and put into prison, whence he was forced into a den of lions, by whom being left unhurt his persecutors caused him to be beheaded. His body was carried to Benevento, but removed to Naples by Alexander VI. in 1497. It is still preserved in the crypt of the cathedral in that city, and in a chapel of the same church are also kept the head of the martyr and two phials supposed to contain his blood. Many miracles have been ascribed to the relics: the principal one was the famous liquefaction of the blood annually on the 19th September, the day of the martyrdom, a priestly juggle, which has lately been very fully exposed.

JANUARY, the first month in our present Calendar, was also the first month in the Roman Calendar. It was not the first month in the year in this country till 1752, when the legislature, by an act passed in the preceding year, altered the mode of reckoning time from the Julian to the Gregorian style. At that time it was directed that the legal year, which began in some parts of England on 1st March, and in others on 1st January, should universally be deemed to begin on 1st January. [PERIODS OF REVOLUTION.]

JANUS, in mythological history, is the earliest of the Italian kings, and reigned in Latium, being contemporary with Saturn. Janus, by some accounts, was the son of the sun, and his attributes appear to connect him with sun-worship. He is the porter of heaven; he opens the year, the first month being named after him; he presides over the seasons, whence he is sometimes represented with four heads (Janus Quadrifrons), and his temples in that capa-

city were built with four equal sides, but only one entrance. He is the keeper of earth, sea, and sky; the guardian deity of gates, on which account he is commonly represented with two heads, because every door looks two ways; and thus he, the heavenly porter, can watch the east and west at once without turning. He usually carries a key in his left hand, and a staff in the other. In war times the gates of the principal temple at Rome, that of Janus Quirinus, were always open; in peace they were closed to retain the wars within; but they were shut once only between the reign of Numa and that of Augustus.

JAPAN, EMPIRE OF. A collective name given to an archipelago of islands in the North Pacific Ocean, off the coast of China, consisting of three large mountainous and volcanic islands, Nippon, Kiusiu, and Sikok, and an immense number of smaller ones, among which may be enumerated Sado, Tsousima, Awadsi, Tanegasima, Yki, Yaksima, and Oosima, with the groups Okisima, Gotusima, and Kosikisima. These form Japan Proper. The large and fertile island of Yesso, north of Nippon, and separated from it by the Strait of Sangar or Matsmai, with the southern half of the island of Tarakai, Krafto, or Saghabin, and the larger and more southern of the Kurile group, are included in a dependency, called the province of Matsmai. Taking Japan to include also the dependency of the Loo Choo Islands, it extends from lat. $24^{\circ} 16'$ to 50° N., and long. 128° to 151° E., or covering an area of about 1830 miles by 1800. N. spreads the Sea of Okhotsk, E. and S. the vast expanse of the Pacific Ocean, W. and N.W. the Strait of Corea, the Japanese Sea, and the Gulf of Tartary. The following table sets forth the number of islands which comprise this remarkable and extensive empire:—

Principal Islands.	No. of small detached isles.	Area in geog. sq. miles.
JAPAN PROPER:—		
Nippon, ...	1,269	} ... 87,304
Kiusiu, ...	1,515	
Sikok, ...	526	
Yki, ...	201	
Tsousima, }		
DEPENDENCIES:—		
Yesso, ...	83	20,723
The Kuriles, ...	48	1,412
Saghabin, ...	27	11,194
Boninsima group, ...	89	92
Loo Choo Islands, ...	92	2,010
	3,851	122,735

The population of the empire is variously estimated at from 15,000,000 to 60,000,000. But we know as yet too little of Japan to be able to base our computations on any satisfactory data. Commercial enterprise, however, is the handmaid of geography, and by the labours of our merchants and traders we may reasonably hope in due time to penetrate the mists and shadows which a singularly jealous government has drawn around this mysterious portion of the civilized world.

Physical Aspect, &c.—The largest island, Nippon, or Nippon, whose name has been corrupted into Japan, and is said to signify in Chinese 'Sunborn,'

or 'Land of the Rising Sun,' has a crescent shape, with the curved side turned towards the Asiatic continent. It measures 800 miles from N.E. to S.W., while its breadth varies from 50 miles to 100. Kiusiu, divided from Nippon by a narrow channel, is about 200 miles long from N. to S., and 120 miles broad. Sikok, which lies to the E. of Kiusiu, is 140 miles long by 60 miles broad. The straits to the N. and E. which divide Sikok from Nippon are about 12 miles broad, but so beset with isles and islets that the navigable channel is frequently not more than one mile wide. Yesso is of a triangular form, and its three sides are respectively 300 miles, 260 miles, and 220 miles in length. The Strait of Sangar, about 8 miles wide, separates it from Nippon on the S.E. To the W. lies Sado, between Cape Noto and Russian's Cape: it is supposed to be about 45 miles long and 21 miles to 24 miles broad. The narrowest part of the channel which divides it from Nippon does not exceed 20 miles across.

The coasts are generally rocky, and extremely irregular, being broken up with numerous romantic inlets. They are deficient in good harbours, and from this exposure to frequent typhoons are the scene of numerous shipwrecks. A mountainous chain of considerable elevation traverses the whole insular series in the line of its greatest extent, many of its higher summits remaining clothed in snow for several months, and some throughout the year. In Nippon the highest peak is Fusi, a dormant volcano, 12,000 feet high; but generally the range is sufficiently low to admit of cultivation up to the sources of the waters.

The Japanese islands form a link in that great chain of volcanic action which is carried on from Kamtchatka through the Philippines, Sumbawa, and Java, to Sumatra, and thence, in a north-westerly direction, to the Bay of Bengal. The igneous agency is especially conspicuous in Yesso, Nippon, and Kiusiu, and earthquakes are of common occurrence in all the islands. In Yesso occurs the great volcanic mountain of Fusi-yama, dormant since the year 1707, and rising to the elevation of 14,177 feet above the sea, so as to form the culminating point of the whole empire. It is the *mons excelsus et singularis* (the lofty and singular mountain) of the old traveller Kämpfer, who visited the island in the seventeenth century as physician to a Dutch embassy. 'Poets cannot find words,' he says, 'nor painters skill and colours, sufficient to represent the mountain as they think it deserves.' It forms a magnificent cone, with an extensive truncated pinnacle, and shooting heavenward above all the encircling hills, its snowy crest is visible from Yeddo, a distance of 80 miles. Fusi-yama, the 'Rich Scholar's Peak,' is regarded by the common people as a 'holy place.' They make pilgrimages to it, as the Moslems to Mecca, to ward off the anger of the gods, dressing for the occasion in white vestments, which the priests inhabiting the summit (during the summer months) stamp with various mystic seals and devices. A tradition runs that the volcano rose in a single night from the bowels of the earth, and that a spacious lake was simultaneously formed at Miaw, evidently referring to some great volcanic convulsion.

Several terrible eruptions have occurred in Yesso;

one, in 1783, destroyed twenty-three populous villages; while the volcano of Wauzendake, in Kiusiu, broke forth in 1792, and overwhelmed with floods of lava and torrents of ashes and scorice no less than 53,000 people.

The Japanese mountains present no bare and rugged outlines, being cultivated to their summits, or mantled with shaggy woods. The soil, in volcanic districts, is a rich, black, stoneless mould, several feet in depth, and composed of the detritus of igneous rocks; it has been enriched for several centuries by a constant application of the sewage from the great towns. The principal formations of the islands are trachyte and basalt; hills of sandstone are numerous; and plastic clay, marl, and felspar abound in various localities. The metallic treasures of the empire are considerable, comprising

gold, silver, tin, copper, lead, and iron; both the tin and copper being of superior quality. Coal-measures are found in various districts; sulphur occurs in large quantities; and ambergris is found on the shores. The sulphur is admirably pure, and inexhaustible supplies are procurable at Sulphur Island, an active volcano, off the S. coast of Kiusiu. Hot mineral springs, saline and sulphureous, are largely patronized by the Japanese. The small village of Atami, sequestered in a seaward valley on the S.E. coast of Nippon, possesses so many boiling fountains that the entire locality may well be compared to a gigantic witches' cauldron. From numerous apertures is ejected a vast volume of steam and slightly sulphurous water at a temperature of from 100° to 120° Fahr.

Climate.—In the northern islands the winters



Fusi-yama, from the Suburbs of Yeddo.

are long and severe; the summers short, but intensely hot. Snow lies even in the plains and valleys from November to May. In the southern regions of the empire the climate is not unlike that of France, the extreme heat of the summer months being tempered by the influence of the ocean breezes. The weather is more boisterous, and the general climate colder, on the western than on the eastern coast, for the same reason. In Kiusiu, and the S. of Nippon, the range of the thermometer extends from 29° to 104° , 80° being the summer average, and 35° that of winter. In June, July, and August the rains descend with great violence, dense fogs occur, and typhoons of fearful violence strew the shores with wrecks, and cover the interior with desolation. In lat. 32° N. ice is formed of nearly an inch in thickness, and in lat. 4° obtains such consistency that the rivers may safely be crossed by the pedestrian. Southerly winds are prevalent during the months from March to September, blowing almost with the constancy of a monsoon, as well over the open ocean as over the more secluded waters of the Japanese Sea and the Gulf of Tartary.

Vegetation.—From the semi-tropical, semi-temperate character of its climate, Japan possesses a singularly rich and varied flora. In the N. flourish vast forests of oak and pine; in the S. the sago palm, the tree-fern, the banana, the bamboo, bigonia, and myrtle delight the eye with their graces of form and wealth of colour. The landscapes are also diversified by rich clusters of hydrangeas, camellias, japonicas, and azaleas, which here attain a luxuriance and a beauty unknown in Europe. Amongst the trees which hang their glories on the mountain sides are the chestnut, maple, beech, elm, lime, elder, and

cypress. Japan also possesses a peculiar cedar (*Cryptomeria Japonica*), which borders the high roads with stately avenues, and frequently springs to an altitude of 130 feet. Their upper branches, uniting from either side, constitute a perfect canopy of leafiness. The orange, pomegranate, pear, apricot, and peach, though now common in Japan, and of great excellence, with many other fruits and garden plants are of foreign extraction, and were probably introduced from Corea and China. The camphor tree (*Laurus camphora*), found in most of the forests, occasionally attains to huge dimensions. One, visited by Kämpfer, in the island of Kiusiu, is still standing, and supposed to be upwards of 1000 years old. The lacquer or varnish tree (*Rhus vernificera*) furnishes the gum with which the Japanese heighten the brilliancy of their *papier maché* articles. Hence arose the term *japanning*. The wax-tree (*Rhus succedanea*) yields seeds from which wax for candles is obtained by compression. It thrives best on barren and stony ground, ripens in its eighteenth year, and afterwards declines. Another valuable tree is the paper-mulberry (*Broussonetia papyrifera*), whose bark supplies the paper of which the Japanese make such extensive use. In the south the sugar-cane is successfully cultivated. Rice yields two crops annually, and is the staple food of the majority of the population. Tea of a superior quality is largely grown, and cotton, tobacco, ginger, melons, buckwheat, pumpkins, and cucumbers are also objects of culture; for the industry of the Japanese, like the persevering ingenuity of the Chinese, compels the most ungrateful soil to yield a liberal return.

Zoology.—The bear is said to haunt the woods of Yesso, and in the north of Nippon linger a few wolves

and boars: these, with foxes and hyænas, are the only wild animals that Japan possesses. Those of a tamer class are not very numerous, owing to the great extent of ground occupied by the agriculturist; but some species are protected by the laws, and others by the partial abstinence of the inhabitants from animal food. The stork is as sacred in Japan as in Holland. Deer run freely about the public streets. Buffaloes and zebu abound, but are only employed for draught and burthen. Among the domesticated quadrupeds are horses, sheep, dogs, pigs, and cats. Birds are numerous, and include geese, ducks, teal, pheasants, ravens, larks, pigeons, and pelicans. Snakes are commonly met with, and one species, the *ourabami*, grows to an enormous size. There are also tortoises and lizards, scorpions, centipedes, and other genera of the insect world. The seas and rivers teem with wholesome fish, which form an important article of food both with the upper and lower classes.

Manners and Customs, System of Government, &c.

—We possess as yet no very full or accurate information respecting the Japanese system of government. The nominal head of the state is a spiritual emperor called the *Mikado*, who keeps himself secluded from the vulgar gaze, and, like the Lama of Tibet, is considered of semi-divine origin. Of equal influence and authority is the temporal emperor, the 'Ziogun,' or, as commonly called, the Tycoon, whose office is hereditary, and who represents the central executive power. Yet neither the mikado nor the tycoon appear to engross the whole authority, and the actual government seems vested in a number of feudal and almost independent princes, or 'daimios,' lords in their own right of a more or less extensive territory, over which they exercise an uncontrolled supremacy. Not only, as recent events have shown, are these independent of the central authority, but they even claim the right of removing the tycoon and his ministers. A recent writer, however, asserts that the Mikado has no spiritual character, and that the relation which exists between him and the Tycoon is analogous to that held of old, by the incompetent Merovingian kings of France, and their potent 'Mayors of the Palace.'

The administration of the empire is conducted by two councils of state; the first, called the 'Gorgio,' composed of five members, and the second, or 'Omva-kadouchisri,' of seven members. Over the first council, which may be taken to represent the executive authority, presides the 'gotario,' or chief minister, who, in the minority or during the illness of the tycoon, acts as regent. The 'gotario' is elected by the two councils of state and the principal daimios, from among the latter.

The daimios, according to Sir Rutherford Alcock, are divided into two classes; the first, including those whose annual revenues exceed 7000*l.*, while the 'saimios,' or second class, possess yearly incomes beneath that amount. Each of the first-class magnates is lord within his own territory, like the feudal baron of mediæval Europe, and has power of life and death over all his subjects and vassals. Certain districts only are under the immediate control of the central executive, and their revenues are assigned as a civil list to the mikado and tycoon. As already hinted, the real governing power is in the hands of the

daimios, among whom the greater portion of the land is divided, and who receive seven-tenths of the annual produce of rice. Each daimio must reside six months in the year at Yeddo, and during their absence from that city, their wives and families are held as hostages. They maintain a large number of retainers or dependents; one daimio possessing as many as 40,000, who are as ferocious and lawless as the bodyguard of a mediæval baron. The laws of the empire are most sanguinary in principle, and appear to have been written in blood; but practically they are modified and ameliorated by the discretion of the local magistrates. The most remarkable punishment is that of the 'happy despatch,' or *haru-wo-kiru*, in which the offender becomes his own executioner, by making two cross-cuts on the abdomen with a sword or sharp-pointed knife. Almost all crimes are legally punishable by death; the universal panacea which, in Japan, cures every moral disease. Reformatories are unknown; the improvement of evil-doers is never deemed possible; and the short cut of the headsman's sword severs those Gordian knots of social economy and internal policy which in Europe still puzzle philanthropists and statesmen.

The Japanese are among the most ingenious, industrious, and peaceable people in the world, and their artisans are distinguished by their fertile fancy and exquisite skill. They are excellent workers in metal; there is no piece of foreign machinery which they cannot reduplicate and imitate; their sword-blades are more finely tempered than those of Birmingham or Sheffield; they are equally distinguished as silk-manufacturers and landscape gardeners; adepts in jewellery or in Bramah locks; good builders and road makers, agriculturists and carpenters. In physiognomy they correspond to the Mongolian races, and are probably sprung from them, with an admixture of Malay blood. Their eyes are small, dark, and twinkling; their eye-brows heavy and arched; their complexion varies from a light olive hue to a deep copper; in limbs they are robust and muscular; in stature below the ordinary standard. The men elaborately embroider their persons with tattooed devices of dragons, lions, tigers, and fantastic imaginary objects. They wear a robe of cotton, gauze, or silk, according to their means; it falls down from the neck to the ankles, but is gathered in at the waist with a girdle; the colour is black or dark blue. The women dress more gaily, and plaster themselves with paint and powder; they varnish the teeth with black, dye the lips a brick-red, pluck out every hair from the eyebrows, and cover the face and neck with rice-flour.

John Japan, says a lively writer, is altogether a contradictory and anomalous sort of individual. He is a gentleman with oblique eyes, shaven crown, and yellowish complexion, who arrays himself in gown-like garments, with a fan in his girdle, straw slippers on his feet, and a bamboo hat, half sombrero, half parasol, on his head. When travelling, he carries a cloak made of oiled paper to protect him from the rain, or a straw cape which hangs from the shoulders like the thatch on a stack. He scrambles up his horse, not on one side, but by the animal's breast, and accomplishes his journey on a saddle of wood, or on a little platform, where he sits cross-legged, like a

tailor at his table. His pocket-handkerchiefs are made of paper, there being two sorts in vogue for this purpose—namely, common nose-paper and large nose-paper. He eats various sorts of animal food, from venison to whale, or even a slice of shark; and he is still more catholic in regard to vegetables, for he will luxuriate over a mess of boiled sea-weed. He divides his day into twelve hours, of which six are given to sunshine, and he illuminates the darkness with candles, hollow in the centre, and wicks made of paper. He buys his wife, and marries her in a shroud; permits her to smoke, and to bathe in public. He blisters himself once every six months, whether he is well or ill, and with burning wormwood leaves. And when he shuffles off this mortal coil, he is placed in a sitting posture in a round cup-like coffin, interred in a grave shaped like a well, and mourned by his kinsmen in the whitest of white garments.

Let us walk into a Japanese house, which by law must not be more than 44 feet high, passing without notice the worthy householder who sits in a tub of water at the door, performing his ablutions with a refreshing freedom from bashfulness. You will notice that the floor is slightly raised above the level of the earth, and thickly covered with mats of rushes and rice-straw, elegantly decorated. These mats are used instead of chairs, and there are no tables; but when you take refreshment, you will be provided with a little raised tray. There are no beds; you must sleep upon mats, sit upon mats, smoke upon mats, and fidget upon mats.

Observe that the rooms—which are all on one story—are separated by folding-screens of gilt or coloured papers, and lighted by windows of oiled paper, for glass is unknown. You cannot warm yourself at the fire, for the Japanese build no fire-places; but in the middle of the room you may crouch down on the brink of the square-tiled hole, from which ascend the fumes of charcoal. The said charcoal, we may add, is always burning, and over it a pot of water is always boiling. The Japanese drink tea voraciously; they use little sugar, and serve it up in dainty porcelain cups.

The bath-room resembles European bath-rooms in its general appointments; but it is more frequently resorted to than in our chilly British isles. The men bathe, the women bathe, the children bathe, in-doors and out-of-doors, morning, noon, and night.

Every street in a Japanese town is controlled by its own official, the *Otona*, who is a combination of authorities, being police-inspector, magistrate, registrar, and consul. The citizen cannot remove from one street to another without a certificate of good behaviour from the *otona* under whose government he has been living.

Rendall, in his 'Memorials of the Empire of Japan,' pronounces an opinion on the Japanese character, which seems both impartial and accurate: 'They carry their notions of honour,' he says, 'to the verge of fanaticism, but they are haughty, vindictive, and licentious. On the other hand, brawlers, braggarts, and backbiters are held in the most supreme contempt. The slightest infraction of truth is punished with severity; they are open-hearted, hospitable, and, as friends, faithful to death. It is represented that there is no peril a Japanese will not encounter to serve a friend; that no torture will

compel him to betray a trust; and that even the stranger who seeks aid will be protected to the last drop of blood.'

Religion.—There are several religious orders, hermits, and holy men who give themselves up to a life of prayer and solitude for the mortification of the flesh; and others, like itinerant monks, wander about in a state of mendicancy, dealing in charms and incantations for the cure of disease, the recovery of criminals, &c. Sir Rutherford Alcock states that two sects of the blind exist, founded by two great celebrities in Japanese history; one, by the third son of a mikado, who wept himself blind on the death of his mistress; and the other, by a defeated general in the civil wars, who tore his eyes out that he might not be provoked to take the life of a generous victor. Into these two sects, half-religious, half-secular, persons of all ranks enter. They are generally, but not exclusively, musicians, and maintain themselves by playing on musical instruments.

Engrafted on the Sinto, or ancient religion of the Japanese, which was non-idolatrous, are the two derived from China—Confucianism, Chinese in origin; and Buddhism, which has been imported from India. The former was adopted in the first century of our era, the latter not until the sixth. The Japanese writers assert that the somewhat arid doctrines of Confucius made but slow progress, whereas Buddhism rapidly found votaries, and the most effectual and persuasive arguments were those which spoke of the immortality of the soul and the promises of a future life.

Many of the Japanese temples are of great extent and magnificence. One of the largest and most celebrated in Yeddo is the temple of Asava, situated in one of the most populous quarters of the city. It is also called the temple of Quanonas, the god Quanon of thirty-six arms and a hundred hands, who must be very popular, says Alcock, to judge by the crowding of the thousand idlers, who seem to be never wanting in its vicinity; and who rush through from one extremity to the other to catch a sight of the foreigner, with an uproar as loud as distant thunder. A long avenue intervenes between the outer and inner gateway, and on each side of it are placed stalls or booths forming a vast bazaar of a very mixed character. 'Toys for children occupy a large space; a few little stone models of shrines, idols, tombstones, and temples were the only things I could perceive having the remotest connection with the ascribed sanctity of the edifice adjoining. Trinkets for women—especially metal pins for their hair, and combs, almost the only article they appear to indulge in; and, perhaps, to make up for any restricted use elsewhere, they sometimes carry a forest of these on their heads; pins with hollow glass heads, filled with bright coloured liquids, also seemed to enjoy great favour. The infant windmill, stuffed tigers, and barking dogs, drums and fifes, and miniature swords, bows and arrows, dressed dolls, and masks, kites, and even hoops, seemed to make the staple of the toy booths; so that our common humanity asserts itself even in toys for Japanese children. Of course picture-books and gaudy prints were not wanting; nowhere in Japan apparently, certainly not in Yeddo, is the supply of these deficient.'

In every temple you observe the same stereotyped

features—an altar, an image, chandeliers, paintings, and trumpety decorations of artificial flowers. The same 'bell and book,' priests in their robes and scapulars, acolytes in attendance, and choristers to stand behind the officiating bonze; the same burning of incense; the same reiteration and mumbling of prayers and rituals in an unknown tongue, unknown even to the priest who gabbles them; at other times consisting of three words, incessantly reiterated for an hour without ceasing, 'Amida! Amida! Amida!' the name of the god.

The religious duties of the Japanese consist chiefly in worship at the temples, where they display a very reverent behaviour, and the observance of festivals, pilgrimages, periodical adoration of tutelary divinities, reverence to parents, obedience to magistrates, and offerings at the tombs of their ancestors. For strange as it may appear, considering the general indifference of the Japanese to death, they manifest a peculiar regard for the dead, and the solid and elaborately carved granite monuments in a Japanese cemetery are admirable specimens of architectural taste and skill. Each body is buried in a sitting posture, with the hands folded as if in prayer, and all the coffins are circular in shape.

Principal Cities.—Jeddo, or Yeddo. [JEDDO.]

Miako, an inland city, upwards of 200 miles to the westward, is the ancient and still the titular

capital, as well as the residence of the mikado. It is said to contain 500,000 inhabitants. Its temples are innumerable; its houses of a better class than those of Yeddo, and enriched with blooming gardens. It is the educational centre of the Buddhist priesthood, and has considerable manufactures of carved ornaments and japanned wares.

Osaka, a few miles to the S.W., is one of the ports opened to European commerce by recent treaties. It is a busy and populous commercial centre, on the banks of a navigable river, which is spanned by more than a hundred bridges. Its port, Hiogo, stands on an arm of the Savrada Sea, and possesses several docks and shipbuilding yards. (See Plate.) Osaka is also a fashionable resort of the Japanese nobility, who delight in its splendid theatres, brilliant gardens, and luxurious tea-houses.

The Dutch traders have held commercial relations with the port of *Nangasaki* for upwards of two centuries. It occupies the shore of a large bay, inclosed by pine-clad hills, on the western side of the island of Kiusiu, upwards of 800 miles from Yeddo, and about ten days' steam voyage from Hong Kong. Its manufactures are important, and its foreign trade has attained to considerable dimensions. The climate is very genial. There is scarcely any winter, and in summer the temperature ranges from 60° to 80°.



View of Nangasaki Harbour.

Matsmai, the chief town of Yesso, situated at its southern extremity, contains, it is said, 50,000 inhabitants, and is controlled by a feudatory noble.

Hakodadi, a treaty port on the N.E. of Matsmai, 650 miles from Yeddo, is small and of recent origin, but already growing in commercial importance. In position as well as in aspect it resembles Gibraltar. The winters are extremely cold; the thermometer has been observed to register 18° below zero; the snow lies on the plains till the close of April, and

storms of rain, driven up by the S.E. winds from the Pacific, herald the return of spring. (See Plate.)

History.—The early annals of Japan are shrouded in mysterious obscurity. The empire was unknown to Europeans until discovered by the Portuguese about the year 1452. Christianity was then introduced by the Jesuit missionaries, under the auspices of the famous St. Francis Xavier, but owing to their interference with state affairs, the enterprise termi-

nated in a most tragical catastrophe. A persecution followed of forty years' duration, and was only ended by a sanguinary massacre which left not one Christian alive in the empire.

In 1611, the Dutch contrived to obtain permission to establish a factory at Firands. They were then at war with Spain, and Portugal was at that time under Spanish government; and the Hollanders, by their intrigues, soon contrived to oust the Portuguese from the empire, and monopolize the whole of its foreign commerce. In the reign of Elizabeth, an English mariner, named William Adams, being wrecked on the coast of Japan, was detained a prisoner for life, but obtained such influence over the Tycoon, that he succeeded in opening up a commercial intercourse between Japan and England. For several years the English flag was constantly seen in the Japanese ports, but during the reign of James I. it was withdrawn, and the Japanese ports rigorously closed against all vessels but the Dutch.

European traders remained thus excluded from the commerce of Japan until 1854, when it was thrown open to the great Western Powers by a treaty enforced by the American squadron, under Commodore Perry. At a solemn assembly of the principal state officials, held at Yeddo, in June, 1856, it was decided that the two imperial ports of Nangasaki and Hakodadi should be free to the vessels of all nations for commercial purposes, to refit, reprovise, and establish depôts of coal. To vessels in distress it was agreed that any port should be accessible, on condition that they put to sea immediately the peril was over. But no foreigner was to be allowed to penetrate into the interior without a special license. In 1858 the Americans negotiated a treaty on a much more favourable basis, inasmuch as it provided for a resident minister at the court of Yeddo, and for the opening of the ports of Kanagawa, Nangasaki, and Hakodadi, while the two principal cities, Yeddo and Osaka, were also released from the oblivion of centuries. In the

summer of the same year, the earl of Elgin, on the part of Great Britain, and Baron Gros, on behalf of France, having successfully concluded a mission to the Chinese court, proceeded to Japan, with a powerful fleet, and negotiated a treaty which conferred on European powers the privileges previously conceded to the United States. It was signed in due form at Yeddo, on the 26th of August, 1858. Diplomatic agents were to reside at Yeddo and London, with the privilege of travelling freely to any part of the empire; the three ports already named were opened up to British and French traders, with permission to establish permanent factories and have ground for building. They were also allowed to move unchecked to any point within 30 miles of their place of residence. Cotton and woollen fabrics were to pay a duty of only five per cent. of the declared value on importation. On almost all other articles a duty of twenty per cent. was imposed, and it was agreed that after the 1st of July, 1862, the tariff should be subjected to a general revision.

Though Japan was thus admitted within the potent influences of European civilization, the intercourse between the Western nations and this jealous empire of the East has not flowed freely. Serious differences have arisen owing to the persistent efforts made by the Japanese to render the treaty stipulations inoperative, and the murder of some British subjects by retainers in the service of Prince Satsuma, a powerful and arrogant daimio, led to the bombardment and destruction of his palace, town, and fortifications by a British squadron, under Admiral Kuper. Since that event, and owing in no small measure to the firmness and sagacity of our late representative, Sir Rutherford Alcock, our relations with the Japanese have assumed a more satisfactory character, and a steady increase has taken place in British commerce. Kanagawa is at present the principal trading port.

The commercial intercourse of Japan with the United Kingdom is shown in the subjoined tables :—

Exports from Japan to the United Kingdom.	Quantities.		Value.	
	1860.	1864.	1860.	1864.
Camphor, ... Cwts.	336	—	£2,352	£
Cotton, raw, ... "	—	83,967	—	696,316
Galls, ... "	1,085	1,804	2,984	5,778
Japanned or lacquered ware, ... "	52	172	629	2,958
Oil, train or blubber, ... Tuns	92	159	2,783	7,247
" Seed, ... "	8	102	340	4,341
" Unenumerated, ... Value	—	—	12,400	—
Rags and other materials for making paper, ... } Tons	—	43	—	579
Seeds, rape, ... Qrs.	769	—	2,320	—
Silk, raw, ... Lbs.	87,917	428,474	90,115	467,568
" waste, knubs or husks, ... Cwts.	—	353	—	4,823
Soy, ... Gallons	4,524	300	339	15
Tea, ... Lbs.	5,208	2,434,180	394	159,307
Tin, ... Cwts.	—	2,271	—	12,129
Tobacco, unmanufactured, ... Lbs.	45,386	1,596,968	473	38,891
Wax, vegetable, ... Cwts.	14,704	3,841	46,318	12,172
All other articles, ... Value	—	—	6,064	11,695
Total, ...	—	—	167,511	1,423,819

Imports of British Produce from the United Kingdom into Japan.	Quantities.		Value.	
	1861.	1864.	1861.	1864.
Apparel and haberdashery, ... Value	—	—	£	£3,136
Beer and ale, ... Barrels	52	1,463	213	5,846
Cotton yarn, ... Lbs.	284,000	45,810	14,115	5,955
Cottons, entered by the yard, ... Yards	1,754,300	6,232,348	22,441	187,752
Iron, wrought and unwrought, ... Tons	27	2,006	246	17,617
Lead and shot, ... "	3	834	67	18,338
Linens entered by the yard, ... Yards	8,600	25,724	628	1,342
Machinery and millwork, ... Value	—	—	—	3,922
Perfumery, ... Cwts.	—	—	—	156
Soap, ... "	120	1,026	186	1,281
Spirits, British, ... Gallons	—	5,174	—	655
Tin plates, ... Value	—	—	125	21,541
Woollens entered by the yard (includ- ing those formerly entered by the piece, ...)	Yards	20,146	4,097,819	2,230
All other articles, ... Value	—	—	2,849	53,035
Total, ...	—	—	43,100	627,383

In addition to the above, the imports of foreign and colonial produce and manufactures from Great Britain into Japan were valued in 1864 at 39,609*l*, making the total amount 666,992*l*.

(*History of Japan*, Kæmpfer; Rendall's *Memorials of Japan in the sixteenth and seventeenth centuries*; Commodore Perry's *Narrative of the American Expedition*; Sir Rutherford Alcock, *Capital of the Tycoon*; Sherard Osborne, *A Cruise in Japanese Waters*; Oliphant's *Narrative of Earl of Elgin's Mission*; Siebold's *Japan*; Martin, *Statesman's Year Book*; Blue Books presented to Parliament; *Revue des Deux Mondes*, 1865; *British Quarterly Review*, &c., &c.)

JAPANNING is the art of producing a highly varnished surface on wood, metal, or other hard substance, sometimes of one colour only, but more commonly figured and ornamented. The process has received its name from that of the island of Japan, whence articles so varnished were first brought to Europe; though the manufacture is also extensively practised by the Chinese, Siamese, Birmanese, and other nations of eastern Asia, among whom it was suggested most probably by the possession of a tree, which affords with little preparation a beautiful varnish, exceedingly well adapted for the purpose, and which hardens better than those prepared in Europe. [VARNISH TREE.]

The appearance of japanned work is as various as the taste and fancy of the artists employed upon it. Sometimes it is a plain black or red, with a gilded or painted border; or it is an imitation of marble, of fine grained or rare wood, or of tortoise-shell; sometimes a drawing, with high finish, brilliant colour, and showy patterns; and occasionally fine copperplate engravings are applied to a japanned surface with good effect. In all cases the work is highly polished and varnished.

Japanning is applied to ladies' work-boxes, and work-tables, to toilet-boxes, cabinets, tea-caddies, fire-screens, tea-trays, bread-baskets, snuffers and trays, candlesticks, and a variety of other articles.

The japanning material consists of anime, or copal varnish, mixed with different substances, according to the intended colour of the ground. After being varnished with this mixture the articles are heated in an oven till perfectly dry. In the better class of goods the process is repeated several times to insure a good ground. When thoroughly dry, after the last application, they are painted or gilded as required, after which nothing remains but the finishing. This is a very simple process: the workman chooses a suitable varnish, and passes it over the work with a brush several times, until he judges the coating to be thick enough to bear the polish. It is an important precaution not to begin the varnishing until the preceding work is thoroughly dry, and to dry perfectly each coat before laying on a succeeding one. A hot stove is used in the best establishments to aid in drying the work. When thick enough, the varnish is polished by rubbing it with a rag dipped in finely powdered tripoli or rottenstone. Towards the end of the operation a little oil is also applied to the rag; and the work is completed by rubbing with oil alone, to clear off the powder or any other impurity. In the manufacture of papier mâché the process is very similar to japanning. Lacquering is also done in the same way, but this word is more generally applied to metal articles. In 1864 the imports of japanned or lacquered ware amounted to 408 cwts., valued at 6620*l*. In the same year 235 cwts., value 9118*l*., were exported.

JARASLOV. [YARASLOV.]

JARNAC. [CHARENTE.]

JASHER, BOOK OF, or the 'Book of the Upright,' is twice referred to in the Old Testament as a work of authority. (Josh. x. 13; 2 Sam. i. 18.) Many conjectures have been formed concerning the author and contents of this book; but the work appears to have been lost before the time of the Babylonish captivity. In the year 1751 a pretended translation was published by a printer of the name of Ilive. In 1855 Dr. J. W. Donaldson published a work in which he endeavoured to prove that

none of the books of the Old Testament were written before the time of Solomon, and then only as fragments, which he thinks formed the Book of Jasher, and that these fragments were afterwards worked up into the shape of the existing books, at least as far as the Psalms. This theory was combated by the Rev. J. J. S. Perowne and others, and it has met with but little support either in Germany or England.

JASIONE, a genus of plants belonging to the natural order *Campanulaceæ*. There is only one British species of this genus.

JASMINACEÆ, a natural order of monopetalous Exogens. Only four genera of this order have yet been discovered, the principal being *Jasminum* itself, which consists of a large number of species, found in Europe, Africa, Asia, and Australia.

JASON. [ARGONAUTS.]

JASSA, a genus of amphipodous Crustaceans, established by Dr. Leach.

The general characters resemble those of *Corophium* (Latreille), but differ from them as well as from those of *Podocerus* (Leach), in the considerable size of the hands of the first four feet, which are oval; those of the second pair being the greatest, and armed with teeth more or less numerous on the internal border. Eyes not projecting.

Dr. Leach records two species: one, *Jassa pulchella*, from the south coast of Cornwall, where it was found in the midst of sea-weed; the other, *Jassa pelagica*, found near the Bell Rock, Scotland.

JASSEY, or **YASSY**. [MOLDAVIA.]

JATROPHA, a genus of plants, containing among its numerous species the *Jatropha manihot*, a Brazilian and Guiana plant, the fecula of which forms a well-known nutritious substance called *Cassava*, when prepared in one manner, and *Tapioca* in another state.

JAUNDICE (from *Jaune*, 'yellow') is the name given to those diseases in which the excretion of the bile being prevented, it is retained in the blood, or reabsorbed, and being diffused throughout the system, gives a yellow colour to the skin, and all the other tissues and secretions.

Everything which obstructs the main trunk of the bile-ducts, as gall-stones or other foreign bodies filling its canal, morbid alterations of the liver or duodenum, or of the duct itself, tumours and enlargements of adjacent organs, and inflammation of the liver, will produce jaundice. But the most frequent cases are those which do not appear to be the consequence of any organic disease, but are accompanied by the symptoms of general disorder of the digestive organs, as nausea or vomiting, thirst and loss of appetite, confined or irregular condition of the bowels, headache, and general uneasiness.

It is impossible that any one mode of treatment should be adopted for a symptom depending on such varied causes. Where the obstruction is mechanical, the jaundice is of course curable only by the removal of its evident cause; and in inflammation of the liver it is but a symptom of a more important disease, to which the treatment must be directed. In the more common cases, which, as distinguished from these, are sometimes called functional, the treatment should consist chiefly of small doses of mercury, and active purgatives, containing calomel or neutral salts.

JAVA, one of the Greater Sunda Islands, belonging to Holland, is situated between $5^{\circ} 52'$ and $8^{\circ} 46'$ S. lat., and between $105^{\circ} 11'$ and $114^{\circ} 13'$ E. long. The length is 628 miles; the breadth varies from 40 to 130 miles. The area is estimated at 50,000 square miles. The population is given at 9,943,075, having doubled itself in thirty years.

The shores are washed by the Indian Ocean, the Java Sea, the Straits of Sunda, and the Straits of Bali. The island of Madura, almost close to Java, is 91 miles long, and 31 miles wide in the widest part.

Surface and Soil.—The southern coast in its whole extent is high and steep. It runs in a continuous line, with few indentations, and those not deep. Consequently there are few places which have good anchorage.

The hilly country which is contiguous to the southern coast rises rapidly as we advance inland, and attains towards the middle of the island a mean elevation of more than 1000 feet, where it extends in elevated plains with an uneven or hilly surface. Several ridges traverse this elevated region, having numerous volcanic peaks, some of which attain an elevation of from 10,000 to 12,000 feet. The hilly district contains also some extensive plains and fertile valleys, inclosed by the peaked ridges. This elevated area terminates to the north in rather a steep slope, and between it and the Java sea extends a flat country, which descends imperceptibly from the foot of the hills to the very shores, where it is frequently covered with swamps.

The northern coast is lined by numerous small islands, and marked by many projecting points and headlands. Accordingly the harbours are numerous; and the adjacent seas are navigated by numerous vessels of small tonnage.

The soil of Java is generally deep and rich. The best soils are alluvial, along the beds of the rivers, but the fertility of the whole island is far above the average. Java is watered by numerous rivers, but few of them have a considerable course on account of the comparative narrowness of the island. Five or six are navigable at all times to a distance of some miles from the coast. The rest, in number many hundreds, are used to irrigate the fields. The chief rivers are the Solo and the Kediri, or Surabaya. There are swamps, but no lakes.

In Java, as in other countries between the tropics, the year is divided into a wet and a dry season, and these seasons depend on the periodical winds. Hurricanes are very rare, but thunderstorms are frequent and destructive, and earthquakes are common in the vicinity of the volcanoes.

Though not equal to the Hindus in agriculture, the Javanese are far superior to their immediate neighbours of the other islands. They are well acquainted with the cultivation of rice and other grains, and with the advantages of irrigation. Wheat was introduced by the Dutch, and is cultivated on the more elevated lands. Millet is grown in some places on a limited scale. Among the many esculent roots cultivated, the principal are the yam, the sweet potato, the Java potato, arrow-root, the common potato, artichokes, cabbages, and peas. The Javanese also cultivate cucumbers, onions, capsicums, coconuts, ground-nuts, areca palm, betel, tobacco, coffee, sugar, pepper, cardamoms, ginger, cotton, and great

varieties of dye-stuffs, and fruits. They procure oil from many of their trees, and make toddy from the palm.

Java is the granary of the Asiatic Archipelago, and is supposed to be capable of supporting many times its present population—only about one-third of the surface being yet under culture; its temperature, hot in the plains (ranging from 85° to 94° Fahr.), is cooler in the elevated parts, and the highest peaks are often covered with ice. The climate, except in the marshy regions of the north, is healthy.

There are no elephants, camels, or asses. The horses are of a small breed, but strong, fleet, and well made. Buffaloes are numerous, and of greater use in agriculture than any other animal. Black cattle and goats are common, but sheep and hogs scarce. There are tigers, tiger cats, leopards, jackals, rhinoceroses, and other wild animals, and also crocodiles and serpents. Domestic fowl and fish are very abundant.

Political Divisions, Towns, &c.—The government is administered by a governor-general (who has authority over all the Dutch East Indian colonies), assisted by a secretary-general, and a council of four members, of Dutch descent. Three superior tribunals and courts-martial are seated at Batavia, Samarang, and Surabaya, the whole being subordinate to a supreme court at Batavia. There is complete religious toleration, and Europeans are not prevented from going to Java, though the permission of the governor-general is necessary to their settling there.

Java is divided into twenty-two residences, in each of which are a European governor and secretary, and various sub-residents. These provinces are subdivided into arrondissements and communes, in each of which is a justice of the peace. The most considerable and remarkable towns in the country are on or near the northern shores. *Batavia* is the capital. [BATAVIA.] *Cheribon* is a thriving town, with a good roadstead and 11,000 inhabitants. It is the residence of a Dutch governor, and has a trade in coffee, indigo, teakwood, &c. Population of residency, 550,000. Among the inland towns is *Buitenzorg*, a thriving and well-built town, thirty-five miles from Batavia; it is united to the harbour by a navigable canal; has government buildings, and the hotel of the governor-general. *Samarang*, a fortified seaport on the northern coast, the capital of a province, near the mouth of the river of the same name, 210 miles E.S.E. Batavia. The population numbers 22,000, including many Chinese. The harbour is not good, and the town is unhealthy from contiguous morasses. Coffee, pepper, and rice are produced in the adjacent country. It is the residence of the Dutch governor, and the seat of one of the three principal law-courts in Java. Population of residency, 550,000. *Surabaya*, or *Sourabaya*, has an excellent harbour, a flourishing trade, and 130,000 inhabitants. It is situated in lat. 7° 12' S., long. 112° 44' E., has a government house, a mint, and large store-houses. The harbour is defended by many forts and batteries, and is the best in Java; there are also shipbuilding docks, an extensive iron floating dock, capable of containing ships of the greatest burthen, a naval arsenal, and a cannon foundry.

All the preceding towns are in the Dutch possessions. There are several native states in the interior under Dutch protection. The residency of *Soerakarta*, or *Souracarta*, contains a total population of 400,000. The capital town of the same name, on the river Sols (which it is also sometimes called), has a garrison, a fort, and 100,000 inhabitants. *Yugyacarta*, or *Iocjocarta*, is a large and populous town, 60 miles south of Samarang, and the capital of a native sultan. In the eastern district of this territory is the fertile plain of Kediri. *Soerabaya* is the capital of a residency of the same name, on the north-eastern coast, and was formerly the residence of the governor of East Java. The town is on the strait of Madura, has 60,000 inhabitants, shipbuilding yards, and a fort. Population of residency, 970,000.

Inhabitants.—The natives of Java belong to the widely-spread race of the Malays. They are short, thickset, and robust. The religion is Mohammedanism, modified by Buddhism. Three different dialects of the Malay language are spoken on the island, but they have also an ancient sacred language, called Kawi, which contains a great number of Sanscrit words. The Javanese have a native literature, which, however, is not rich. They have also translations from the Sanscrit and Arabic. In civilization the Javanese are much superior to all other nations who inhabit the Indian Archipelago. They show skill in manufactures of cotton, silk, and shipping.

Java is extremely well adapted for an extensive commerce. The island itself is rich in productions, and its northern coasts, which are accessible to vessels all the year round, lie opposite the richest countries of Asia. Besides this, the Dutch government has made it the centre of all the trade which Holland carries on with its extensive settlements in the Indian Archipelago. Hence the transmission of native produce to other countries, and the importation of foreign commodities, are both very large. The imports comprise cottons, woollens, and other manufactured goods, wines, spirits, iron, hardwares, machinery, opium, and articles of luxury. The commerce is chiefly carried on by the Dutch East India Company, and the Netherlands absorb fully five-sevenths of the whole. Batavia is the centre of at least half of the general trade. The exports of Java produce, except to Holland, are comparatively trifling, caused by the restrictive duties charged on them when shipped to any other country. The chief articles are sugar, tea, coffee, indigo, rice, hides, tobacco, oil-cake, &c.

The total value of merchandise and specie imported into Java is nearly 4,000,000*l.* per annum, and that of the exports 4,500,000*l.*; almost the entire trade being with the Netherlands. In 1864 the exports from Java to the United Kingdom were valued at 16,749*l.*, consisting chiefly of rice and pepper. The value of British produce and manufactures imported into Java in the same year was 796,850*l.*, the principal articles being cotton and woollen goods, copper, iron, earthenware, and machinery.

Public improvements have of late years been much extended. A good road traverses the island in its entire length; many forts have been constructed in the interior; commercial stations planted in the

southern part of the island; and regular steam communication is kept up with Singapore.

Since 1833 the finances of the colony have been very prosperous, and upwards of 30,000,000*l.* were transmitted to the Netherlands from 1838 to 1863. In thirty years the annual revenue has risen from 2,500,000*l.* to 9,500,000*l.*, and the value of the exports in almost exactly the same ratio, being now about 9,000,000*l.* per annum. The marked prosperity of the island is due to the amazing industry with which the Dutch have promoted the growth of those articles to which it is specially adapted. Slavery was abolished in Java on September 20, 1859.

History.—Java was under Hindu sovereigns till 1478, when it was conquered by the Arabs. It contains the ruins of several considerable cities and temples, the principal being Mojopahit, the former capital of Java, and Boro-Budor, and various large structures of considerable architecture are scattered over the island. It is presumed that the Hindus settled here at an early period, Hindu monuments of antiquity being found.

The Portuguese reached Java in 1511, and soon after began to form small settlements. The Dutch established themselves at Bantam in 1575, and in 1602 the English erected a factory at the same place, which was the first possession of the English in the East Indies. But the English, as well as the Portuguese, were soon obliged to give way to the Dutch, who built the town of Batavia, and by degrees enlarged their dominion, until they succeeded, about the middle of the last century, in dividing the empire of the Susuhunan into two parts, and appropriating the greater portion of it to themselves. When Holland was united to the French empire, the British took possession of the island in 1811, but restored it to the Dutch, after the fall of Bonaparte, in 1816.

(See Junguhn's *Java*; Craufurd, *Dictionary of the Indian Seas*; Temminck's exhaustive work on the Dutch East Indian colonies, *Les Indes Néerlandaises*; D'Almeida, *Life in Java*; Sir J. Bowring, *Fortnightly Review*, January, 1866, &c.)

JAVELIN, among the classical ancients, a spear-like missile used both by the cavalry and infantry. It was sometimes five feet in length, and in a charge was darted at the enemy, often with destructive effect.

JAXT, or *Jagst*, a circle of Würtemberg, bordering N.W. on Baden, and N. and E. on Bavaria, has an area of 1986 square miles, and a population of 414,904 in 1861. The chief town is *Ellwangen*, a small place of 3000 inhabitants. The principal rivers are the Jaxt, from which it has its name, the Kocher, and the Rems. The greater part of the possessions of the princes of the House of Hohenlohe is situated in this circle. Besides Ellwangen the most important towns are—*Hall*, an ancient and picturesque town, situated on the Kocher; population, 6600. It is 35 miles from Stuttgart on the rail to Heilbronn; was formerly a free imperial city, inclosed by walls; and has seven churches, a town hall, endowed college, mint, hospital, two public libraries, and several sugar refineries. There are also soap and other factories, and a trade in oxen, hogs, and salt from the neighbouring springs, which yield 175,000 cwt*s.* annually. *Schorndorf*, a walled town, with a royal castle, near the Neckar, has carpet and tobacco factories and 3815 inhabitants; *Gmünd*,

a manufacturing town farther E., on the south bank of the Neckar, with 7000 inhabitants; and *Oehringen*, N.W. of Hall, the residence of the princes of Hohenlohe Oehringen; population, 3106.

JAY. [*Corvidæ.*]

JAYADEVA, a celebrated Hindu poet. The only extant poem of Jayadeva is entitled '*Gita Govinda*;' that is, 'the poem in honour of Govinda,' one of the names of Krishna, whose love for Râdha is described in a glowing and voluptuous manner. An English translation of '*Gita Govinda*' was published by Sir William Jones in the third volume of the '*Asiatic Researches*.'

JEAN or **JOHN II.**, son of Philip of Valois and Jeanne of Burgundy, ascended the throne of France upon his father's death in 1350. At the beginning of his reign he invited King Charles of Navarre to an interview at Rouen, and there arrested him, and put to death several lords of his suite. The brother of Charles applied to Edward III. of England for assistance. In 1355 Edward sent his son the Black Prince into France, who, after ravaging several provinces, was met by King John near Poitiers, with 80,000 men, the English being only 10,000 in number, on September 19, 1356: the French were completely defeated, and John was taken prisoner and conducted to London. Meanwhile the citizens of Paris revolted against the Dauphin Charles, and soon afterwards the peasants, or serfs, broke out into insurrection, with circumstances of frightful atrocity. This servile war, called *La Jacquerie*, lasted during the years 1357 and 1358, until the dauphin with a large force fell upon the peasants and massacred them by thousands. In May, 1360, peace was concluded at Bretigny between France and England, Edward giving up his claims to Normandy and France, and assuming the title of sovereign lord of Aquitaine, with the consent of the dauphin, who promised to pay a large ransom for his father. John was then restored to liberty; but he found so great an opposition among his nobles to the fulfilment of the conditions of the treaty, that he returned to London, where he took up his old quarters in the Savoy. He died in London, in April, 1364, and was succeeded in France by his son, Charles V.

JEAN-D'ANGELY, ST. [*CHARENTE-INFÉRIEURE.*]

JEAN-DU-LUZ, ST. [*PYRÉNÉES, BASSES.*]

JEAN-PIED-DE-POR, ST. [*PYRÉNÉES, BASSES.*]

JEDBURGH. [*ROXBURGHSHIRE.*]

JEDDAH, or **JIDDA**, a city of Arabia, situated on the east coast of the Red Sea, near Mecca, and a great entrepôt for foreign commerce. It has rendered itself notorious for the savage butchery of the Christian residents, including the English and French consuls, for which ample retribution was exacted by the bombardment of the town, and the public execution of eleven of the murderers. Although the resident population does not usually exceed five or six thousand, the number is usually increased by the influx of strangers on their pilgrimage to Mecca. Its public buildings are but of a mean description. The governor's house, a small castle with nine or ten guns, five mosques, and a few handsome Khans, are all that claim attention. The town, however, is one of the holy places of the

Mohammedan faith, and its sanctity is increased by the reputed tomb of Eve being in the neighbourhood. 'The caravans of Mecca,' says MacCulloch, in his 'Geographical Dictionary,' 'start daily; those to Medina, every forty or fifty days; the trade in grain is monopolized by the Egyptian government. Twice at least in every year Djidda is inundated with inhabitants, viz., on the arrival of the Indian fleet (about May), when merchants from all quarters pour in to purchase at the first hand; and during the hadj, when pilgrims come from all the African ports in vast numbers. In 1831 above 20,000 pilgrims landed either at Djiddo or Yembo, but mostly at the former. There is no manufacture in the town. Everything, for use as well as for consumption, is imported, and the occupations of the poorer as of the richer inhabitants consist almost exclusively of barter.'

JEDDO, or YEDDO. (Lat. 35° 40' N.; long. 139° 40' E.). The residence of the Tycoon, and the metropolis of the empire of Japan, is situated on the south-east side of Nippon, at the upper extremity of an inlet 20 miles long, which forms its harbour; a harbour equally capacious and secure, owing to the narrowness of its entrance, and the number of small islands which break the roll of the Pacific. The actual port is at Kanagawa, 16 miles nearer the mouth of the inlet, where the British consul resides. The establishments of the foreign merchants are planted at Yokohama, a neighbouring town, which has a quay and pier of granite.

The city of Yeddo probably stands second only to London in point of population and extent. It lines the shores of the inlet for about 10 miles, and extends 7 miles inland, but a considerable area is devoted to gardens and orchards. Long lines of booths enliven the streets, where a kind of daily bazaar is held for the sale of gaudily-coloured prints, maps (many of them copies of European charts), story-books, swords, tobacco pouches, and pipes for the humbler classes; and in the midst of which a fortune-teller may usually be seen, surrounded by a crowd of credulous listeners. Something very like the gambling table of our English fairs may also be seen in the same spot; but, judging by the stock in trade and the juvenile customers, the gambling would seem to be only for sweetmeats.

A fine view is obtained from the summit of a hill called Atango-gama, so called from the god Atango, to whom a temple is dedicated there. The picture that from this point breaks suddenly upon the traveller is very striking. The hill fronts to the bay, but with a couple of miles of valley intervening, thickly covered by streets and temples. To the left, and in a north-eastern direction, another 10 miles' interval of plain is in like manner filled up with a dense mass of houses, until the eye reaches a range of heights crowned by the Tycoon's castle. The whole *enceinte* of the official quarter, within a triple line of moats, is there, not only the official residence of his court, but the palaces of the feudatory daimios. This range excludes a still more extensive view of the city, which stretches away into the country on the other side, and may be traced from the point where the spur of the hill ends abruptly towards the bay, winding round the edge of the coast-line, and backwards up the valley, until it fades away in the remote distance. Behind, a broken series of hills and dales,

diversified by groups of temples, conceals yet another large quarter of the capital; a daimio's residence and park, or a few streets, spreading over the crests and straying into the hollows. Seaward the eye looks out upon the point which conceals Kanagawa; and across the line of batteries a couple of miles from shore, on to the distant edge of coast and mountain, some two or three leagues off, which forms the boundary on the hither side.

Fair to look on, says Alcock, is the capital of the Tycoon, thus nestled in a broad valley, girdled with green woods and crowned by undulating hills, sloping with a gradual descent to the edge of a bay, into which the Pacific seeks in vain to pour its stormy waters. Nature has barred the entrance with a breakwater of volcanic islands and verdurous headlands on either side. And to make it more secure, she has shoaled the whole gulf, so that five miles from the city it is difficult to find anchorage for a vessel drawing 20 feet—the best of all defences against assaults from without, whether the elements or a hostile fleet be the enemy.

The most populous part of the city is intersected by the river Okawa, which is spanned by a great central bridge. From thence are measured all the distances throughout the empire. Public baths are numerous and well frequented. In the suburbs tea-houses and gardens abound. There are shops for books, bronzes, lacquer goods, copperware, basket-work, mosaics on wood, paper, and old clothes. The houses are almost all one story high (a precaution against earthquakes), and of wood, which is the cause of numerous destructive fires. The Tycoon's palace crowns the highest hill (1200 ft.), and is surrounded by a triple moat. The residences of the daimios are of enormous extent, sometimes a quarter of a mile in length, in order to accommodate their crowds of retainers. These feudal barons are 264 in number, and have incomes which range as high as a million *kokoos*, or measures of rice, each *kokoos* being worth about 13s. 10d. in British money. The population of Jeddo was estimated in 1863 to be 1,700,000, comprising 572,840 merchants and artisans; the daimio's army, 25,000; the Tycoon's attendants, priests, monks, nuns, travellers, &c., 180,000.

JEEJEEBHOY, SIR JAMSETJEE, Bart., a famous Indian merchant and philanthropist, born at Bombay, 15th July, 1783. Although his parents were poor he received a good education, and having shown a special aptitude for mercantile pursuits, he at an early age became partner in business with his father-in-law, Framjee Nusserwanjee. His skill and enterprise were soon manifested in extensive and successful speculations in the produce of various countries, and in the prosecution of business he had made many long and hazardous voyages before he had completed his twenty-fourth year, when he became principal partner in the firm. Ere he had been twenty years in business, and when still young, he had amassed an immense fortune, which, instead of expending in personal display and luxurious gratification, he resolved to devote to the good of his less fortunate fellow-men. He expended vast sums on benevolent institutions and works of utility connected with his native city. Exclusive of private charity it has been computed he bestowed between the years 1822 and 1858 not less than a quarter of

a million sterling in the foundation, endowment, or support of undertakings of a benevolent character. Munificence so unprecedented did not escape the notice of her majesty Queen Victoria, who, as a mark of her esteem, conferred on him the honour of knighthood, the first instance of its being bestowed on an Indian subject. Other honours followed, and in 1857 he was made a baronet of the United Kingdom. In 1843 the queen sent him a gold medal set in diamonds. He died April 15, 1859, and was succeeded in the baronetcy by his eldest son, Cursetjee Jamsetjee Jeejeebhoy, who, while on a visit to this country in 1861, received signal marks of respect from the most distinguished personages and corporate bodies.

JEFFERSON, THOMAS. Thomas Jefferson was born April 2, 1743, at Shadwell, now in the county of Albemarle, in Virginia. He was educated at the college of William and Mary, at Williamsburg, then the capital of the colony, where he studied mathematics, ethics, and other branches of knowledge. In addition to his general acquirements, he made himself well acquainted with the best Greek and Latin writers, and to the end of his long life retained his ability to read them. Mr. Jefferson studied law under Mr. Wythe, then a lawyer of eminence. He made his first appearance at the bar of the General Court in 1767, at the age of twenty-four, about two years after the misunderstanding between Great Britain and the Colonies had commenced. He practised for seven or eight years in the General Court, when he was called away to more important duties by the political events that preceded the American Revolution. In 1769 he was elected a member of the House of Burgesses for the county of Albemarle. In the session of this spring the House unanimously came to resolutions in opposition to those which had been lately passed in England by both houses of Parliament on the affairs of Massachusetts.

In 1773, on the meeting of the Virginia Assembly in the spring, Mr. Jefferson was an active member in organising the Standing Committee of Correspondence and Inquiry, the main objects of which were to procure early intelligence of the proceedings of the British Parliament, and to maintain a constant communication among all the colonies.

On the 21st June, 1775, Mr. Jefferson took his seat in the General Congress, as one of the delegates from Virginia, and was appointed one of a committee for preparing a declaration of the cause of taking up arms. A part of the address which he drew up was finally adopted. In 1776 Mr. Jefferson was again a delegate to Congress, and one of a committee appointed to draw up a declaration of independence. Before it was shown to the committee, a few verbal alterations were made in it by Dr. Franklin and Mr. (afterwards President) Adams. After being curtailed about one-third, and receiving some slight alterations in the part retained, it was agreed to by the House, July 4, and signed by all the members present, except one.

From this time Mr. Jefferson's public life is interwoven with the history of the United States. He was governor of Virginia in part of 1779, 1780, and part of 1781, in which year the state suffered considerably from the incursions of Lord Cornwallis; and at the close of his period of office he narrowly

escaped being taken prisoner by Colonel Tarleton in his own house at Monticello, in the county of Albemarle.

In May, 1784, Mr. Jefferson was appointed by Congress minister to France, where he remained five years. His industry and methodical habits enabled him to devote a great deal of his time to the examination of everything that could prove beneficial to his countrymen.

He returned to America at the close of 1789, and in the next year he was appointed secretary of state by the president, General Washington. This office he held till the end of 1793, when he resigned. From 1793 to 1797 he lived in retirement. In 1797 he was elected vice-president of the United States, and in 1801 was chosen president, in place of Mr. Adams, by the House of Representatives, on whom the election devolved in consequence of the equal division of the electors' votes between Mr. Jefferson and Colonel Burr. He was elected a second time, and after fulfilling his term of eight years retired to his favourite residence at Monticello.

The nation was indebted to Mr. Jefferson's administration for the acquisition of Louisiana from the French for 15,000,000 dollars, and with it the free navigation of the Mississippi. Mr. Jefferson himself thought that the most important service which he rendered to his country was his opposition to the federal party during the presidency of Mr. Adams, while he was himself vice-president of the United States. His own administration was characterized by unwearied activity in the promotion of all those measures which he believed to be for the general welfare. He never allowed considerations of relationship or friendship to bias him in the selection of proper persons for offices; he always found, as he says, that there were better men for every place than any of his own connections.

The last years of his life were spent in retirement. But he continued his habits of early rising and constant occupation; he maintained an extensive correspondence with all parts of the world; received at his table a great number of visitors; and was actively engaged in the foundation of the University of Virginia, which was established by the state of Virginia, near Charlottesville, a few miles from Monticello. Though often baffled, he finally succeeded, by the help of his friends in the Virginia Legislature, in obtaining ample grants for the buildings, library, and the salaries of the professors.

He died July 4, 1826, just half a century after that day on which the Declaration of Independence was signed. Mr. Adams died on the same day. Mr. Jefferson is buried in the grounds near his own house. A simple inscription, which was found among his papers after his death, recording him as the author of the Declaration of American Independence, of the Statute of Virginia for Religious Freedom, and Father of the University of Virginia, is placed on his tomb. The fact of his having been president of the United States is not mentioned.

The latter days of Mr. Jefferson were embittered by pecuniary difficulties, which were owing in some measure to the neglect of his estates during his long absence on the public service; and in a great degree to an obligation which he incurred to pay a friend's debts.

When Mr. Jefferson was a member of the colonial legislature, he made an effort for the emancipation of slaves; but all proposals of that kind, as well as for stopping the importation of slaves, were discouraged during the colonial government. The importation of slaves into Virginia, whether by sea or land, was stopped in 1778, in the third year of the Commonwealth, by a bill brought in by Mr. Jefferson, which passed without opposition, and, as Mr. Jefferson observes, 'stopped the increase of the evil by importation, leaving to future efforts its final eradication.'

Mr. Jefferson married, in 1772, Martha Skelton, the widow of Bathurst Skelton. She died ten years after their marriage. One daughter, and a numerous family of grandchildren and great-grandchildren survived him.

JEFFREY, FRANCIS, an eminent Scotch judge and critic, was born at Edinburgh, 23rd October, 1773, and was the son of Mr. George Jeffrey, one of the depute-clerks of the Court of Session. He was educated at the High School of Edinburgh, from which he passed in 1787 to Glasgow College, where, under the able training of Professors Young and Jardine, his talents began to develop themselves with great brilliancy. In September, 1791, Jeffrey went to prosecute his studies at Oxford, which he quitted with great delight after a residence of only nine months, shocked at the dissipation and idleness which then prevailed in that seat of learning. In 1792, on his return to Edinburgh, he entered the Speculative Society, a step which brought him into close and familiar contact with Sir Walter Scott, Brougham, Horner, the marquis of Lansdowne, Charles and Robert Grant, and other master spirits of the age. He was called to the bar on the 16th of December, 1794. At this time he joined with Sidney Smith, Horner, and others, in establishing the *Edinburgh Review*, of which he continued sole editor for twenty-seven years, and by his labours undoubtedly established in England a new school of criticism. His professional progress was for some years very limited. The effect of his talents and industry was counteracted by certain unpopular peculiarities of manner, and by his political opinions, which at that period were in bad odour among both the middle and upper classes of society. 'Willing and waiting to work, but idle from want of employment,' he had frequent fits of depression and discontent. At one time he had thoughts of abandoning the law and settling in London 'as a grub;' and a little later he was anxious to obtain the chair of moral and political science in the College of Calcutta. In the midst of all his discouragements, however, he married in 1801 Miss Catherine Wilson, daughter of Dr. Wilson, professor of church history at St. Andrews, though the lady had no fortune and Jeffrey's professional income did not exceed 100*l.* a year. In 1804 he had the misfortune to lose his father and brother, together with his amiable partner—a blow which sunk deep into his heart, and made him, he says, 'inwardly sick of life.' Up to this period—though he had been nine years in practice—his professional income was only 240*l.* a year. Now, however, his prospects began to brighten, and he gradually won his way to the foremost rank in all the courts, civil, criminal, and even ecclesiastical. About the close

of the year 1813 Jeffrey married a second time. The object of his choice was an American lady, Miss Charlotte Wilkes, grandniece of the celebrated John Wilkes. Lord Cockburn says that almost the whole happiness of Jeffrey's future life flowed from his union with Miss Wilkes, and speaks in strong terms of the natural and cheerful pleasure which she diffused round her husband and his friends. In 1820, after a keen contest, Jeffrey was chosen lord rector of the University of Glasgow, an honour of which he was justly proud; and in 1829 his brethren of the bar elected him their dean, the highest distinction of the kind that can be conferred in Scotland. Immediately after his elevation to this office he withdrew from the management of the *Edinburgh Review*. In the following year the long reign of the tory administration terminated, and a whig government was formed under Earl Grey. Jeffrey, as indisputably the first Scottish lawyer of the party, was appointed lord-advocate, an office which he accepted with reluctance. A few weeks after his elevation he was elected member for what were termed the Forfarshire burghs, but was unseated on petition, and found refuge in Lord Fitzwilliam's burgh of Malton. He represented this place till after the passing of the reform bill, when he was returned, in 1832, by the Scottish metropolis, which he had unsuccessfully contested in 1830. As a speaker he can scarcely be said to have succeeded in the House of Commons. Jeffrey's parliamentary career lasted only about three years and a half. The most important measures connected with it were the Scotch reform bill, and the bill for the reform of the burghs of Scotland, both of which he prepared and carried through. The death of Lord Craigie caused a vacancy in the Court of Session, and Jeffrey was elevated to the bench in 1834. The remainder of his life was passed in the quiet discharge of the duties of his judicial office. He died on the 26th of January, 1850, in his seventy-seventh year. Mrs. Jeffrey survived him only a few months. Their only child was married to Professor Empson of Haileybury College.

Further details of this distinguished man's career will be found in Lord Cockburn's interesting 'Memoir,' whose perusal will impress the reader with a high opinion of the excellence of his character and the charms of his society. His wit was genial and sparkling; his play of fancy felicitous and inexhaustible. Of unimpeachable integrity, high and daring spirit, a delicate sense of honour, a generous temper, and a benevolent disposition, he was no less loved by his friends, than as a writer and man of letters he was admired by the public.

JEJUNUM. [INTESTINES.]

JELALPOOR, a town on the right bank of the Jhelum, in a fertile valley of the Punjaub, in lat. 32° 40' N., long. 73° 26' E. Here is one of the fords over the Jhelum, on the route from Afghanistan to Hindustan. It is a point of dispute whether here or higher up at Jhelum, was the scene of the battle between the forces of Alexander the Great and Porus.

JELLALABAD, a town of Afghanistan, in a fertile plain near the Cabool river, 78 miles E.N.E. of Cabool, on the route to Peshawur. It is famous for the heroic and successful resistance made here by the British troops, under Sir Robert Sale, in 1841-42. Its defences were destroyed at the British

evacuation of Afghanistan, in 1842. The stationary population is probably only about 3000, but it is greatly augmented in winter.

JELLY-FISH. [CILIOPODA.]

JEMAPPES. [HAINAULT.]

JENA, a town in the Grand-Duchy of Saxe-Weimar, is situated on the Saale, over which there is a stone bridge of nine arches, in 50° 56' N. lat., 11° 37' E. long. The ramparts and moats which formerly surrounded the town have nearly disappeared. Jena is the seat of a supreme court of appeal, and of several learned societies. It is, however, chiefly celebrated for its university, which was founded in 1557, and has a library of 100,000 volumes. There are in connection with it a botanic garden, a veterinary school, a school of midwifery, an anatomical theatre, a clinical institution, a collection of physical and mathematical instruments, a cabinet of minerals, an observatory, &c. It is the university of the whole of the Saxon states, and is supported by contributions from them all. Its income is nearly 6000*l.* per annum; and an academic honour obtained at it is much prized throughout all Germany. The population of the town in 1861 was 6984. Jena has acquired celebrity from the disastrous defeat of the Prussians by the French which took place near it on the 14th of October, 1806. [AUERSTADT; BONAPARTE.]

JENNER, EDWARD, the discoverer of vaccination, was born at Berkeley in Gloucestershire, on the 17th of May, 1749. He was the third son of the Rev. Stephen Jenner, vicar of Berkeley. At eight years of age Jenner was sent to school at Wootton-under-Edge, under the Rev. Mr. Clissold, and was afterwards placed at Cirencester, under the tuition of the Rev. Dr. Washbourne, where he received a respectable classical education. On leaving school he became the pupil of Mr. Ludlow, an eminent surgeon at Sodbury, near Bristol. His apprenticeship having terminated, he proceeded to London, where he prosecuted his professional studies under the immediate superintendence of John Hunter, in whose family he resided for two years. There can be no doubt that the intimacy which sprang up between the master and pupil, and which continued until Hunter's death, exercised a powerful influence on Jenner's subsequent career. The love of natural science, which with him was almost an instinct, was fostered and quickened into the highest degree of life and energy by the example and teachings of Hunter, who had already commenced the formation of that magnificent museum which forms the lasting monument to his fame. It was in such a field that Jenner's powers were cultivated. He became an expert practical anatomist, a careful and observant experimenter, a sound pathologist, and a finished naturalist. During the time of Jenner's residence with Hunter, in the year 1771, Captain Cook returned from his first voyage, and Jenner was recommended by Hunter for the service of arranging and preparing the specimens of natural history which had been collected by Sir Joseph Banks. The manner in which the task was accomplished showed so much skill and knowledge, that Jenner was offered the post of naturalist to the next expedition, which sailed in 1772. He declined, however, the appointment, and decided to return to Gloucestershire and fix his residence in the place of his birth,

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where he took up his abode with his brother, and commenced the practice of his profession. The reputation he had brought with him from London, the great professional knowledge he evinced, his kindly disposition and manners, rapidly brought him practice. In March, 1788, he married. In the year 1792 Jenner retired from the more onerous duties of a country practitioner's life, and obtained the degree of M.D. from the University of St. Andrews. It was not long after this that he made the great discovery, which may be said to have eclipsed every other discovery of modern science in the amount of benefit it has conferred on the human race, and which has enwreathed the memory of Jenner with honours that time can never wither. The first incident in the story dates back to the time when Jenner, as the surgeon's apprentice, was pursuing his professional education at Sodbury. One day a young countrywoman applied at the surgery of his master for advice. The small-pox was casually mentioned in her hearing; she immediately observed, 'I cannot take that disease, for I have had cow-pox.' This assertion made a deep impression on Jenner's mind; it was the first time he had heard of what had been for many years a tradition amongst the peasantry in the dairy districts of Gloucestershire and other counties; he continued to think of it, and when, some time after, he was domiciled in London with Hunter, he mentioned the subject of cow-pox to him. It does not, however, appear that Hunter was impressed with the importance of the consequences which were involved in the popular observation. He mentioned the Gloucestershire tradition in his lectures on Jenner's authority. He likewise spoke of it to some professional friends, and it was noticed in other lectures of the time; but he never pursued the matter further. Jenner, however, never lost sight of it; he found the subject loaded with many obscurities and contradictions which he set himself to unravel, and he never failed to stimulate all his professional friends and acquaintances to apply themselves to its investigation. In this latter object he met with but little success. Determination of purpose was, however, a leading characteristic in Jenner, and regardless of the arguments and ridicule of his friends, he continued to prosecute his inquiries. He discovered that cows were the subjects of at least two eruptive diseases which were capable of producing sores on the hands of those employed in milking, and that to both these affections the name of cow-pox was applied. It was only one of these diseases, however, which gave immunity from small-pox. He ascertained also another most important fact, that in the case of the true cow-pox, it was only in a certain state of the pustule that virus was yielded capable of affording a protective power. He found that matter taken at a later period might induce a local sore, but that it failed in bestowing any safety from variolous contagion. It was in the year 1780 that he first disclosed the result of his inquiries to his friend Edward Gardner. In the year 1788 he took a drawing of the casual disease as it occurs on the hands of milkers to London, and showed it to Sir Everard Home and others. The subject attracted some attention; and Dr. Adams, who had heard of it from Mr. Cline, mentioned it in his work on Morbid Poisons, which appeared in 1795. It was not until

a year later, 1796, that Jenner was able to institute the first experiment, which proved that the disease might be communicated by artificial inoculation. The following is Jenner's own report of the experiment, extracted from one of his letters to Edward Gardner:—'As I promised to let you know how I proceeded in my inquiry into the nature of that singular disease, the cow-pox, and being fully satisfied how much you feel interested in its success, you will be gratified in hearing that I have at length accomplished what I have been so long waiting for, the passing of the vaccine virus from one human being to another by the ordinary mode of inoculation. A boy of the name of Phipps was inoculated in the arm from a pustule on the hand of a young woman (Sarah Nelmes) who was infected by her master's cows. Having never seen the disease but in its casual way before, that is, when communicated from the cow to the hand of the milker, I was astonished at the close resemblance of the pustules, in some of their stages, to the variolous pustules. But now listen to the most delightful part of my story. The boy has since been inoculated for the small-pox, which, as I ventured to predict, produced no effect. I shall now pursue my experiments with redoubled ardour.' The experiment above referred to was performed on the 14th May, 1796, a day still celebrated as an annual festival at Berlin. After multiplying his experiments, Jenner published his first Memoir in June, 1798. The progress of vaccination was darkened at the outset by various disappointments and obstacles. Objectors were numerous, and rival claims to the merit of the discovery were set up. But a high tribute to Jenner was paid as early as the year 1799, when a large number of leading physicians and surgeons signed an earnest expression of their confidence in the efficacy of the cow-pox. The discovery was soon afterwards promulgated throughout civilized Europe and America, and it was introduced into Asia by Dr. De Carro, at that time a physician of Vienna. Honours were showered on Jenner by foreign princes, and by the principal learned societies of Europe; the royal family of England exerted themselves to promote the cause of vaccination; and Parliament voted to its discoverer, in the year 1802, a grant of 10,000*l.*, and in the year 1807 an additional grant of 20,000*l.* The latter days of Jenner's were occupied in the dissemination and elucidation of his great discovery. He died of apoplexy at Berkeley in February, 1823. A statue to his memory has been recently erected by the French at Boulogne.

JENYNS, SOAME, was born in 1704, and died in 1787. He was educated at St. John's College, Cambridge; he was M.P. for Cambridgeshire in 1741; for the borough of Dunwich in 1754; and for the town of Cambridge from 1761 to 1780. In 1755 he was made a lord of trade, and he held that office in spite of political changes until its abolition in 1780. His poems, which consist of 'The Art of Dancing,' 1728, and 'Miscellanies,' 1770, are included in Johnson's 'Works of the English Poets.' His prose works are:—'A free Inquiry into the Nature and Origin of Evil,' 1756; 'View of the Internal Evidence of the Christian Religion,' 1776; 'Dissertations on various Subjects,' 1782. His works are collected in 4 vols. 8vo., 1790-93.

JERBOA. [MURIDÆ.]

JEREMIAH, one of the prophets of Judah, the writer of the book in the Hebrew canon which bears his name, and of that succeeding it, called 'The Lamentations.'

He was of the sacerdotal family, being the son of Hilkiah, a priest, whose residence was at Anathoth, a city of the tribe of Benjamin, about three miles north of Jerusalem. This we learn from the general title to his book of Prophecies (chap. i., ver. 1); and that title sets distinctly before us the period through which he flourished. He was called to the prophetic office, being then in his youth, in the thirteenth year of King Josiah, which, according to the received chronology, was 629 years before the Christian era commences. He continued in office till the eleventh year of King Zedekiah, that is, till 588 B.C. His contemporaries were in the earlier periods Zephaniah and Habakkuk, and in the later his era approaches near to that of Ezekiel and Daniel.

The book entitled his Prophecies is a collection of such prophecies or exhortations as he delivered at various times, mingled with relations of historical events. The last chapter, the fifty-second, is wholly historical, and is supposed to have been written by some other person, not improbably Ezra, and to be intended as a kind of introduction to the book of 'Lamentations,' which follows it. But the most remarkable circumstance relating to the composition of the book is this, that the various prophecies are put together without any regard to the order of time in which they were delivered. At the beginning we have the account of his call to the prophetic office, but we soon find prophecies delivered in the reign of Jehoiakim following others which were delivered many years after in the reign of Zedekiah. Jeremiah seems to have employed Baruch, his uncle's son, to commit his prophecies to writing.

The sacred books contain no later information concerning the prophet than that he was among those who went to Taphanhes. But some of the early Christian writers relate of him that he was stoned to death by his countrymen in Egypt for preaching against their idolatry.

JERICO. [SYRIA.]

JERICO, ROSE OF, is the popular name of a plant called by botanists *Anastatica Hierochuntica*. It is a native of Palestine and other parts of the East.

JERK, a word which, while continuing to be used as equivalent to 'sudden twitch or thrust,' is also employed as an adjective, in a widely different sense. Thus, *jerked beef* is meat cut into pieces and dried in the sun. In certain districts of South America, where the supply of animal food surpasses native consumption, it is customary to cut up the carcass into small pieces, and export them under this name. It is a well known fact, that neither flesh nor fruits lose much, if any, of their nutritive qualities in consequence of drying. Thus after having been dried, they can, by a simple process, be rendered easily edible.

JEROME OF PRAGUE, the friend and fellow martyr of John Huss, was born at Prague between the years 1365 and 1370. He studied in the universities of Prague, Heidelberg, Cologne, Paris, and Oxford, and obtained the degrees of master of arts and bachelor of divinity. His reputation for

learning was so great that Wladislaus II., king of Poland, commissioned him to organize the new University of Cracow in 1410, and Sigismund, king of Hungary, invited him to preach before him at Buda. He held the doctrines of Wyckliffe, attached himself to the cause of Huss, and denounced the abuses of the church. He trampled the relics under his feet, and excited the minds of the people so violently against the monks, that several of them were seized and kept in durance, and one of them was even thrown into the Moldau. When the bull of Pope John XXII. arrived in Prague, Jerome sent it through the city attached to the dress of a courtesan, and then caused it to be publicly burned along with some indulgences at the common pillory. When he heard of the treacherous imprisonment of Huss at Constance, he hastened to join him, but his devoted fellow-confessor had become a martyr before he arrived. The same tragical glory awaited himself. On his return to Prague, he was seized by the orders of the duke of Bavaria, and was carried back in chains. He was then cast into a dungeon and placed on trial. At first his firmness forsook him, and on the 23d September, 1415, he recanted his opinions, but subsequently abjured his recantation with horror, and he was condemned to death by the Council of Constance, on the 30th May, 1416. He heard his doom pronounced with the utmost composure, and died in the fire with a heroism worthy of the friend and fellow-worker of Huss, bearing witness to the truth with his latest breath.

JEROME, SAINT, accounted the most learned of all the Latin Fathers of the Church, was born about 340, and died in 420. He was a native of Pannonia, but came early to Rome, where he studied under the grammarian Donatus. He visited Gaul, where he remained some time, and afterwards travelled in Thrace, Pontus, Bithynia, Galatia, and Cappadocia. He also visited Jerusalem. In 382 he returned to Rome, having spent some time at Constantinople on his way. At Rome he became secretary to Pope Damasus. He eventually returned to the neighbourhood of Jerusalem, and took up his abode in a monastery at Bethlehem, and here it is believed that he died.

Many of the writings of Jerome are come down to us. Amongst the most valuable are, his treatise on the 'Lives and Writings of the elder Christian Fathers,' and his 'Commentaries on the Prophetical Books of the Old Testament,' on the Gospel of St. Matthew, and on several of St. Paul's Epistles. But his greatest work is a translation of the books of both the Old and New Testament into Latin, which translation has been always highly valued in the Latin Church, and is that known by the name of the Vulgate.

JERROLD, DOUGLAS, a distinguished dramatist and journalist, was born in London in 1803. His father was the manager of a theatre at Sheerness; but it does not appear that the stage, at that early period of his life, had any attractions for his son, who entered the navy as a midshipman under Captain Austen, brother of the well-known novelist, Miss Austen. At the conclusion of the war, however, he had to select another profession; and was placed as an apprentice with a London printer. Here he devoted himself to the study of languages, and to literary

pursuits. His first impulse for dramatic writing was the favourable reception of a critique on the opera of *Der Frieschutz*, which he had written for the newspaper on which he was employed as a compositor. Before he was twenty he wrote several dramatic pieces; among others 'More Frightened than Hurt,' which was performed at Sadler's Wells, and still keeps the stage. He was then engaged by the manager of the Coburg Theatre to produce pieces at a salary; but he soon afterwards went to the Surrey, where he produced the celebrated naval melodrama of 'Black-eyed Susan,' which had a wonderful run, and completely retrieved the fallen fortunes of that house. It also largely contributed to the fame and independence of the late T. P. Cooke, who played the principal character. It was afterwards performed for many hundred nights on the boards of the theatres royal, and had the run of nearly all the provincial theatres; but after all, the author's share of the immense profits thence arising did not exceed 70%. Jerrold now devoted his pen almost exclusively to dramatic compositions, and among other pieces he brought out 'Nell Gwynne,' 'The School-fellow,' 'The Housekeeper,' 'Bride of Ludgate,' 'Mutiny at the Nore,' and the 'Rent Day,' the last of which, founded on one of Wilkie's celebrated pictures, had a considerable run, and proved a source of profit to the author. Soon afterwards appeared his comedies of 'The Prisoner of War,' 'Bubbles of a day,' 'Time works Wonders,' and other pieces, which were played with considerable success at the Haymarket and the Princess'. His talents, however, were not confined to the drama; he applied them in a variety of ways to numerous compositions of a light and agreeable character, which were chiefly contributed to the magazines and newspapers. In *Blackwood* appeared his 'Men of Character,' and 'The Chronicles of Clovernook' in the *Illuminated Magazine*, of which he was editor. His ready wit appeared also in the various numbers of *Punch*; to which he contributed a 'Story of a Feather,' 'Punch's complete Letter Writer,' 'Punch's Letters to his Son,' and the 'Caudle Lectures.' He was afterwards engaged, at the earnest desire of the proprietor of *Lloyd's Newspaper*, to undertake the editorship of that journal at 1000*l.* per annum; and it is stated that on the assumption of Jerrold's name, it received during the first week an accession of 25,000 subscribers. He died in 1857, and was interred in the Norwood Cemetery. His works, which have been collected in eight volumes, exhibit great insight into character, much shrewdness of judgment, and a caustic wit. The style is sharp and epigrammatic, but philosophical views or luminous expositions of moral truth must not be looked for in any of Jerrold's writings.

JERSEY, an island in the English Channel, about 18 miles S.E. from Guernsey, between 49° 9' and 49° 16' N. lat., and 1° 58' and 2° 14' W. long. Its greatest length E. to W. is about 12 miles; its greatest breadth N. to S. is about 6 miles. The area is about 62½ square miles, or 39,580 acres, of which 25,000 are cultivated. The population in 1861 was 57,030.

The surface of the island has a gradual slope from north to south. On the north side the coast is abrupt, rising to the height of 100 to 200 feet, and

broken by a succession of small bays and coves. On the remaining sides it is less precipitous. There are several good bays, the chief being Boulay, St. Catherine, Grouville, St. Ouen, St. Aubin, and St. Brelade. Groups of rocks surround the island at various distances from it, and there are also many banks and shoals.

The surface is everywhere undulating. The valleys generally run from north to south; they are narrow at the north end, where the high ground forms an almost unbroken hill, and grow wider as they approach the southern coast, where they expand into several flats of good pasture land. The principal water-courses flow from north to south.

The high land consists for the most part of granitic rocks; the southern part of a mass of schistose rocks incumbent upon granite. The roads are numerous, wide, and well constructed, and traverse the island in many directions. The granite from the Mount Mado quarries, in the northern part of Jersey, is largely exported, and much esteemed in London for paving purposes.

The climate of Jersey, from its insular situation, is milder than that of other places under the same latitude, and the mean annual temperature (53°) is higher than that of any part of England. Wheat is the principal grain crop; barley is grown, and some oats; parsnips are extensively grown and used for fattening hogs and bullocks. Potatoes for exportation are widely and increasingly cultivated. Lucerne is one of the most valued crops, but the chief products are apples and pears—the whole island having the appearance of a continuous orchard. All the cows are of the Alderney breed, and are very carefully reared; but sheep and horses are comparatively neglected. Off the south-east coast are oyster-beds, fished by the islanders.

Vraic, or sea-weed, is used both for manure and fuel, and its collection is subject to very stringent regulations.

Jersey is divided into twelve parishes, in the diocese of Winchester. These are subdivided into 'vintaines' (scores), supposed to be so called from having originally contained twenty houses. Of these vintaines there are from two to six in each parish, and in all fifty-two.

The island has its own legislature—the 'States,' or Parliament, consisting of thirty-six members, chosen by the inhabitants, their acts being confirmed or annulled, in special cases, by the English governor. From the decisions of its royal court, the only appeal is to the sovereign in council. As in Guernsey, the laws of the island are very peculiar, being mainly derived from the ancient customary law of Normandy. Arrests take place without proof or affidavit, and it is only recently that the Queen's writ had any power, or that the Act of *Habeas Corpus* has been admitted.

The livings are in the gift of the crown, and are of small value. The principal educational establishment is Victoria College, where instruction in the highest branches of knowledge is imparted on moderate terms. There are also exhibitions at the Universities of Oxford and Cambridge.

The only manufactures in the island worthy of note are hosiery and shoes.

Steamers communicate frequently with Weymouth,

Southampton, Littlehampton, St. Malo, and Granville.

The military governor has under him usually about 300 regular troops, besides which Jersey has a militia of 2500 men, with an artillery battalion. The island is protected by numerous forts.

The native inhabitants speak a French *patois*, and preserve many Norman feudal customs, the Channel Islands having formed part of the Norman dominions, and remained attached to England since the Conquest. French is used in all legal proceedings, and also in the debates of the 'States,' but most of the residents can speak both English and French, as the former has long been taught in all the principal schools.

The trade of Jersey, owing to the privileges possessed by the islanders (there being no customs duties), is very considerable. The agricultural produce of the island, potatoes, apples, pears, fruit, cider, butter, cows, and other live stock, are sent to England in return for cotton and woollen goods, hardwares, cutlery, glass, about 20,000 tons of coal annually, and general merchandise. The foreign imports are wine, brandy, timber, &c.; the two former being supplied from France, from which Jersey is only about 16 miles distant. Particulars of the trade between the Channel Islands and Great Britain will be found in the article GUERNSEY.

There are three towns in the island, St. Helier and St. Aubin, both on the Bay of St. Aubin, and Gorey, on the east coast.

St. Aubin is situated in the western angle of St. Aubin's Bay, $4\frac{3}{4}$ miles from St. Helier. The town consists chiefly of one street of about 100 houses, with about as many more in different directions. There is a good pier, but the depth of water is not sufficient for large vessels. The place is defended by a small fortress, which is insulated at high water. Population in 1861, 800.

St. Helier is toward the S.E. point of St. Aubin's Bay, and fronts the sea. In external appearance it is much on a level with English country towns of the same size, except that the ramparts of Fort Regent, overtopping the buildings, give to the place the appearance of a continental town. The principal public buildings are—the theatre, new court-house, workhouse, gaol, and Victoria College, opened in 1852. There are two fortresses: Elizabeth Castle on a rock in the bay opposite the town, and Fort Regent, a fortification commanding the town, of considerable strength. It was constructed about 1806, at a cost of 800,000*l*. The population of the town in 1861 was 29,528. The harbour is formed by two piers, jutting out into the bay, at the south end of the town. The town is the residence of many retired officers of the British army and navy, foreigners, and families of limited income from Great Britain. It has also a large number of summer visitors from both England and France. There is an active trade with England, France, and the West Indies; and it is the seat of the 'States,' or representative parliament of Jersey. A submarine telegraph to England has been in working operation since 1858. It is within ten hours of Southampton and Weymouth, and twelve or fourteen hours of London by steamer and railway.

Gorey is situated on Grouville Bay. The importance of Gorey depends on its oyster fishery, in which

upwards of 250 boats are employed. In the neighbourhood of Gorey is Mont Orgueil Castle, once the principal fortress of the island, on a headland between St. Catherine's Bay and Grouville Bay.

The other places in the island are mere hamlets, grouped round the churches of the several parishes, or scattered along the coast. Much of what has been said of the state of society and the constitution of the local government in Guernsey will apply to Jersey. [GUERNSEY.]

Jersey, the *Cæsarea* of the Romans, is said to have been originally called Augia. In the reign of Edward III. this island was attacked by Du Guesclin, constable of France, but the arrival of succours from England prevented him from succeeding. In December, 1780, the Baron de Rullecourt landed with 700 men, took possession of St. Helier, and made the lieutenant-governor, Major Corbet, prisoner, and induced him to sign a capitulation. The British troops and island militia, under Major Pierson, next in command, refused to recognize the capitulation, and, attacking the French, killed Rullecourt, with the greater part of his men, and obliged the rest to surrender. Major Pierson fell in the beginning of the attack.

(The best work of reference on Jersey is Professor Andey's *Channel Islands*, London, 1862. See also Dendy's *Islets of Britain*, and Sandford's *Guide to the Channel Islands*.)

JERSEY, NEW. [NEW JERSEY.]

JERUSALEM (Arabic, *El-Kuds*, 'the Holy,' Lat. *Hierosolyma*), the sacred city, which for every Christian, no less than for every historical student, must always possess an absorbing interest, is situated in Palestine, now a portion of Asiatic Turkey, in the pashalik, and about 125 miles S.S.W. of Damascus, at an elevation of 2500 feet above the sea-level. Lat. $31^{\circ} 41' 43''$ N.; long. $35^{\circ} 13'$ E. Population, 17,000. An elevated limestone plateau, of barren character, and broken up by alternate ridges and ravines—in some places utterly sterile and desolate, as if sown with salt, in others clothed with an attractive mantle of olive groves and luxuriant gardens—stretches from the plain of Esdraelon towards the southern extremity of the Dead Sea. Nearly on a level with the watershed which separates the feeders of the Mediterranean and the Dead Sea, rises the loftiest crest of this undulatory table-land, sloping somewhat abruptly towards the rising sun, and finally terminating on the brink of the ravine which is known as the valley of Jehoshaphat. The bottom of this valley forms the channel of the brook Kedron—a winter torrent, completely dry for the greater part of the year—and on the opposite side swell the green ridges of the Mount of Olives. Southward runs another ravine, the valley of Hinnom, also watered by a rain-fed stream, which joins that of Jehoshaphat, and is itself a continuation of the shallower valley of Gihon on the western side. Between these ravines, and dominated over by the Mount of Olives, clusters the modern city of Jerusalem, divided into two equal portions by the Tyropæon, or valley of the Cheesemongers, which are again subdivided by two transverse glens or hollows; so that, in all, there may be distinguished four separate ridges or hills, Zion, on the S.W.; Acra, on the N.W.; Bezetha, on the N.E.; and

Moriah, on the S.E. The culminating point of Zion, which is only partly inclosed within the present walls, rises about 300 feet above the lowest portion of the adjoining valleys, 2535 feet above the level of the Mediterranean, and 8835 feet above that of the Dead Sea.

From Mount Olivet is obtained the finest view of the city as a whole, a view thus graphically described by Dr. Macleod in a recent work:—Towards the east, and between us and the Dead Sea, we see the wilderness of Judea, bare, bleak, and desolate, as would be the rocky bottom of the sea if upheaved and left to bleach beneath a burning sun. We see also a bit of the Dead Sea, more than 3000 feet below us, 'lying dead in its trough.' Though about twelve miles off, it looks very near. It appears hot and steamy, with a misty haze hanging over it. We cannot but associate all that is wild, lonely, and mysterious, with this dismal lake. It does not suggest one noble thought, one act of greatness or goodness, done by man or woman alive or dead, to shed over it a redeeming ray of glory. We can also trace the course of the Jordan, from its line of green vegetation. The memories of the great and good which it recalls are a relief to the mind. Its entrance into the Dead Sea seems like life losing itself in death. There rises also before the eye, the great eastern wall of the ridge of Moab, the separation between modern civilization and almost unknown Arabia, with its ancient cities, far-spread pasture lands, arid wastes, powerful tribes, and primeval traditions. Standing on Olivet, one fully realizes the contrast between East and West, with Palestine as their connecting bridge.

From this point, continues Dr. Macleod, one also takes in at a glance the general topography of Jerusalem. He is struck with the sort of promontory abutting from the general table-land on which it is built; with the wonderful defence against ancient modes of warfare afforded by the valleys that, like deep ditches, surround it on east and south, hindering any enemy from coming near its walls; with the strong military positions which were afforded by the principal eminences within the city, such as the temple area, separated from Zion by the valley of the Tyropæon, and the high ground of Acra and Bezetha, eminences distinctly visible. The hills that surround Jerusalem are also visible, not only in the arching sweep of Olivet and its spurs, but further off in a ridge which stands as a wall between the city and the heathen tribes dwelling by the sea. One can see how it rested like an eagle's nest on a rocky eminence, or like a lion's lair, visible from every side, yet not to be approached with impunity. Its compactness must also have been one of its marked features. There were no human habitations beyond its gates. There it lay like a chess-board, with its men, bishops, knights, and castles, within the walls, while all beyond was painfully empty and bare; limestone everywhere, with little of green to relieve the eye.

South of the Mount of Olives, and, in fact, a continuation of it, rises the Mount of Offence; south of the valley of Hinnom, the Hill of Evil Counsel; and to the north extends a billowy roll of mountainous summits, so that Jerusalem, as a city, is almost entirely encompassed with lofty heights.

Anciently its walls included the four hills already mentioned, and a considerable area to the N. and W. of them, but those now standing comprise a less extensive space, and have a circuit of only 2½ miles. They were built by the Turks about three centuries ago, and vary in height from 20 to 50 feet. Constructed of great hewn stones, they are surmounted by a stout breastwork, loopholed and battlemented, flanked at regular distances by strong towers, and pierced with four gates. These are:—on the E., *St. Stephen's Gate*, called by the Turks *Bâb-es-Sabat*, or 'Gate of the Tribes,' and opening on the brook Kedron, the Mount of Olives, and the picturesque village of Bethany; on the N., the *Gate of Damascus*, *Bâb-el-Amud*, 'Gate of the Pillar,' in the line of the great road which leads to the beautiful Syrian city; on the S., the *Gate of Zion*; and on the W., the *Jaffa*, *Hebron*, or *Bethlehem Gate*. Near the latter, and on the loftiest point of Mount Zion, stands a citadel (also called David's Castle), and the Tower of Hippicus—a massive, battlemented, and turreted stronghold.

Entering the city we shall find that notwithstanding its sublime associations, and the natural beauties of its position, it presents little in itself to attract or interest the pilgrim. The streets are narrow, dark, and ill-paved; the houses, though built of stone, and with flat roofs, sometimes crowned with small domes, are dark, windowless, and prison-like; and a large portion of the interior consists of ill-built churches, monasteries, and mosques. The principal street is the well-known *Via Dolorosa*, or 'Way of Sorrow,' so named because the Saviour is said to have traversed it, bearing his cross, when passing to the last scene of his sacrificial career on Mount Calvary. It extends from E. to W. across the hill of Acra, bends to the N. for a short distance, and again turning eastward, winds between the ridges of Bezetha and Moriah to St. Stephen's Gate. Another street of some importance runs in a direction nearly parallel to the former, from the Bethlehem Gate on the E., between the hills of Acra and Zion, to the bazaar, and afterwards continues to the hill of Moriah. A highway from the Damascus Gate, through the centre of the city, and in a southerly direction, as far as the Gate of Zion, crosses these two streets nearly at right angles. Here, and in the bazaar, congregate the Jerusalem shopkeepers, who are mostly Christians, and exhibit a commendable activity in the disposal of their wares.

To enumerate all the interesting localities within the walls of the Holy City, the very metropolis of Christian faith and feeling, would be impossible in the narrow space to which we are necessarily confined. The first to which the Christian traveller directs his steps is the inclosure of Moriah, now called by the Mohammedans *El-Haram-es-Sherif*, or 'the noble sanctuary,' and only thrown open to Christian visitors since the Crimean war. Its general shape is that of a regular parallelogram, its greatest length being 1500 feet, and its greatest breadth about 1000. On all sides massive walls surround it; some of them to the north and west serving also as walls of houses, which belong chiefly to civil or ecclesiastical officials. On the east and south they now form a portion of the city walls. Of this wide and open area, a small space only is

occupied by buildings. Nearly in its centre stands the *Mosque el Sakrah*, or 'Dome of the Rock,' and at the south end the *Mosque el Aksah*.

This sacred area is overgrown with rich grass, and pleasantly besprinkled with the shadows of cypresses, olives, and other trees. But why is it sacred? Because it undoubtedly includes the site of the Temple, that temple in which Christ taught, and which was at once a symbol of the Old Testament and the New. A portion of this site is now occupied by the Mosque of Omar, a stately octagonal structure, seated on an elevated terrace, and approached by four porticoes, one of them graced with a superb marble colonnade, lighted by forty-eight windows of richly coloured glass, and crowned by a dome of magnificent proportions. Some remains of the great Jewish sanctuary are probably built up into this 'holy place' of the followers of the Crescent. Mr. Fergusson (and few living authorities are entitled to more respect), is, however, of opinion that the mosque was never intended originally as a place of Mohammedan worship, but was raised by the Emperor Constantine as a church over the Sepulchre of Christ. This sepulchre he finds in a cavern cut out of the living rock on which the mosque is built, and the summit of which rises above the floor of the cavern, like a flat boulder, about 60 feet long and 50 feet broad, which lies immediately under the dome, and within the circle of marble pillars supporting it. An open door on the south-east side leads by a few steps down into a vaulted chamber, hollowed out of the rock, about eight feet high and fifteen feet square, and here, according to Mr. Fergusson, the body of our Lord was laid by loving and reverent hands.

The tomb usually identified with this memorable event is contained, however, in the so-called church of the Holy Sepulchre, which stands on the northern ridge of the hill of Acra, and a short distance to the south of the *Via Dolorosa*. There can be little doubt that in this matter the popular tradition is erroneous, although the real site of the Holy Sepulchre is yet a matter of a keen and apparently endless controversy. It may possibly be resolved by the present explorations in Palestine. The church of the 'Holy Sepulchre,' so called, is a Byzantine pile of small architectural merit, but remarkable for the splendour of its internal decorations, was built by Helena, the mother of Constantine the Great.

The other edifices of note are the convents; such as the Armenian, which can accommodate a thousand guests, the Latin, the Greek, and the Coptic; a chapel which marks, it is said, the site of the house of Annas; a building opposite the Gate of Zion, called the house of Caiaphas; and the lofty mosque which covers, according to the legend, the tomb of the sweet singer of Israel.

Other localities there are whose associations cannot fail to endear them to the pilgrim, but of which we must restrict ourselves to a mere enumeration: such as the Pool of Bethesda, once visited by angels, but now a plain, dry, tank-like inclosure, about 360 feet long, 30 broad, and 50 deep; the Pool of Siloam, situated near the confluence of the three valleys of Jehoshaphat, Hinnom, and Tyropæon; the *Aceldama*, or 'Field of Blood,' purchased by the 'thirty pieces' which rewarded the treachery of Judas, and placed on the southern margin of the Hinnom valley; the

so-called Fountain of the Virgin; the tombs of the Kings, clustering on the brow of the hill above the brook Kedron; the pillar of Absalom, on the eastern edge of the valley of Jehoshaphat; the beautiful Pool of Hezekiah; and, above all, the memorable Garden of Gethsemane, situated at the base of the Mount of Olives, east of the brook Kedron, and still adorned by groups of olive trees of such antiquity that it is not improbable they waved to and fro in the wind on the very night of our Lord's last agony.

A few words must be devoted to the principal events in the history of Jerusalem.

Supposing it, as many authorities see good reason for doing, to be the Salem of Melchizedek, it must have existed about 2000 years before Christ's nativity. We first find it mentioned, under its present appellation, about B.C. 1500, when Joshua captured it from the Jebusites. The latter, however, retained possession of the citadel till the time of David, who, having driven them forth, took up his residence in the ancient fortress, and elevated Jerusalem into the capital of his kingdom. He adorned it with many edifices, all of which were eclipsed in glory and splendour by the first Temple, raised by Solomon at the divine command, and sanctified by a symbol of the constant presence of the All Powerful. After a long period of pride and prosperity the sins of its inhabitants called down the judgment of heaven, and the City of David was successively the prize of the conquering hosts of Egypt, Assyria, and Babylon. It was captured by Nebuchadnezzar B.C. 588, who razed it and its temple to the ground, plundered it of its wealth, and bore off its people to captivity. Seventy years of woe and degradation elapsed, and Cyrus then restored the Jews to their desolated land; Jerusalem was rebuilt, under the leadership of Ezra, and the temple rose again from its ashes, though far inferior in splendour to Solomon's glorious pile, B.C. 515.

On the dissolution of the Macedonian empire, Judea was invaded, and the Holy City captured, by Ptolemy Soter, who carried numbers of its inhabitants to Alexandria. Then arose the patriotic chiefs, known as the Maccabees, who delivered it once more from the yoke of the stranger, in 165 B.C. Its independence, however, vanished like a dream, for Rome soon swallowed up the Holy Land into her ever-widening empire, and her sovereigns, though nominally free, paid tribute to the Roman rulers. Then came the Messiah, and forty years after the Jews had denied and crucified Him, the last vestige of Jewish liberty disappeared. The armies of Rome poured into Judea, and under the leadership of Titus Jerusalem was beleaguered, stormed, and captured, A.D. 70. The remarkable events and unutterable horrors of that famous siege have been told by Josephus with graphic vigour. In 136 the Emperor Adrian finally destroyed the city, ploughed up its surface, and raised in its stead the Roman colony of *Ælia Capitolina*.

But Jerusalem seems indestructible. Its sacred name was in due time restored; and when Rome became Christian, the city which had witnessed the miracles and death of Christ naturally rose into importance in the minds of those who had accepted the truths preached by Christ. Helena, the mother of Constantine the Great, embellished and enriched

it, founding the church of the Holy Sepulchre; and it enjoyed a prosperous career under the fostering sway of the Byzantine emperors until captured by the Caliph Omar and his Moslems in 636.

Nevertheless, it continued to attract to its holy places a great throng of Christian pilgrims, who suffered at the hands of the Mohammedans the cruellest persecutions, and were compelled to witness the open and studied desecration of sacred localities which had for them an unspeakable charm. To deliver the Holy Land from these indignities—from the shadow of the Crescent—now became the ardent dream of every true follower of the Cross; and a crusade, or holy war, was accordingly preached by Peter the Hermit and the Roman Church with so much energy and persistence, that at length the mind of Christendom was thoroughly aroused, and its heart lit up by a kindling fire. Kings, princes, barons, knights, burghers, men-at-arms, all poured forth to rescue Jerusalem from the Saracen, and under the guidance of Godfrey of Bouillon, succeeding in their noble enterprise, they established a Christian monarchy in 1099, with Godfrey for its first and ablest sovereign. This kingdom, beset by powerful foes without, distracted by internal convulsions, and neglected by the European powers, could not long maintain its ground, and in 1187 was finally overthrown by the great Turkish sultan Saladin. From that time to the present Jerusalem has remained under the domination of the Mohammedans.

For full details as to the history, topography, and antiquities of the Holy City, we recommend the reader to consult Josephus, *Antiquities*, and *Wars of the Jews*; Milman, *History of the Church*; Gibbon, *Decline and Fall of the Roman Empire*; Mills, and Michaud, *History of the Crusades*; Dr. Robinson, *Researches in Palestine*; Wilson, *Lands of the Bible*; Fergusson, article *Jerusalem* in Dr. Smith's *Dictionary*; Dr. Williams, *Holy City*; Rev. W. Sandies, *Sinai and Jerusalem*; Levin, *Siege of Jerusalem*; Finlay, *Greece under the Romans*; Porter, *Handbook to Syria and Palestine*; Dean Stanley, *Syria and Palestine*; Dr. Norman Macleod, *Eastward*; Hepworth Dixon, *The Holy Land*; Chesney, *Euphrates Expedition*, &c. An association of gentlemen interested in these subjects has recently been formed (the 'Palestine Exploring Society'), under the most favourable auspices, for the thorough examination of the various localities connected with Christian history, and an expedition despatched at its cost has already reached the Holy Land and commenced its well-directed researches. We may, therefore, expect that much new light will shortly be thrown on the antiquities of Jerusalem.

JERUSALEM ARTICHOKE. The name of a plant, a species of *Helianthus*, belonging to the natural order *Compositæ*. It is a well known culinary plant, its tubers affording a wholesome food, somewhat akin to the common potato.

JERVAS, CHARLES, a portrait-painter, was born in Ireland about 1675. He studied with Kneller in London, and also in Paris and at Rome. He returned to London about 1708, where, through the praise and friendship of Pope, he was much employed, though his chief ability as a painter seems to have been his skill in copying: some of his copies after Carlo Maratti are, according to Walpole, equal to

the originals. Jervas died on the 2nd of November, 1739.

JERVIS, JOHN, Earl of St. Vincent, was born at Meaford in Staffordshire, January 9, 1734, O.S.; entered the navy at ten years old; rose to be captain; fought in Keppel's action in 1778; and captured the *Pégasé*, French 74, in 1782, for which he received the order of the Bath. On the breaking out of the French revolutionary war, he sailed in command of a squadron to reduce the French West India Islands, and captured Martinique, Guadeloupe, and St. Lucia. He was promoted to be Admiral of the Blue, June 1, 1795, and in the autumn took command of the Mediterranean fleet, with which he intercepted and defeated the Spanish fleet off Cape St. Vincent, on February 14, 1797, for which he received the thanks of both houses of Parliament, and was raised to the peerage by the title of Earl of St. Vincent and Baron Jervis of Meaford, and received a pension of 3000*l*. In 1798 the mutiny which broke out in the Channel squadron spread to the Mediterranean fleet, but was suppressed by his judicious and decisive severity. In 1801 he was made first Lord of the Admiralty on the formation of the Addington ministry, and at once set himself vigorously to retrench extravagant expenditure and to reform abuses. On Mr. Pitt's return to office, in May, 1804, he placed Viscount Melville at the head of the Admiralty. Earl St. Vincent again took command of the Channel fleet in 1806, in Fox's administration, but held it only for a year. He was appointed admiral of the fleet on the day of George IV.'s coronation, July 19, 1821, and died March 15, 1823, in the ninetieth year of his age. A monument has been erected in honour of him in St. Paul's Cathedral.

JESUITS, SOCIETAS JESU, the name of a celebrated religious order which was formed towards the middle of the sixteenth century. Ignatius or Inigo Loyola was a Biscayan officer of noble birth, in the Spanish army, at the beginning of the reign of Charles V. Being wounded in the defence of Pampluna, then besieged by the French and the Navarrese, he underwent a long and tedious confinement. Loyola was a man of enthusiastic mind; he had been fond of the world, and immersed in gallantry and pleasure; but enforced meditation now decided him upon a life of piety and religious labour, and he conceived the plan of establishing a religious order, which should be entirely devoted to the following objects:—1. The education of youth. 2. Preaching and otherwise instructing grown-up people. 3. Defending the Catholic faith against heretics and unbelievers. 4. Propagating Christianity among the heathens and other infidels by means of missionaries. Ignatius, having promulgated his views, procured some associates, and, after overcoming many impediments, repaired with his friends to Rome in 1537, where he laid before Pope Paul III. an outline of the institutions and regulations of his intended order. Loyola having been a military man, these rules were based upon the principles of a strict subordination, carried through several gradations, terminating with the *præpositus generalis*, or general superior, who was to have absolute sway over the whole society, and from whose decisions there was to be no appeal, except to the pope. Paul III. approved of the plan, and it was decided that the new order should

be called the Society of Jesus, that the members should wear no monkish garb, but dress in black, like the secular priests, and should in fact differ essentially from the monastic orders then existing. The bull of the pope authorizing the new society was issued in 1540. The original 'Constitutions' of Ignatius were written in Spanish, but afterwards translated into Latin. The first edition of them appeared at Rome, 'Constitutiones Societatis Jesu,' 1588, after the death of the founder, who expired on the 31st July, 1556. At his death the society was already established in Italy, Spain, Portugal, and Germany, and had above one hundred schools, besides numerous missionaries in the East and in Africa and America. Ignatius was succeeded as general of the Society by James Lainez, a man of more extensive information than his predecessor. It is to Lainez that the principal share in framing the 'Constitutiones' is attributed.

The constitution and regulations of the society have undergone scarcely any modification since its establishment. The body consists of four classes—professed, coadjutors, scholastics, and novices. The training is very protracted and severe, and the administrative and executive government of the society is such that the character, conduct, and position of each member is always well known to the general superior—he being furnished with quarterly, and in some cases even monthly, reports on the subject. The duty of obedience is carried to the extreme; and the system of training applied to the formation of 'professed' members shows the most profound knowledge of the human heart, and the most correct appreciation of the religious instincts and impulses of mankind. The habits necessary to inspire confidence and disarm prejudice and suspicion were carefully cultivated; and the manner in which some of the members availed themselves of this art in after life brought upon the society the obloquy of having furnished a new ethical term to nearly every European language; and when there is now occasion to denounce any course of conduct as guileful, disingenuous, or traitorous, it is often termed Jesuitical.

The opponents of the society allege that, in addition to the published regulations of their founder, the more advanced Jesuits are bound by a code of secret laws—*monita secreta*. In fact, a work purporting to contain these secret instructions was published at Cracow in 1612; and has been repeatedly reprinted since; but its authenticity has been over and over again denied by the society, and impartial Protestant critics now generally admit that the work must be regarded as spurious.

The Jesuits, very shortly after their establishment, began to play a distinguished part in the affairs of Europe. Lainez was sent by the pope as his legate to the Council of Trent, and he was the opponent of Beza at the Conference of Poissy in 1561. Soon afterwards, notwithstanding the opposition of the University of Paris, they obtained permission from Francis II. to open colleges and schools in France. The Jesuits taught gratis, and the university, whose courses of lectures were paid for, was jealous of them, and attacked them repeatedly.

During the war of the League the Jesuits opposed the claims of Henri IV., as being a heretic; but on suspicion of having been accessory to two attempts

which were made on his life, the Parliament of Paris decreed their banishment in 1594; but in 1603 Henri IV. recalled them.

The missions of the Jesuits form an important part of the history of their society. The first attempts by Xavier in India were premature, but he served as a pioneer to prepare the way for others better qualified for the task, and the Jesuits formed in time numerous Christian congregations in Japan. The history of the Japanese Christians, and their extermination in 1637, is found in Bartoli, '*Historia della Compagnia di Gesu*,' '*Il Giappone, seconda parte dell' Asia*.' In China the Jesuits were likewise successful, and their establishment there has been more durable. Although persecutions broke out against the Christians in China, yet the Jesuits never entirely lost their hold there. In Paraguay the Jesuits had an open field for the display of their abilities and principles. They formed, on the banks of the Paraguay and the Parana, a flourishing community of Indian converts, who are said to have amounted to more than 100,000, and governed them for a century and a half in peace and happiness; but in 1750 an attempted transference of the sovereignty of the territory from Spain to Portugal led to an order from the Spanish government that the Jesuits and their Indian pupils should abandon their homes, and remove to some other part of the Spanish territories. The Jesuits were prepared to obey, but the natives refused to submit, and resisted the Portuguese and Spanish forces which were sent against them; and although a subsequent change in the diplomatic relations of the two countries left the Indians in possession of their country, yet the Jesuits were falsely accused of having encouraged what was styled the rebellion. This and some other causes of offence occasioned the Portuguese minister Pombal, in 1759, to issue an order for the expulsion of the society from the Portuguese territories, and for the confiscation of their property. The order was executed with the greatest inhumanity both in Portugal and Brazil.

France followed next in the same course of proscription. The Jesuits had from various reasons become unpopular with the people, the Parliament, and the minister Choiseul; but the enmity of Madame de Pompadour was productive of more serious consequences. Pretences were easily found, and in 1764, by an order of the king, the society was entirely suppressed in France, and their property was confiscated; but a small pension was given to the members, who were allowed to remain dispersed in the country, on condition of swearing to renounce the society and its institutions.

Their fall in Spain took place three years later. Choiseul is said to have contributed to it by persuading Charles III. that an insurrection which broke out in Madrid in 1766 was the work of the Jesuits. On the 31st of March, 1767, the colleges and houses of the Jesuits throughout Spain were surrounded at midnight by troops, sentinels were posted at every door, the bells were secured, and the king's commissioners, having roused and assembled the respective communities in the refectory, read to them aloud the royal decree which expelled them from Spain.

In the following year, 1768, the king of the Two Sicilies and the duke of Parma suppressed the

Jesuits' Society in their dominions. It still continued in the Papal States; but on the 21st July, 1773, the Pope (Ganganelli) issued a bull declaring the said society to be suppressed and extinct.

In consequence of this bull, the Jesuits were likewise banished from the Sardinian monarchy, the Austrian dominions, and every Catholic state. Two powers only, Prussia and Russia, one Protestant and the other Greek schismatic, allowed the fathers an asylum, and continued to intrust them with the education of their Catholic subjects.

After the society had been suppressed for about thirty years, several attempts were made at the beginning of the present century to re-establish it. And at last, after his restoration in 1814, Pius VII. issued a bull solemnly re-establishing the society as a religious order, under the constitutions of St. Ignatius. In France they had reintroduced themselves in a kind of clandestine manner after the Restoration, upon which a great outcry was raised, and they were again expelled in 1830. They are now tolerated in that country on sufferance, rather than as having any recognized legal authority; but are nevertheless numerous and influential, and their educational establishments hold the very highest rank.

In Russia the Jesuits were expelled by a ukase of the Emperor Alexander, in June, 1817, upon the charge of intriguing and of making proselytes among the members of the established Greek Church, and are still excluded from that empire. They have, however, re-established themselves in other European countries; and, judging from a return published by them in 1865, their numbers would seem to be rapidly increasing. According to this document the number in the Roman States is 475, of whom 385 live in the Holy City, and the others in the colleges or houses of Comarca, Velletri, Frosinone, and Viterbo. At the end of the year 1864, the total number of members of the Company of Jesus was 7728, that is to say, 190 more than in 1863. The Jesuits are divided into twenty-one provinces, of which four belong to France, five to Germany, Holland, and Belgium, two to Spain, five to Italy, one to Mexico, and the others to England, Ireland, and the United States. The total number of Jesuits occupied in the foreign missions was 1532, or 240 more than in 1863, and of that number twenty-eight are on missions in Europe, 296 in Asia, 213 in Africa, 726 in North America, 199 in South America, and fifty-five in Oceania. In 1841, the Jesuits in the whole world numbered only 3563, and at the end of 1864 they had more than doubled. But large as this number may appear it is insignificant as compared with that of the former members of the Society. At the celebration of their first centenary they numbered 13,112, distributed over thirty-two provinces; and at the date of their general suppression, a century later, they had increased to 22,589, and were possessed of twenty-four professed houses, 669 colleges, 176 seminaries, sixty-one novitiates, 335 residences, and 275 missionary stations in heathen countries, or in the Protestant States of Europe.

Whatever their faults may have been elsewhere, there can be no doubt that in China, Japan, the Philippine Islands, and in South America, the Jesuits did much for the civilization and welfare of the inhabitants.

The Act of the 10th Geo. IV., c. 7, which is entitled 'An Act for the Relief of his Majesty's Roman Catholic subjects,' forbids Jesuits, or members of other religious orders, communities, or societies of the Church of Rome, from coming into the realm, under pain of being banished from it for life; except natural born subjects, who were out of the country at the time of the passing of the Act. Such religious persons may, however, enter the United Kingdom on obtaining a license in writing from one of the principal secretaries of state, who is a Protestant, and may stay such time as such secretary shall permit, not exceeding six months, unless the license is revoked before the end of the six months. The Act also makes it a misdemeanour in any Jesuit, or member of other religious body, to admit, or to aid in or consent to the admission of, any person within the United Kingdom to be a member of such body; and any person admitted or becoming a Jesuit, or member of other such body within the United Kingdom, shall, upon conviction, be banished from the United Kingdom for life. It is, however, provided that nothing in this Act shall affect any religious order, community, or establishment, consisting of females bound by religious or monastic vows.

JESSULMIR. [RAJPOOTANA.]

JESUS, the CHRIST, the name usually given to the incarnate Son of God. Jesus was his proper name. It is the Greek form of the Hebrew name Joshua, a contraction of Jehoshua, that is, 'help of Jehovah,' or 'the Lord the Saviour.' The reason assigned by the angel for giving this name to the son of Mary was, 'because he shall save his people from their sins.' The word Christ is not a proper name, but an official title. It signifies 'anointed;' and is used in the New Testament as equivalent to Messiah, the name given to the long-promised Prophet and King whose advent was foretold by the prophets under the former dispensation. It is added to the proper name of our Lord to identify him with the promised Messiah, the deliverer 'of whom Moses in the law and the prophets did write: 'the Anointed One,' the consecrated Prophet, Priest, and King of the Church.

The 'fulness of time' which God had appointed for the sending of his Son arrived towards the close of the reign of Herod the Great, and Jesus was born at Bethlehem about the end of B.C. 5, or the early part of B.C. 4. He was the son of Mary, a virgin of the seed royal of David, to whom an angel was sent with the salutation, 'The Holy Ghost shall come upon thee, and the power of the Highest shall overshadow thee: therefore also that holy thing which shall be born of thee shall be called the Son of God' (Luke i. 35). Joseph, her betrothed husband, when he heard from her what had taken place, intended to put her away privately, but being convinced of her purity by a supernatural communication, he took her to be his wife. A general census of the Roman empire had been ordered by Augustus about this period, and therefore Joseph and Mary went from Nazareth, their usual residence, to Bethlehem, the city of David, to be taxed, and there the King of the Jews was born, in fulfilment of the prophecy of Micah v. 2, that out of Bethlehem Ephratah shall he come forth that is to be ruler in Israel.

Herod was much troubled at the miraculous cir-

cumstances which attended the birth of Jesus, and at the coincidence of the place of his birth with the prophecy of Micah. In order, therefore, that the danger to his authority might be obviated by the destruction of the infant sovereign, he gave orders that all the male children in Bethlehem and the neighbourhood under two years of age should be put to death. But Jesus was saved by his parents, who were warned by an angel in a dream to flee with the child into Egypt.

The child Jesus was circumcised in due time, and brought to the temple at Jerusalem, where his mother made the offering for her purification, as the law enjoined. Here the Saviour was recognized by Simeon, an aged disciple, and by Anna, a prophetess, who prophesied of his divine work: the former rejoicing that his eyes had seen the salvation of God, the latter speaking of him 'to all that looked for redemption in Jerusalem' (Luke ii. 28-38).

The divine mission of the Redeemer was not only recognized among the chosen race, but among the heathen also, for 'wise men from the east,' probably Persian magi of the Zend religion, guided miraculously by a star, came to Bethlehem, sought out the Saviour and worshipped him, and offered gifts of gold, frankincense, and myrrh.

After the death of Herod, in less than a year, Jesus returned with Joseph and Mary to Palestine, and went to Nazareth, where they took up their residence. The evangelists record none of the events of our Saviour's childhood, with the exception of his disputation with the Jewish rabbis. When he was twelve years of age he was found in the temple, hearing the doctors and asking them questions, 'and all that heard him were astonished at his understanding and answers.' This fact shows that Jesus was already aware of his divine mission, and was consciously preparing for it throughout his early life until the period for the actual commencement of his ministry arrived. When the time of his showing to Israel came he had reached his thirtieth year. Shortly before this period John the Baptist began to preach in the wilderness in the spirit and power of Elijah, and exhorted the people to repent, for the time was fulfilled and the kingdom of God was at hand. Great multitudes flocked to receive from him the baptism of repentance, and with the rest came Jesus to receive this rite at John's hands. As he came up out of the water the heaven was opened, the Spirit was seen descending upon him in a visible shape, and a voice was heard: 'This is my beloved Son, in whom I am well pleased.'

Immediately after this inauguration into office as the Messiah, Jesus passed through the ordeal of the temptation in the wilderness, and entered on his ministry. At Bethabara, to which he returned, he began to collect disciples round him: first Andrew, and another (probably John), then Simon Peter, and Philip, and Nathanael, though some time elapsed before they were formally set apart to the apostolic office. He then set out for Galilee, and at Cana, in that district, performed his first miracle by turning water into wine. He next repaired to Capernaum, and after a sojourn there of 'not many days,' he visited Jerusalem to keep the passover. According to John, the first expulsion of the money-changers and traders from the temple took place at this

passover, and so did the visit of Nicodemus, a member of the Sanhedrim (John iii. 1). After a sojourn in the capital of uncertain duration, Jesus went down to the Jordan with his disciples, and they there baptized in his name. He then proceeded to Galilee by the shortest route through Samaria; and while wearied and athirst he sat on the side of Jacob's well at Sichem, and in conversation with a woman who came to draw water from the well, he announced a change in the worship of both Jew and Samaritan, and avowed himself to be the Messiah. He then went on to Nazareth, his own city, where his exposition of a passage from Isaiah (lxi. 1) roused his fellow-townsmen to such fury, that they would have destroyed him if he had not escaped out of their hands. He took refuge in Capernaum, and wrought many miracles for the relief of the sick and of demoniacs. He then turned his thoughts to the rest of Galilee, where other 'lost sheep' were scattered, and made a general circuit of the whole province, in the course of which he wrought many works of mercy, and exhorted the Galileans to repent and believe the Gospel.

Jesus now entered on the second year of his ministry, and went up to Jerusalem to a feast of the Jews, probably the passover. The cure at the pool of Bethesda of the man who had an infirmity thirty-eight years was wrought during this visit on a Sabbath-day, and excited the lasting anger of the Jewish authorities, who sought to kill Jesus, both because he had healed a man on the Sabbath, and because he justified his 'doing well' on that day by an unequivocal claim to the divine nature. The indignation of the Pharisees was strengthened by the discussion which soon after took place respecting the disciples plucking the ears of corn and the healing of the man with a withered hand.

The ordination of the twelve apostles occurred about this period. They had previously associated themselves with Jesus, were his constant companions, and witnesses of the miracles by which the truth of his doctrines was demonstrated; but they were now organized into a distinct body under the name of Apostles, though they were not sent forth to preach until late in the same year. The solemn appointment of the chosen twelve was followed by the Sermon on the Mount, in which he proclaimed the laws and constitution of the kingdom of heaven, and who were meet to be its citizens. A second circuit of Galilee now commenced, in which the apostles journeyed with him; and mention is made of a third, which probably took place towards the close of this year, when he sent forth the twelve by themselves, two and two, to teach and to heal for him. Their mission, which lasted about two months, was limited to their own countrymen.

The third passover now drew near, but Jesus did not go up to it, because his ministry in Galilee was not completed, and his 'time was not yet come.' He went with his apostles to a mountain on the eastern shore of the sea of Tiberias, where he wrought one of his most remarkable miracles for the purpose of producing food for 5000 men, besides women and children. Several other miracles followed (Matt. xiv. 33; Mark vi. 53-56), and then a visit at Capernaum from the Scribes and Pharisees from Jerusalem (Matt. xv. 1). Leaving this neighbour-

hood, the Saviour next travelled to the north-west of Galilee to the regions of Tyre and Sidon, where he healed the daughter of a Syrophenician woman. Returning thence, he passed round by the north of the sea of Galilee to the region of Decapolis, on its eastern side; and among other miracles, fed 4000 persons with seven loaves. His ministry in Galilee was now drawing to a close. According to M. Renan, it had been eminently successful, and everywhere in Galilee he met with a cordial and enthusiastic reception. But the evangelists explicitly state that while here and there a few 'heard him gladly' and embraced his doctrines, the great mass listened to him with indifference and insensibility; and the awful denunciations which he uttered against the towns of Chorazin, Bethsaida, and Capernaum (Matt. xi. 23, 24) clearly imply a complete rejection of his ministry.

A memorable conversation with his disciples respecting self-denial, foreshadowing his own sufferings (Matt. xvi.), was followed by his Transfiguration on the holy mount. He then set out for Jerusalem, as the feast of tabernacles was approaching, taking the direct but less frequented route by Samaria, that his journey might be 'in secret.' On the way he sent out the seventy disciples, an event mentioned only by Luke (chap. x.). He came to Jerusalem 'about the middle of the feast,' and found the minds of the people strongly excited, and public opinion divided respecting his claims. The Pharisees and rulers sought to arrest him, but they feared the people. It is probable that Jesus returned to Galilee, and spent the interval between the feast of tabernacles and that of the dedication in journeying and instructing the people. The parables of the good Samaritan, the prodigal son, the rich man and Lazarus, &c., belong to this period; as also the account of Martha and Mary, and the miracle of the ten lepers. After the feast of dedication Jesus returned to Bethabara, beyond Jordan, where he heard of the illness of Lazarus, and, two days after, proceeding to Bethany, he performed the most signal of his miracles—the raising of his friend from the dead. The publicity and results of this miracle brought matters to a crisis with the Sanhedrim. A meeting was immediately called, and the matter fully discussed, and it was resolved that Jesus should be put to death. The anointing of the Saviour by Mary, the sister of Lazarus; his triumphal entry into Jerusalem; his lamentation over the city, whose destruction he foretold; his second expulsion of the crowd of traders from the temple; the treachery of Judas; the observance of the passover by the Master and his disciples, and the institution of the Lord's Supper; his dreadful agony in Gethsemane, and arrest by a band of soldiers led by the traitor; the trial of the Christ before the Sanhedrim on the charge of blasphemy, and his condemnation; the second trial before Pilate, the Roman procurator, on the charge of sedition, and his ultimate ratification of the sentence of death; the scourging, the blows, and insults of the soldiers; the procession to Calvary, and the crucifixion there of the King of the Jews between two thieves—all followed in rapid succession. On the third day Jesus rose from the grave, according to his own prediction. During forty days he appeared among his disciples, whom he instructed

more fully concerning the nature of his kingdom, and gave them their final commission. He then 'led them out as far as to Bethany, and while he blessed them he was parted from them, and carried up into heaven.'

The great body of Christians have from the earliest ages believed on the combined evidence of his miracles, instructions, and character, that Jesus is the Messiah predicted in the Old Testament Scriptures, the eternal Son of God, equal to the Father. Those who agree in rejecting this view hold widely different opinions among themselves respecting the person and work of Christ: from the high Arian theory that he was the greatest of created beings, down to that of modern infidelity, which regards him as a mere man, and by no means a perfect man. The latest teachers of this school, Strauss, Baur, Renan, and Newman, have now adopted substantially the same theory. Strauss, indeed, at first broached what is called the mythical view, that Jesus was simply a Jewish rabbi who lived in Judea about 1800 years ago, who shared in the feelings and hopes of his countrymen at that period, around whose life a vast number of legends and fables have in the course of time clustered; that after these had floated about in Christian society they were collected and put into shape about the middle of the second century by certain unknown writers, who had no personal knowledge of the transactions described. The notion that such a collection of legends could have been palmed on the world for truth in probably the most sceptical age the world has ever seen, was from the first seen to be absurd by all intelligent men, and has now been completely exploded. Even Strauss himself has been compelled to modify his original theory, and has now ascribed the miraculous events of the Saviour's life to wilful imposition. Renan, Baur, and Newman have adopted the same view, and have substituted for the myth of Strauss the notion of 'conscious design and of planning intuition.' They exonerate the apostles, however, from the reproach of designing untruthful narratives and of fabricating history, and direct their attacks against the person of Christ himself. They speak of the unbounded self-exaltation of Jesus, his deficiency in modesty, humility, and knowledge of self, his enthusiasm verging on insanity, and intolerable pride. M. Renan accuses the Saviour of using artifice and deception to impose on the people, of assuming a character to which he had no real claim, and of pretending to work miracles which are impossible; while at the same time he calls him a man of unparalleled greatness, speaks of his divine instinct and divine life, and says between him and God mankind will not any longer distinguish. The facts, however, of our Saviour's life are related by trustworthy and unprejudiced eye-witnesses, who could have no motive but a regard to truth to narrate events which were at variance with all their prepossessions and expectations, and who sealed their testimony with their blood. These statements were made public at a time when multitudes were alive who could have contradicted them if they had been untrue, and who had the strongest motives to do so; yet no such denial was ever given by the Pharisees and Scribes, and other hostile Jews. The events of our Lord's career being thus established by

the testimony of competent, credible, trustworthy, disinterested witnesses, it necessarily follows that his claims and doctrines are entitled to implicit belief.

The character of Christ, as delineated by the sacred writers, is perfectly harmonious throughout; all the actions and instructions ascribed to him are in strict unison with his personal qualities, as these are with each other. But the Christ of Renan and Baur is a moral monstrosity, a real impossibility, a combination of qualities which never have been, and we may venture confidently to affirm, never will be found in combination in the same person.

JESUS, son of Sirach, was a learned Jew of Jerusalem, who employed himself in collecting sayings of wise men, from which, with additions of his own, he formed the book of ECCLESIASTICUS. ('Ecclesiasticus,' i. 27.) We know little of him but what we can gather from that book, which was probably composed about 180 B.C.

JESUS COLLEGE, CAMBRIDGE, was founded in 1496, by John Alcock, bishop of Ely, who had obtained from King Henry VII. a grant of the nunnery of St. Radegund, then lately suppressed. It has sixteen foundation fellowships, open to natives of England and Wales, without any restriction or appropriation whatsoever. Six of the fellows are required to be in orders. On every vacancy of a fellowship, the master and fellows nominate two candidates, of whom the bishop of Ely elects one. To one of the fellowships, however, founded by James Stanley, bishop of Ely, the bishop has an exclusive right both to nominate and appoint. The mastership of this college is in the absolute appointment of the bishop of Ely. Various scholarships, exhibitions, and smaller foundations, of different annual values, have been bestowed on this college from time to time by different benefactors. The buildings consists of two courts situated in the eastern part of the town. One of the courts is small, very ancient, and surrounded by a cloister. (*Cambridge University Calendar*, 1866.)

JESUS COLLEGE, OXFORD, owes its foundation to the zeal of Hugh ap Rice, or Price, a native of Brecknock, who meditated the establishment of a college which should extend the benefits of learning to the natives of Wales. Queen Elizabeth, on his petition, granted a charter of foundation, dated June 27, 1571, the society to consist of a principal, eight fellows, and eight scholars. Lands were left by the founder, and the income of the college was so increased by different benefactors, that a few years since the society consisted of a principal, nineteen fellows, and eighteen scholars.

But by the recent ordinance of the University Commissioners, as vacancies occur, the fellowships will be reduced to thirteen, which are to be divided, as nearly as possible, into two moieties; one moiety to be termed Welsh fellowships, and to be filled up by natives of Wales or Monmouthshire, if any such be found of sufficient merit. For the other moiety, no person shall be either entitled to preference, or ineligible, by reason of his place of birth. The fellowship founded by King Charles I. for natives of Guernsey and Jersey, is to be applied to the maintenance of not less than two scholars, to be elected by the principal and fellows from persons born in one of the Channel Islands; or educated at Eliza-

beth College, Guernsey, or at Victoria College, Jersey.

One fellowship is devoted to the purposes of the professoriate of the University; and the emoluments of four other suppressed fellowships are to be applied to raise the number of the scholarships, other than King Charles I's, to twenty-two, and their income to 80*l.*, per annum. Of these, twenty are to be termed Welsh scholarships, and to be filled up by persons born in Wales or Monmouthshire; or educated for four years at one of the Free Grammar Schools of Abergavenny, Bangor, Beaumaris, Bottwinnog, and Cowbridge. Two continue to be open scholarships.

There are nearly thirty exhibitions of 40*l.* per annum, tenable for five years from matriculation. This was the first Protestant college, and in its statutes the Protestant religion is guarded by several enactments. (*Oxford University Calendar*, 1866.)

JET, a black bituminous mineral, found in many parts of the world. In France large quantities are procured from the department of Aude; in Spain, from the province of the Asturias; and in England, from Whitby, in Yorkshire. It is a kind of pitch-coal, capable of being cut, and of receiving a fine polish. In Prussia, it is called black amber. It is chiefly used for making mourning ornaments, such as bracelets, brooches, beads, &c.; also, for rosaries, crosses, and other trinkets.

JETHOU. [GUERNSEY.]

JETSAM. [FLOTSAM.]

JEWELLERY. This term comprises the setting of precious stones, and also the manufacture of small ornamental works in gold and silver. It is probable that the wearing of gold and silver ornaments is almost as early as the discovery of those metals. The jewels found in Egyptian tombs bear the stamp of artistic production, and have been rarely surpassed even in modern days.

There are great differences in the quality of the gold used by modern jewellers. Old standard gold used to have, and sterling gold still has, 22 parts of gold to 2 of alloy; new standard has 18 to 6. [HALL MARK.] The so-called fine gold of the jewellers is now usually about 16 carats. Some jewellers' gold is as low as 3 carats, not worth more than about 9*s.* per ounce. Silver, copper, and zinc are used for alloy. There are many compositions and many imitations of gold used by artificers.

The different kinds of jewellery imported into the United Kingdom in 1864—chiefly from Hamburg, Belgium, and France—were valued at 97,099*l.* The exports in the same year were valued at 180,399*l.*, the largest quantities being sent to India, the Channel Islands, and North America.

JEWS, a term, in its widest acceptance, used as synonymous with Hebrews, or Israelites, but in a more restricted sense applied to the inhabitants of the kingdom of Judea as it existed in the time of Jesus Christ, and whose descendants are now scattered over the world. Their ancestor Abraham, called 'the Hebrew,' by birth a Chaldean, emigrated, about 1921 B.C., with his wife Sarah, his nephew Lot, and his servants and flocks, to the land of Canaan, the modern Palestine, where he settled. [ABRAHAM.] At an advanced age his wife bore him a son, Isaac, from whom the Hebrews are descended. Abraham's

elder son Ishmael, whose mother was an Egyptian and a slave, settled in the wilderness of Arabia. Isaac married Rebecca, by whom he had two sons, Esau and Jacob, the former of whom was a hunter, and gave up his birthright to his younger brother Jacob. Jacob, surnamed Israel, or 'the strong' (Genesis xxxii. 28), had twelve sons, namely, Reuben, Simeon, Levi, Judah, Dan, Naphtali, Gad, Asher, Issachar, Zabulon, Joseph, and Benjamin. From these were descended the twelve tribes of Israel, or of the Hebrew nation.

One tribe, the descendants of Levi, was set apart for religious service. Out of this class the officiating priesthood was chosen, as well as the scribes and keepers of records, the judges, and perhaps also the physicians.

The history of this people previous to the time of Christ is contained in the Old Testament and in Josephus.

To the Asmonæan dynasty [ASMONÆANS] succeeded that founded by Herod the Great [HEROD], under whom Christ was born. These kings, dependent on Rome for support, were in fact no more than Roman lieutenants. Under Herod Agrippa a succession of more than usually rapacious Roman governors, Felix, Albinus, and Florus, drove the people into insurrection, and led the way to an open revolt against the Romans. A party called the Zelotes, or fanatics, now obtained an ascendancy over the minds of the people, and the feeble Roman garrison was overpowered and massacred. At the same time the Greeks of Cæsarea put to death all the Jews in that city, but the Roman governor Florus took no notice of the transaction. Other cities of Palestine and Syria followed the example of Cæsarea by a wholesale butchery of the Jews. The Jews retaliated in those towns of Palestine where they were the majority by murdering the Syrians and Greeks. The Romans advanced against Jerusalem, and were repulsed; but Vespasian, an officer of tried abilities, was sent by the Emperor Nero into Syria, A.D. 66–7. Vespasian assembled his forces at Ptolemais, where he was joined by Agrippa and by his own son Titus. His army, including auxiliaries, amounted to 60,000 men. For one year he employed himself in scouring the country and reducing the strongholds of the Jews. In the following year, A.D. 68, Nero's death gave them a respite of nearly two years, during which, however, the inhabitants destroyed each other through intestine factions. At last Vespasian was proclaimed emperor; and Vitellius being defeated, he entered Rome. His son Titus was left behind to complete the subjugation of Jerusalem. The regular siege began in the spring of A.D. 70, and it lasted till the following September, when the Holy City was finally taken and totally destroyed, with its temple: the inhabitants were killed or sold for slaves. Still the Jewish population was by no means extirpated from the country, and we find them rising in vast numbers in the reign of Hadrian, and again engaging the Roman legions commanded by Severus. They were, however, overpowered with immense slaughter, and the second desolation of Judea took place. [BARCOCHEBAS; HADRIAN.]

The dispersion of the Jews over the world, which is commonly dated from the destruction of Jerusalem, had in reality begun long before. The Ptolemies

had transplanted large colonies of them into Egypt, Cyrene, and Cyprus; and Antiochus the Great settled great numbers in the towns of Asia. In the time of Cicero ('Pro Flacco') there was a wealthy Jewish community in Italy. A passage of Philo, in his letter to Agrippa, enumerates the countries in which the Jews were settled in the time of Caligula: Egypt, Syria, Pamphylia, Cilicia, the greatest part of Asia Minor as far as Bithynia, the shores of the Euxine, Macedonia, Thessaly, Ætolia, Attica, the Peloponnesus, Cyprus, and Crete, besides the countries beyond the Euphrates. Alternately persecuted and protected by the emperors, both of the west and of the east, they acquired by their commercial industry wealth and importance when unmolested, and their numbers saved them from annihilation when in disfavour. But the rise of Mohammedanism brought an unfavourable change to the eastern Jews. Mohammed endeavoured at first to win them over, but they refused to acknowledge a descendant of Hagar the bondwoman as the greatest of prophets; and Mohammed treated them without mercy in Arabia, where they were at that time numerous. But under the caliphs, his successors, they were protected on the easy terms of paying tribute; and as they made no resistance, they experienced not only protection, but even encouragement from their new masters, whom they followed through their tide of conquest along the coast of northern Africa. They also contributed materially to the triumph of the Crescent in Spain, where the Jews had really a golden age, which lasted for some centuries. There they cultivated science and literature; and the names of Benjamin of Tudela, Isaac of Cordova, Hasdai, the confidant of Abderrahman, and many others, are examples of their proficiency. At the same time they were thriving in the East under the caliphs of Bagdad, whose favour they enjoyed, at least till towards the end of the tenth century.

Charlemagne protected the Jews like his other subjects: they filled municipal offices; they were physicians and bankers. The Jews enjoyed the same, or even greater influence under Louis le Debonnaire and Charles the Bald, but towards the end of the latter reign the clergy began afresh to show their hostility. Philip Augustus, pressed by the wants of an empty exchequer, and perhaps also by the reports of fanatics, who charged the Jews with all sorts of crimes, banished, in 1180, all the Jews from his dominions, confiscated their property, and declared all debts due to them to be annulled. About twenty years afterwards the Jews were readmitted, but were again expelled under Charles VI.

In Italy the Jews seem to have enjoyed great though not uninterrupted security; but their safest asylum was Poland, where Casimir the Great allowed them considerable privileges, and where they formed the only middle order between the nobles and the serfs. It was in Spain and Portugal, after the expulsion of the Moors, that the proscription of the Jews was most sweeping and effectual. The number of Jews expelled from Spain has been vaguely estimated at 500,000, and even 800,000. The expulsion of the Jews, and that of the Moors or Moriscos, drained Spain of its most useful subjects.

Throughout the dominions of the Sultan the Jews were allowed to settle and follow their trades, though

looked upon with scorn by the Osmanlees. In the regencies of Barbary they settled likewise in great numbers.

During the eighteenth century a milder spirit of toleration manifested itself toward the Jews in several countries of Europe. Maria Theresa and Joseph I. gave them equal rights, and subjected them to the same laws with the Christians. Frederick, called the Great, was not so liberal towards them, for he laid them under peculiar restrictions and disqualifications. In Holland they have long formed a highly flourishing, numerous, honourable, and intelligent community. Napoleon, in 1806, issued an ordinance giving them a regular organization throughout France, and placing them on the same footing as other Frenchmen. This system has remained unaltered. The king of Prussia and other German powers have followed the example. In Russia the Jews are subject to many restrictions, and especially the Rabbins. In the United States of North America they are placed on the same footing as other citizens.

It does not appear at what time the Jews found their way to this island, but they were settled here in the Saxon period, and as early as 750. From the time of the Conquest they rapidly increased in number. In the reign of Edward I., about 1290, all the Jews were banished from the kingdom. Their numbers at that time are conjectured to have been between 15,000 and 16,000. It was not till after the Restoration, in 1660, that they again settled in England. In the year 1753 an Act was passed to enable foreign Jews to be naturalized without taking the sacrament; but the Act was repealed in the following session, under the influence of the popular feeling, which was most strongly opposed to the measure.

During their residence in England, up to their banishment in the time of Edward I., the Jews were considered as the villeins and bondsmen of the king. The statute of the 54th and 55th of Henry III., which declared the Jews incapable of purchasing or taking a freehold interest in land, &c., and the Statutum de Judaismo, 3 Edward I., which forbade Jews from alienating in fee, either to Jew or Christian, any houses, rents, or tenements which they then had, or disposing of them in any way without the king's consent, &c., were repealed by the 9 and 10 Vict., c. 59. By the Reform Act of 1832 they were admitted to the elective franchise, and in 1845 the 8 and 9 Vict., c. 59, was passed, by which they were made eligible to fill all municipal offices. In the following year their marriages were legalized, and in 1855 their places of worship were placed on the same footing as those of Roman Catholics and Protestant dissenters. In 1858 they were admitted to Parliament, by the omission from the usual oath of the words, 'on the true faith of a Christian,' in any case where the person elected shall declare himself a Jew. They are now, therefore, in exactly the same position, and enjoy precisely the same privileges, as other subjects of her majesty.

According to a calculation recently made, there exist in the whole world nearly 7,000,000 of Jews, of whom one-half are in Europe, especially in Russia, where there are 1,220,000. The number in Austria is 853,000; in Prussia 284,500; and in the rest of Germany, 492,000. At Frankfort-on-the-Maine

there is one Jew to sixteen Christians; in Sweden and Norway only one in 600. France contains 80,000, England 42,000, and Switzerland 3200. A remarkable fact is that in the countries where the Jews are completely emancipated their number is diminishing, while elsewhere it is increasing. Since the commencement of the present century the societies for the conversion of the Jews (thirty-three in number, and employing 200 missionaries), have at the most, and with great expense, made but 20,000 proselytes.

Of the 40,000 Jews in England about 20,000 are in London. They have in England and Wales about sixty synagogues, with accommodation for about 10,000 worshippers. In Scotland and Ireland their numbers are very few indeed, but they are more numerous in the British colonies and the United States. In scarcely any country in the world is there now any active persecution against them or their faith.

JHILUM. [HINDUSTAN.]

JIB, a triangular sail placed in front of the foremast in all vessels, in small ones having the bowsprit for a base, in large ones the jib-boom. The flying-jib, or extra front sail, has the flying jib-boom for its base. The *jib-boom* is an extension of the bowsprit, and a flying jib-boom runs out beyond this, thus giving a greater spread for the jib-sails.

JIDDA. [ARABIA.]

JOA'CHIMITES, a sect of heretical Christians of the thirteenth century, founded by Joachim, abbot of Flora, in Calabria, who was esteemed a great prophet while he lived, and left behind him several books of prophecy. Their tenets were formally condemned by the councils of Lateran and Arles in 1215 and 1260.

JOAN, POPE, a supposed individual of the female sex, who is placed by several chroniclers in the series of popes between Leo IV. and Benedict III., about 853-55. David Blondel, a Protestant, completely refutes the story in his '*Familière Eclaircissement de la Question si une Femme a été assise au Siège Papal entre Leon IV. et Benoit III.*' Amsterdam, 1649.

JOAN or JOANNA I. of Naples, daughter of King Robert of Naples, of the Anjou dynasty, succeeded her father in 1343. She was then only sixteen years of age, but had been married some time to her cousin Andreas of Hungary. Andreas claimed to be crowned king, and to share his wife's authority. A conspiracy was formed by some of the barons, and Andreas was strangled. There seems little or no doubt that Joan knew of the plot; but nevertheless, by her orders, torture was employed to find out the conspirators, and many persons were put to a cruel death. The same year Joan married her relative Louis, prince of Tarentum. Louis, king of Hungary, and brother of Andreas, came with an army to avenge his brother's death, but Joan having been acquitted of the murder by Pope Clement VI., of whom she had demanded a trial, and a pestilence breaking out in Naples, the Hungarians withdrew, and Joan reigned many years in peace. Having lost her second husband in 1362, she married a prince of Majorca, and on his death she married, in 1376, Otho, duke of Brunswick. Soon afterwards the schism between Urban VI. and Clement VII. broke out, and Joan took part with the latter. Urban excommunicated her, and gave the investiture of the kingdom to her niece's husband,

Charles Durazzo, who revolted against his sovereign and benefactress, and took her prisoner. He tried to induce Joan to abdicate in his favour, but she firmly refused, and named as her successor Louis of Anjou, brother of Charles V., king of France. Charles then transferred Joan to the castle of Muro, in Basilicate, where he caused her to be strangled or smothered in her prison in 1382.

JOAN OF ARC. [ARC, JOAN OF.]

JOANES, or JUANES, VICENTE, a Spanish painter, was born at Fuente la Higuera in Valencia, in 1523. He studied in Italy, and chiefly the works of the Roman school. He died December 21, 1579, whilst engaged in finishing the altar-piece of the church of Bocairente. His best works are in the cathedral of Valencia, and there are several good specimens at Madrid.

JOANNINA, or JANINA, the capital of the Turkish province of Albania, and the residence of a pasha, is situated on the south-western shore of the Lake of Janina, in 39° 47' N. lat., 20° 53' E. long., and has about 25,000 inhabitants. It is supposed to stand on or near the site of the ancient Dodona. The city was taken in 1082 by the Normans, who under Bohemond, son of Robert Guiscard, defeated the Emperor Alexander Comnenus under its walls. In 1432 it fell into the hands of the Turks. An unsuccessful attempt made by the Albanian Greeks in 1611, to shake off the Turkish yoke, led to their expulsion from the old or fortified part of the town, and to the extension of the city along the shores of the lake on each side of the fortress. Janina was the capital of the famous Ali Pasha [ALI PASHA], under whom it contained 40,000 inhabitants, including the garrison, sixteen mosques, eight Greek churches, the seraglio and palaces of the pasha, the fortress mentioned above, and two others named Coulia and Litaritza. When Ali found himself no longer able to defend his capital against the Turks, he ordered it to be set on fire. So great was the destruction that followed, that although some of the houses have been rebuilt, the city has still a deserted and ruined appearance. The house situated on the small island opposite to the peninsula on which the fortress stands still bears marks of the violence used in the murder of Ali. A British consular agent resides in Janina, and there are extensive manufactures of gold brocade by Greek workmen, as well as gold lace for the East, and morocco leather, silk goods, and coloured linen. There are several mosques and Greek churches in the town. Janina stands in the midst of an extensive and fertile plain which produces fruits and grain in abundance.

JOB, *the Book of*, is one of the poetical books of the Old Testament. Its title is taken from the patriarch Job, whose story it relates. Some critics have supposed, from the nature of the exordium, that Job was not a real person, and that the narrative in the book is fictitious. He appears, however, to be referred to as a real person by Ezekiel (xiv. 16), and James (v. 11); and the style of the book has all the circumstantiality of a real narrative. It has been inferred, from his longevity (xlii. 16), his holding the office of priest in his own family (i. 5), his allusion to no other species of idolatry than the worship of the heavenly bodies (xxxi. 26-28), the

silence of the book respecting the history of the Israelites and the Mosaic laws, and several incidental allusions to patriarchal customs, that Job lived in the patriarchal age. The scene of the poem is laid in the 'land of Uz,' which, as Bishop Lowth has shown, is probably Idumæa. The language is Hebrew, with a considerable admixture of Arabic, or, as others contend, of Aramaic. The author is unknown, but is supposed to have been contemporary with Abraham. The canonical authority of the Book of Job is fully established by frequent quotations from it, both in the Old and New Testament.

JOHN, king of England, surnamed Sansterre, or Lackland, was the youngest son of Henry II., and was born at Oxford, December 24, 1166. John married the youngest daughter of William, earl of Gloucester. In 1178 his father conferred upon him the dignity of Lord of Ireland; and in 1185 John went to take the government into his own hands; but the insolent demeanour of the prince and his attendants so disgusted the Irish, that his father found it necessary to recall him in the following December.

No opposition was offered by John to the accession of Richard, notwithstanding his own ambitious expectations; but when the intelligence of his brother's captivity arrived in 1193, John at once openly took steps for the usurpation of the throne. In this attempt, however, he was successfully resisted; and on the return of Richard to England, in March, 1194, John's castles and estates were seized by the Crown, and he fled to Normandy, whither he was followed by the king at the head of an army; but the traitor made his peace by an abject submission. It is said that Richard, when on his death-bed, was induced to declare John his successor.

John was present when Richard expired at Chalus, 6th April, 1199, and before visiting England he hastened to secure the submission of the various continental territories of the Crown. Meanwhile in England, by the activity of the justiciary Fitz-Peter, a unanimous resolution to receive him as king had been obtained from a great council held at Northampton. Soon after this, John made his appearance in person; and he was crowned at Westminster, on the 26th of May, the festival of the Ascension.

Philip Augustus of France having, for his own purposes, espoused the cause of Arthur (the son of Richard's elder brother Geoffrey), whom he had got into his possession, soon overran both Normandy and Anjou; but in May, 1200, John purchased a peace. The next year John procured a divorce from his wife on the plea of consanguinity, and married Isabella, daughter of Aynar, count of Angoulême, who had already been betrothed, and even privately espoused, to Hugh, count of La Marche. The complaints of the count gave Philip such a pretence as he wanted for renewing the war; and again putting Arthur forward as the legitimate lord of the old fiefs of the Plantagenets, he rapidly obtained possession of all the most important towns and places of strength in those countries. Arthur, however, was taken captive by his uncle (August 1, 1202), immediately consigned to close custody in the castle of Falaise, whence he was removed to Rouen, and was universally believed to have been there put out

of existence by his uncle's order. Notwithstanding the capture of Arthur, however, the war in France went wholly against John: and before the end of the year 1204, Normandy, Anjou, Maine, and Touraine were rent from the crown of England, and reannexed to that of France. Two years afterwards John made an unsuccessful attempt to recover what he had thus lost.

While still at war with France, John became involved in another contest at home. By insisting upon the right of the crown to nominate the archbishop of Canterbury, he drew upon himself the hostility of the whole body of the national clergy, and also of the Pope [INNOCENT III.], at whose instigation Philip Augustus prepared to invade England.

The ill success of an expedition against France induced John to make the most humiliating submissions to the Pope, to whom he surrendered his kingdom and paid homage and tribute. Philip, mortified by this pacification, would have persisted in his project of invasion but for the result of a battle fought in June, 1213, between the English and French fleets, in the harbour of Damme, the first great victory in the naval annals of England, in which 300 of his vessels were captured, about 100 burned, and all Philip's military stores and provisions taken or destroyed. On the 19th October, 1214, a truce was arranged between the two kingdoms, to last for five years. But the depressed state of John's affairs now presented to his barons an opportunity for the renewal of demands which they had repeatedly made in vain. The result was the celebrated meeting on the plain of Runnimede, on Trinity Monday, June 9th, 1215, and the concession and signature of the Great Charter. [MAGNA CHARTA.] This was followed by fresh encounters with the barons, caused by John's endeavours to escape from the obligations of the charter, which the Pope annulled at his request, excommunicating the barons and laying London under an interdict. John contrived to triumph not only over these adversaries, but also to defeat the king of Scotland, who had taken the opportunity to invade the kingdom. The barons, as a last resource, invited Louis the dauphin to accept the crown. Louis set sail from Calais with a fleet of six hundred and eighty sail, and on May 30, 1216, landed at Sandwich, attacked and reduced the castle of Rochester, and immediately marched to the capital. The contest which followed seemed of doubtful issue; but on October 14th, as John was attempting to ford the Wash at low-water, from Cross-keys to the Fossdyke, and had already got across himself with the greater part of his army, the return of the tide suddenly swept away the carriages and horses that conveyed all his baggage and treasures; on which, in an agony of vexation, he proceeded to the Cistercian convent of Swineshead, and was that same night seized with a violent fever, which was attributed to poison. He was conveyed the next day in a litter to the castle of Sleaford, and thence to the castle of Newark, where he expired, October 18th, in the forty-ninth year of his age, and the seventeenth of his reign. He was succeeded by his son Henry. [HENRY III.]

JOHN I.—XXIII. [POPE.]

JOHN OF GAUNT. [EDWARD III.]

JOHN OF SALISBURY finds a place in every catalogue of learned Englishmen. His era was the reign of King Henry II. John had studied at Oxford, but he visited also the universities of France and Italy. He became bishop of Chartres in 1164, and died in 1182. His principal historical writings were lives of two archbishops of Canterbury, Anselm and Thomas à Becket. But the work by which he is best known to scholars is entitled 'Polycraticus, sive de Nugis Curialium et Vestigiis Philosophorum,' in which he describes the manners of the great, speaking not unfrequently in a style of sharp satire. His other works are of inferior interest.

JOHN O'GROAT'S HOUSE, Scotland, in the county of Caithness, a mile and a half west from Duncansby Head, is a site once occupied by a cottage, and proverbially nearly the most northern point of Great Britain. According to tradition the name is a corruption of John de Groot, a Dutchman, who settled at the spot about the reign of James IV., and arranged a dispute among his eight sons upon a point of precedence, by making eight doors to his dwelling, by which means they passed in and out without quarrel. Whatever may be the value of the tradition, there can be no doubt as to the existence of a John Groot, for in 1496, 'John Groot, son of Hugh Groot,' had a grant of a penny land in Duncansby, from William, earl of Caithness. The family still exists.

JOHN, SAINT, *the Baptist*, son of Zachariah, a Jewish priest, and Elizabeth, his wife, who was a near relation of Mary, the mother of Jesus Christ, was born to them in their old age. The sacred office was assigned to him of being the precursor or herald of the Messiah. With the acts of John the Baptist begins the public ministry of Jesus Christ, who at his baptism was announced, both by the Baptist himself and by a voice from heaven, to be the Son of God, the Messiah.

From this time we hear little more of John till we find him in prison. He had ventured publicly to reprove Herod the king for an act of great immorality. Herod had married Herodias, who was the wife of Philip, tetrarch of Idumæa, his own brother. The Baptist's reproof was resented more violently by Herodias than by Herod, and at her instigation John was beheaded.

JOHN, SAINT, *the Apostle and Evangelist*. James and John, the sons of Zebedee, were both admitted by our Saviour into the number of his Twelve Apostles, and John was throughout distinguished by him with peculiar marks of regard, as we find in all the Gospels.

After the resurrection of Jesus he was again distinguished by his notice; and when Jesus had ascended to heaven, and the interests of the gospel were committed especially to those who had been chosen by him out of the world, John became one of the leading persons in the church.

Saint John's labours in the church were chiefly among the inhabitants of Syria and Asia Minor, and no doubt he had a large share in planting Christianity in those provinces, where for a time it flourished greatly. We have no particulars of his labours on which we can safely rely; but there is little reason to doubt that he was at one period of his life banished to the island of Patmos, and that

there he wrote the book called the 'Apocalypse,' or 'Revelation.'

There are also preserved three of his epistles; but the most valuable of his writings which have descended to our time is his Gospel.

JOHN, ST., OF JERUSALEM, KNIGHTS OF. [MALTA, KNIGHTS OF.]

JOHN, ST., River. [CANADA.]

JOHN'S COLLEGE, ST., CAMBRIDGE, was projected and begun by Margaret, countess of Richmond, a short time before her death, which happened in 1509. It was completed by her executors, under the authority of a papal bull and the royal mandates of her son and grandson, King Henry VII. and King Henry VIII., which gave them the power of suppressing a decayed hospital dedicated to St. John, at that time existing on the same site. The college, then consisting only of the present first court, was four years in building. The original endowment was for fifty fellows, but part of the foundation-estates having been seized by King Henry VIII., the funds were found to be sufficient for thirty-two only. The college now consists of a master, fifty-six fellows, and sixty foundation scholars, the fellowships and scholarships being open to all British subjects without any restriction or appropriation. There are also studentships in divinity and law, and several exhibitions and annual prizes.

The present buildings consist of the first court, a second court of large dimensions, and a third which contains the library. A handsome new court, built by Rickman on the opposite side of the river Cam, is connected with the old buildings by a bridge. (*Cambridge University Calendar*, 1866.)

JOHN'S COLLEGE, ST., OXFORD, was founded in 1555 by Sir Thomas White, Knt., alderman of London. The original foundation consisted of a president, fifty fellows and scholars, one chaplain, an organist, six singing men, eight choristers, and two sextons.

Under a recent ordinance of the university commissioners, amended by a committee of the privy council, the foundation is hereafter to consist of eighteen open fellowships tenable for life, five open scholarships and twenty-eight appropriated scholarships tenable for seven or five years, by persons elected from Merchant Taylors' School who shall not have attained the age of nineteen, and from the other schools who shall not have attained the age of twenty at the time of their election, viz., twenty-one to Merchant Taylors' School, two to Coventry, two to Bristol, two to Reading, and one to Tunbridge. There is also one open scholarship, called the Holmes scholarship, tenable for four years, without limitation in regard to age.

In 1854, four fellowships were established in this college in pursuance of the will of Dudley Fereday, Esq., of Ettingshall Park, Staffordshire. They are open, with certain limitations and under certain conditions in respect of literary proficiency, first, to the kindred of the founder; secondly, to natives of Staffordshire; and in case of a founder's kin or Staffordshire candidate not satisfying the conditions, then to any other person whatsoever, being a member of the Church of England. The tenure of the fellowships is for fourteen years.

The buildings of St. John's College form chiefly

two quadrangles, of which the first was originally St. Bernard's College, founded in the time of Henry VI. King Henry VIII. had granted these premises to Christ Church, Oxford, from which college Sir Thomas White purchased them in 1555. The second quadrangle was entirely built at the expense of Archbishop Laud. It was begun in 1631, and completed in 1635, from a design furnished by Inigo Jones. (*Oxford University Calendar*, 1866.)

JOHN'S, ST. [NEWFOUNDLAND.]

JOHN'S, ST. [NEW BRUNSWICK.]

JOHNSON, SAMUEL, the son of Michael Johnson, a bookseller at Lichfield, was born at Lichfield, September 18, 1709. As a child he was afflicted with the king's evil, which disfigured his face and impaired his eyesight. His education was commenced at Lichfield, whence he was removed to a school at Stourbridge; and in 1728, two years after he had left Stourbridge, he was placed at Pembroke College, Oxford. His father was unable to continue to maintain him at college, and he was compelled to return home without having taken a degree. In the December following (1731) his father died in such pecuniary distress, that Johnson was soon afterwards glad to become usher of a school at Market Bosworth, in Leicestershire; but finding the drudgery of this employment intolerable, he procured temporary employment in translating for a bookseller in Birmingham. During his residence in this town he became intimate with the family of a mercer named Porter, whose widow he subsequently married (1736). Mrs. Porter was more than twenty years older than himself, but he was much attached to her, and she added to other powers of increasing his happiness the possession of 800*l*. With this capital he established a school; but the scheme failed, and he left Staffordshire with his pupil Garrick to seek his fortune in the metropolis. He was employed by Cave the bookseller, the projector of the *Gentleman's Magazine*. In 1738 he published his 'London,' an imitation of the third satire of Juvenal, for which Mr. Dodsley gave him ten guineas, and by which he obtained a certain degree of reputation. His pen was continually at work, and his pamphlets, prefaces, epitaphs, essays, and biographical memoirs were continually published by Cave, either by themselves or in the *Gentleman's Magazine*, for which periodical in 1740, and for more than two years afterwards, he wrote the parliamentary debates. In 1744 he published his 'Life of Savage,' in the following year some observations on Shakspeare, of whose plays he afterwards published an edition. In 1747 he commenced his 'English Dictionary,' which he engaged to complete in three years for 1757*l*. In 1749 appeared 'The Vanity of Human Wishes,' an imitation of the tenth satire of Juvenal; and in the following year was printed the first paper of the 'Rambler.' On the death of his wife in 1752, he relinquished the 'Rambler.' The 'Dictionary' was published in 1755, in 2 vols. folio. In May, 1762, George III., through his minister Lord Bute, granted Johnson a pension of 300*l*. a year, and the days of his penury were at an end. He was introduced in the following year to his biographer Boswell, and we have from this date (1763) as full and minute an account of him as has ever been written of any individual.

In 1765 the University of Dublin sent over a

diploma creating him a doctor of laws; but he did not assume the title until some years afterwards, when the University of Oxford conferred a similar honour upon him.

In 1766 his friend Mr. Thrale received him into his house at Streatham. In the autumn of 1773 he made a tour, in company with Mr. Boswell, to the Western Islands of Scotland, of which he published an account. Two years afterwards he made a short excursion to Paris. The last of his literary labours was 'The Lives of the Poets,' 4 vols. 8vo., 1781. He died December, 1784, at his house in Bolt Court, Fleet Street. He was buried in Westminster Abbey, near the foot of Shakspeare's monument, and close to the grave of Garrick.

Boswell's 'Life of Samuel Johnson, LL.D.,' was published in 1791, 2 vols. 4to. Many editions have been since published. Boswell's life, of which there are numerous editions, still remains the principal authority. Some interesting details respecting the great lexicographer will be found in Hayward's edition of the 'Letters of Mrs. Thrale-Piozzi.'

JOHNSTON, GEORGE, an eminent Scottish naturalist, was born at Simprin in Berwickshire, on the 20th July, 1797, and died on the 30th July, 1855, at the age of fifty-eight. He was sent to school at Kelso, and then to Berwick. He afterwards went to the high school of Edinburgh, and he commenced his medical studies in that city about 1812, as an apprentice of the late Dr. Abercrombie. He passed as surgeon, and then went to London. He commenced practice at Belford. Subsequently he took the degree of M.D. at the University of Edinburgh, and became a fellow of the Royal College of Surgeons. He then settled as a medical man in Berwick, where he remained till his death. While he was a successful and celebrated medical man, he was also distinguished as a naturalist, and he lost no opportunity of cultivating science. He was an able zoologist and botanist. He published a 'Flora of Berwick-upon-Tweed;' 'The Botany of the Eastern Borders;' 'History of British Zoophytes,' and of 'British Sponges;' and he contributed various papers to *Loudon's Magazine*, and to the *Magazine and Annals of Botany and Zoology*, now continued under the name of *Annals of Natural History*. He was one of the editors of the last-named journal. He had a happy geniality of mind, and a kindness of disposition which endeared him to all. Wherever he went he gained friends, and he was universally beloved. He was the founder and first president of the Berwickshire Naturalists' Club, which has published valuable Proceedings. He was three times elected mayor of Berwick, and twice served the office of sheriff.

JOIGNY. [YONNE.]

JOINERY (French, *Menuiserie*) is the art of joining pieces of wood together for the interior fittings of buildings, for making articles of furniture, and for numerous purposes requiring greater neatness of workmanship than the operations of the carpenter. As carpentry and joinery are in many cases carried on in the same establishment, and even by the same workmen, it would be difficult accurately to define the limits of these two kindred trades. The proper object of carpenter's work in a building is to give firmness and stability to the structure; and within

its proper range may be embraced all the rough timber-work necessary for the support, division, or connection of the several parts of a building. Carpentry thus includes the construction of the framing of floors, partitions, and roofs. Joinery has for its object the addition of all the fixed wood-work necessary for convenience or ornament. Cabinet-making, or that department of wood-work which relates to the making of furniture, has little affinity with joinery, although the same materials and tools are employed in both descriptions of work. The line of demarcation, however, between joinery and cabinet-making seems to be even more difficult to define than that between carpentry and joinery; and, with the exception of such matter as veneering and polishing, which relate only to the use of the harder and more valuable woods, the operations of the cabinet-maker and the joiner are nearly identical, the same means being adopted by both for the production of neat and strong joints, and for evading the injurious effects of shrinkage and warping in the material operated upon. See Plate for illustration of details connected with this subject.

JOINT. [ARTICULATION.]

JOINT-STOCK BANKS. All banks which have more than six partners are called Joint-stock Banks, and were first allowed by 7 Geo. IV., c. 56, passed in 1826. The operations of the Bank of England are controlled by the 7 & 8 Vict., c. 32. [BANK.]

Private Banks.—By the 7 & 8 Vict., c. 98, no new bank of issue can henceforth be established in England, and only those bankers are now allowed to issue notes who were issuers on the 6th of May, 1844. The Act contains other regulations as to private banks of issue, and requires among other things a weekly return to the commissioners of stamps.

Joint-Stock Banks.—Nearly twenty years elapsed from the date of the Act which allowed the establishment of joint-stock banks, before a comprehensive Act was passed 'to regulate joint-stock banks in England.' This is the Act 7 & 8 Vict., c. 113, which received the royal assent on the 5th of September, 1844. On the same day, another Act (7 & 8 Vict., c. 111) received the royal assent, entitled 'An Act for facilitating the winding up the affairs of Joint-stock Companies unable to meet their pecuniary engagements;' and s. 48 of 7 & 8 Vict., c. 113, enacts that every banking company of more than six members in England shall be deemed a trading company within the provisions of this Act.

By sec. 47 of this Act every company of more than six persons, carrying on the business of bankers, is required to present a petition to her majesty in council, signed by at least seven shareholders, praying for a grant of letters patent; and this petition must set forth certain matters which are required by the Act. When joint-stock banks were first established, each shareholder was answerable to the extent of his whole property. By 1 Vict., c. 73, they were rendered liable only to the extent of their shares; but the liability did not extend to the shareholders as a body. By 7 & 8 Vict., c. 113, s. 47, the liability of any shareholder extends equally to the whole body of shareholders as a company; but if execution upon any judgment against the company shall be ineffectual to obtain satisfaction, then any shareholder may be proceeded against. These Acts have been repealed

by the Act noticed in the next article [JOINT-STOCK COMPANY], but the same Act re-enacted the 47th sec. of 7 & 8 Vict., c. 113, and also re-enacted sec. 12 of 20 & 21 Vict., c. 49, which made it lawful for ten persons, instead of the limit of seven, to form a banking partnership.

JOINT-STOCK COMPANY. Joint-stock companies are such companies as are unincorporated, and which trade upon a joint stock. All trading associations, however numerous, and although not established by charter or Act of Parliament, are legal, provided their purposes be legal, and provided they do not attempt to exercise the privileges of a corporation, such as the power of making their shares transferable at the will of the holder. The partners in joint-stock companies are of two classes: one consists of directors, trustees, and others, who are actively employed in conducting the concern; the other, of a number of persons who take little or no part in its management, and many of whom become shareholders for the sake only of a profitable investment of their money. The general conduct of the trade falls upon the directors, while the more particular transactions are usually managed by paid agents who are not shareholders. The funds and other property of the company are vested in the trustees.

Formerly the shareholders in a company were liable personally to all the debts of the company after its assets were exhausted; and the first attempt at limiting the liability of shareholders was made by 21 & 22 Vict., c. 91. Several acts were passed, but it was found that continual questions of liability rose under them, and the legislature determined by one comprehensive measure to settle the law of limited liability.

By the 25 & 26 Vict., c. 89, or 'The Companies' Act, 1862,' the laws relating to the incorporation, regulation, and winding up of trading companies and other associations were consolidated and amended, and came into operation on the 2nd November, 1862. By it no company, association, or partnership, consisting of more than ten persons, shall be formed after the commencement of the Act for the purpose of carrying on the business of banking, unless it is registered as a company under this Act, or is formed in pursuance of some other Act of Parliament, such as a local or personal Act, or 7 Geo. IV., c. 46, which is not repealed, or in pursuance of letters patent; and no company, association, or partnership, consisting of more than twenty persons, shall be formed for the purpose of carrying on any business, unless it is registered as a company under this Act, or is formed in pursuance of some other Act of Parliament, or of letters patent, or is a company engaged in working mines within, and subject to the jurisdiction of, the Stannaries. This Act is divided into nine parts, relating to the following subject matters:—1. To the constitution and incorporation of companies under the Act. 2. To the distribution of the capital, and liability of members of companies under the Act. 3. To the management and administration of such companies. 4. To the registration office. 6. To application of the Act to companies registered under the Joint-stock Companies Act. 7. To companies authorized to register under the Act. 8. The application of the Act to unregistered companies. 9. To repeal of acts, and temporary provisions.

Any seven or more persons may, by subscribing

their names' to a memorandum of association and registering the same, form a company, with or without limited liability. The liability of the members may be limited to the amount, if any, unpaid on the shares held respectively by them, or to such amount as they may respectively undertake by the memorandum of association to contribute to the assets of the company. Where the formation is on the principle of limited liability, the memorandum must contain the following things:—1. The name of the proposed company, with the addition of the word 'limited' as the last word in such name. 2. The part of the United Kingdom in which the registered office of the company is situate. 3. The objects of the company. 4. A declaration that the liability of the shareholders is limited. 5. The amount of the capital divided into shares of a fixed amount. When a company is formed on the principle of the members undertaking to contribute to the assets of the company to a certain amount, the first three of the above requisites are needful, and then a declaration of undertaking to contribute a sum not exceeding a certain amount, in the event of the company being wound up. Where no limit is placed on the liability of members, then only the first three requisites. The Act in a schedule supplies the rules, or 'articles of association,' which shall govern it; but these may be to such form as the promoters may think proper, provided such articles are registered with the memorandum of association. Any member may have, on request and the payment of one shilling, a copy of such memorandum and articles.

A register of the names, addresses of, and number of shares taken by, the members must be kept open to the inspection of every one, to members free, and to others on payment of one shilling. A copy of this register must at least once a year be sent to the registrar of joint-stock companies.

The liability of a member ends after he has ceased to be a member for one year; and he is liable to contribute to no debt contracted after he has ceased to be a member. The present members are liable in the first instance. The liability extends only to the amount subscribed for by each member.

All mortgages and charges on the property of the company must be registered. Limited banking companies, and insurance and deposit, provident or benefit societies under the Act, must at certain stated times make a return of its assets and liabilities, and place the same in a conspicuous part of its offices. The articles of association may be altered at a general meeting by a special resolution, carried by the vote of the majority at such meeting, provided not less than three-fourths of the members be present. Upon the application of a certain number of members, the Board of Trade may appoint an inspector to examine into the affairs of the company, the application being supported by such evidence as the Board of Trade may require. A company may be wound up, 1. Whenever it has passed a special resolution requiring the company to be wound up by the Court. 2. Whenever it does not commence its business within a year from its incorporation, or suspends its business for the space of a whole year. 3. Whenever the members are reduced in number to less than seven. 4. Whenever the company is unable to pay its debts. 5. Whenever the Court is of opinion that it is just and equitable that the company should be wound up. The

'Court' is defined to mean the Court of the vice-warden of the Stanneries, where his jurisdiction extends; the High Court of Chancery, when a company is registered in England; when in Ireland, the High Court of Chancery there; when in Scotland, the Court of Session in either division thereof. The Courts of Chancery in England and Ireland may order the proceedings to be transferred to the Court of Bankruptcy. Under the proceedings in winding up a company an official liquidator is appointed, whose duties are to collect the assets of the company, to settle the list of contributories, and generally to liquidate the affairs of the company.

The Act is to extend to all joint-stock companies registered under the Joint-stock Companies Acts of 1856, 1856–57, 1857, and 'the Act to enable Joint-stock Banking Companies to be formed on the principle of Limited Liability,' but not to the Act of 8 Vict., intitled 'an Act for the Registration, Incorporation, and Regulation of Joint-stock Companies.' The regulations for registering old companies under the Act are very special and numerous, and would be out of place here. It may be noted, that no banking company claiming to issue notes in the United Kingdom is entitled to limited liability in respect of such issue, and that where a bank is registered under this Act a special notice must be given to all its customers.

The effect of this enactment has been something marvellous, the capital now embarked in limited liability being, at the last return (April, 1866), upwards of a thousand millions sterling. Persons who hitherto could not embark in undertakings whereby they hoped to extend the amount of profit on their capital, because they shrank from the endless liability they incurred, now can enter into partnership in a legitimate trading, knowing for a certainty at the outset the full extent to which they may be called upon. Doubts exist in the minds of many whether the effect of this Act has not rather been pernicious than otherwise, seeing the enormous amount of speculation it has produced. On the other hand, the principle is sound, and trading is largely induced and greatly extended; and it is hardly an argument that because unprincipled persons turn to evil a good principle that that principle should not be extensively and legitimately used.

JOINT TENANCY signifies joint ownership of two or more persons in land, or other property, as goods and chattels. It differs from Tenancy in Common and Coparcenership in the following essentials: Joint tenants are considered to be severally seised or possessed of the undivided whole of the land or other property in which they have a joint interest, and also of their several shares, which shares are always equal shares, inasmuch as joint tenants take by purchase only, and by a joint title: the estate or interest must be limited to the several persons by the same deed or instrument, and such estate or interest must vest in them at the same time, except (according to the more common opinion) the estate be limited to take effect under the Statute of Uses or by devise, in which case the contemporaneous vesting of the several parts is not necessary: the whole estate or property goes to the survivors and survivor of the joint tenants if the jointure continue until such survivorship; which is the important characteristic of a joint tenancy. Any

joint tenant may transfer his interest to any one of his companions by release; and any joint tenant may convey his share to a stranger by grant; or he may compel his companions to make a partition. Every person to whom the interest of a joint tenant is transferred becomes, as to such share, a tenant in common with the remaining joint tenants.

A joint tenant cannot dispose of either the whole or the part of the property in which he is jointly interested consistently with the proper notion of a joint tenancy, by a will made during the continuance of the joint tenancy, even though he should happen to be the survivor; because until he has survived he has nothing to dispose of by will. But by severing the joint tenancy he acquires the power of disposing of his share by will. By the Act of 1 Vict., c. 26, a person may, by a will made according to the provisions of that Act, dispose of all real and personal estate to which he shall have a legal or equitable title at the time of his death, and which, if not disposed of by will, would go to his heir, or the heir of his ancestor, or to his personal representatives. But this Act gives no power of disposal over the unsevered interest of a joint tenant.

JOINTURE is the income secured to a wife for life under her marriage settlement, and is accepted in lieu of dower.

JOINVILLE. [MARNE-HAUTE.]

JOINVILLE, JEAN, SIRE or LORD DE, born of a noble family of Champagne. Joinville accompanied Louis IX. of France in his first crusade in 1248, and his narrative of the six years during which that crusade lasted is extremely interesting. It is entitled 'Histoire de St. Louis IX., Roi de France, par Jehan Sire de Joinville,' and has been often republished. One of the best editions is that by Ducange, folio, 1668. It has been translated into English by T. Johnes, 2 vols. 4to, 1807. Joinville, after his return to his native domain, continued to enjoy Louis' confidence. Joinville avoided the court of Philip le Bel, but is said to have joined the army which Louis X. collected at Arras against the Flemish. He died not long after; but the precise date is not known. Joinville and his predecessor, Villehardouin, are among the oldest of the French chroniclers who wrote in the vernacular tongue.

JOLIBA. [QUORRA.]

JONAH is one of the twelve minor Hebrew prophets. It is said in 2 Kings xiv., that he was the son of Amittai, of Gath-hepher, a city of the tribe of Zebulun. From the remainder of the passage some critics have supposed that Jonah lived under Jeroboam II., who reigned from 823 to 782 B.C., while others think that Jonah prophesied of Jeroboam, and was consequently much earlier—probably the earliest of the prophets whose time can be ascertained. There is no authentic information concerning Jonah later than what the book of Jonah records. The probability is that he returned from Nineveh to his own country, and died there. The history of Jonah is referred to in several passages of the New Testament (Matt. xii. 39–41; xvi. 4; Luke xi. 29, 30, 32), from which it appears improbable that the book of Jonah is to be considered merely a story of the nature of a parable, as some have supposed. The canonical authority of the book is generally admitted.

JONES, INIGO, was born in 1573, in the neighbourhood of St. Paul's, London. By his talent for drawing he attracted the notice of William, earl of Pembroke, by whom he was sent to Italy, and found himself in an entirely new world of art, which he carefully studied. Jones returned to England in 1605, and was employed at court in devising the machinery and decorations of masques and pageants. He was appointed architect to the queen and to Prince Henry. After a second visit to Italy he was employed to build the palace at Whitehall; and soon after the only portion ever built of it, namely, the Banqueting House, was completed, he engaged in a task of a very different nature, that of ascertaining the origin and purpose of Stonehenge; but he left the question, as he found it, a subject for speculation.

The church of St. Paul, Covent Garden, York Stairs, and Ashburnham House, Westminster, yet remain among his works in the metropolis. To give a list of all the buildings attributed to him would occupy a considerable space. He died in June, 1653, at the age of eighty.

JONES, GENERAL SIR JOHN T., K.C.B., historian of the war in Spain, was born in 1783, and first obtained his commission in 1798, in the Royal Engineers. He distinguished himself in various campaigns, especially in the Peninsula under the duke of Wellington, and in 1837 he became a general officer, and K.C.B. He was the first officer who published a history of the war in Spain. His 'Journals of Sieges in Spain,' which is a storehouse of military information, was first published in 1813, and has since passed through various editions. He died at Cheltenham in 1843.

JONES, SIR WILLIAM, was born in London, September 28, 1746. William Jones, his father, was a mathematician of some eminence.

Jones, at the age of seven, was sent to the grammar-school at Harrow, where, during the last two years, he did not confine himself to the study of the classical writers, but learned the Arabic characters, and made some progress in Hebrew. During the vacations he studied the French and Italian languages.

In 1764, at the age of seventeen, he entered at University College, Oxford. In 1765 he went to reside in the family of Earl Spencer, in order to superintend the education of Lord Althorp. During the five years that he stayed there he made great acquisitions in Oriental literature, and obtained the reputation of being one of the first Oriental scholars of his age. In his twenty-first year he began his 'Commentaries on Asiatic Poetry,' which were written in Latin, and published in 1774, under the title of 'Poeseos Asiaticae Commentariorum Libri Sex.' In 1771 he replied anonymously in French to Anquetil du Perron, who had attacked the University of Oxford and some of its learned members in his introduction to the 'Zend-Avesta.' In 1772 Mr. Jones published a small volume of poems consisting chiefly of translations from the Asiatic languages.

In 1774 Mr. Jones was called to the bar. While diligently attending the courts of law, he wrote an essay on the law of bailments; but his legal studies were superficial. In 1783 he was appointed a judge in the supreme court of judicature at Fort William

in Bengal, and was knighted. A few weeks after he married Miss Shipley, the eldest daughter of the bishop of St. Asaph.

Sir William Jones arrived at Calcutta at the close of the year, where he was mainly instrumental in forming a Society 'for inquiring into the history and antiquities, the arts, sciences, and literature of Asia.' To the 'Asiatic Researches,' which were published by this Society, of which Sir William Jones was the first president, Oriental scholars in Europe are indebted for much of their knowledge of the literature and antiquities of the Hindus.

The study of Sanscrit principally engaged the attention of Sir William Jones during the first three or four years of his residence in Bengal. When he had attained sufficient proficiency in this language, he undertook to prepare a copious digest of Hindu and Mohammedan law. It was unfinished at the time of his death, but has since been completed under the superintendence of Mr. Colebrooke. The laws of Manu were translated by Jones, and published separately in 1794. He died at Calcutta, April 27, 1794, after a few days' illness. Besides the Latin, Greek, Arabic, Persian, Sanscrit, Turkish, and Hebrew tongues, Sir W. Jones knew enough of Chinese to translate an ode of Confucius, and was also well acquainted with nearly all the modern languages of Europe.

A complete edition of the works of Sir William Jones was published in six volumes 4to., 1799, and in thirteen volumes 8vo., 1807, with his life by Lord Teignmouth.

JONES, JOHN PAUL, was born in Scotland, July 6, 1747. The name of his father was Paul; the addition of Jones was assumed by the son after he grew up in life. He went to sea at the age of twelve, and, after making many voyages to America and other parts, was in 1768 made captain and supercargo of a vessel. Having made a good deal of money, he settled in Virginia in 1773, on a property which fell to him by the death of an elder brother. After the Declaration of Independence by the colonies, he offered his services in the war against his native country, in which he soon greatly distinguished himself. In 1778 and 1779 he cruised off the coasts of England and Scotland, and caused great alarm with his single ship. At Paris, Louis XVI. presented him with a richly ornamented sword bearing a flattering inscription, he was invested with the military order of Merit, and received in every way the most distinguished reception, both from the government, the court, and in general society. On his return to America, in February, 1781, a gold medal was voted to him by Congress. He then served till the peace under the French admiral D'Estaing, after which he proceeded to Paris with the appointment of agent for prize money. Some years afterwards he entered the Russian service with the rank of rear-admiral; but disputes with the Russian naval authorities soon compelled him to retire, on which he returned to Paris, where he died, July 18, 1792.

JONE'SIA, a genus of plants of the tribe *Cassieæ*, and of the natural family of *Leguminosæ*. The species are few in number, and indigenous in the islands of the Malayan Archipelago. They form trees which are highly ornamental.

JONGLEURS, the name of those itinerant musicians, who in the Middle Age were very numerous in France. They wandered about from province to province, singing, and performing on the flute, violin, or other instruments, at the courts of princes and nobles, by whom they were often liberally rewarded. They were something like the early troubadours or bards; and one of their earliest employments was to attend and perform for these troubadours, who, from deficiency of musical knowledge, were unable to sing their own compositions.

JONQUIL, or JONQUILLE (*Narcissus jonquilla*), rush-leaved daffodil, a plant of the natural order *Amaryllidaceæ*, or Narcissus family. The Jonquil is well known; being one of the prettiest and sweetest of this tribe, it is a favourite in most gardens. When decocted it yields an acrid emetic quality. Several closely-related forms are natives of Britain; as the common daffodil (*N. pseudo-narcissus*), the poet's narcissus (*N. poeticus*), and the pale narcissus (*N. biflorus*).

JONSON, BENJAMIN, was born in Westminster, in 1574, and educated at Westminster School. The early part of his life is somewhat uncertain; but it is known that he went to Cambridge, and on leaving college took to the stage, where he proved but an indifferent actor and at first an indifferent author. In 1598 his fame rose by the production of the comedy of 'Every Man in his Humour,' at the Globe Theatre, and from this time he wrote a play annually, for several successive years. His writings are numerous and well known. In 1616 he was made poet-laureate, with a salary of 100*l.* a year and a tierce of wine. He died August 6, 1637, and was buried in Westminster Abbey. His works have been edited by Gifford with great acumen and considerable research. An edition has been published by Moxon, with a memoir, also by Gifford. His plays are eighteen in number, of which 'Every Man in his Humour' is still occasionally played.

JONZAC. [CHARENTE INFÉRIEURE.]

JOPPA. [SYRIA.]

JORDAENS, JACOB, was born at Antwerp in 1594. He studied under Adam van Oort, and also received instruction from Rubens. His pictures are distinguished by powerful, brilliant, and harmonious colouring, as well as knowledge of chiaroscuro; but he is deficient in elegance and taste: he copied nature as he found it. He died in 1678, aged eighty-four. His works are very numerous.

JORDAN. [SYRIA.]

JORTIN, JOHN, D.D., was born in 1698, in London. He received his grammar education at the Charter House, whence he passed to Jesus College, Cambridge, of which he became a fellow.

While living at Cambridge he published a small volume of Latin poems. His college presented him to a living in Cambridgeshire, but he determined on residing in London, where he soon became an admired preacher. In 1751 he obtained the living of St. Dunstan in the East. In 1762, when Dr. Osbaldeston became bishop of London, Jortin was appointed his domestic chaplain, and was presented with a prebend in the church of St. Paul and the living of Kensington. He fixed his residence at Kensington, where he died in 1770, and was buried in the churchyard of that place.

Dr. Jortin published in 1731 a critical work of considerable interest, entitled 'Miscellaneous Observations on Authors, Ancient and Modern.' In 1751 the first volume appeared of his 'Remarks upon Ecclesiastical History;' and in 1758 he published his valuable 'Life of Erasmus.'

JORULLO. [MEXICO.]

JOSEPH I., Emperor of Germany, succeeded his father Leopold I. in 1705. He carried on the war 'of the Spanish Succession,' which had begun under his father, against Louis XIV. The allied armies under Prince Eugene and Marlborough were prosperous in his reign. The battles of Ramilies, Oudenarde, and Malplaquet, the deliverance of Turin by Prince Eugene, the surrender of Naples to the Austrians, and the permanent footing obtained by the Archduke Charles in Spain, seemed to have nearly decided the question, when Joseph died of the small-pox in April, 1711, leaving his brother Charles VI., the last male heir of the house of Hapsburg, to conclude the war.

JOSEPH II., eldest son of Maria Theresa and of Francis of Lorraine, was elected king of the Romans in 1764, and in the following year, on the death of his father, he became emperor. Joseph joined Catherine of Russia in a war against Turkey, which his general, Laudon, carried on with success, taking Belgrade and other fortresses in 1789. But the threatening aspect of affairs in France and Brabant arrested the progress of the Austrian armies, and Joseph himself died in 1790. The character in which Joseph is chiefly viewed is that of a reformer; but his reforms, though well intended, were not judiciously devised or ably carried out. They led ultimately to the separation of the Belgian provinces from the Austrian monarchy, and to an insurrection in Hungary which his successor Leopold had some difficulty in suppressing.

JOSEPHINE. [BONAPARTE, NAPOLEON.]

JOSEPHUS, FLAVIUS, the Jewish historian, was born at Jerusalem A.D. 37. By his mother's side he was descended from the Asmonæan princes, and his father Matthias belonged to a high sacerdotal family. Josephus was brought up at Jerusalem with his brother Matthias. He was early celebrated for his learning: and after long study and experience of the tenets of different sects, embraced those of the Pharisees. On the breaking out of the Roman war, he at first joined the party in favour of peace; but when, after the defeat of the Roman general Cestius, peace appeared hopeless, he acted with great vigour as a commander against the Romans, until he was taken prisoner by Vespasian, A.D. 67, after having defended the town of Jotapata to the last extremity. Instead of being put to death, as was the fate of his companions, he was received by Vespasian with honour, in consequence of his artfully predicting that Vespasian would shortly succeed Nero in the government of the Roman empire. He was present with Titus at the siege of Jerusalem, and endeavoured to prevail upon his countrymen to submit to the Romans. On the capture of the city, Titus offered to grant him anything he wished. He asked for the sacred books, and the lives of his brother and fifty friends. He received a large estate in Judæa, and upon going to Rome was admitted to the privileges of a Roman citizen by Vespasian, who

also gave him an annual pension and apartments in his own house. After the death of Vespasian, he continued to live in Rome in high favour with Titus and Domitian. The time of his death is uncertain; he was alive at the latter end of the first century, and probably at the beginning of the second.

The first work published by Josephus was the history of the 'Jewish War;' it was originally written in the Syro-Chaldaic language for the use of those Jews who lived beyond the Euphrates. He afterwards translated it into Greek for the benefit of the learned Romans. Many years afterwards, A.D. 93, Josephus published in Greek his great work on the 'Antiquities of the Jews.' He also wrote 'Two Books against Apion,' in reply to those Greeks who questioned the truth of the early part of his work on the 'Antiquities of the Jews.'

The works of Josephus have been frequently translated into most of the modern languages of Europe. The best English translation is by Whiston.

JOSHUA, a book of the Old Testament, so called because it records the exploits of Joshua, the son of Nun, who succeeded Moses in the command of the Israelites. Joshua led the Israelites over the Jordan, B.C. 1451, and in the course of seven years conquered the greater part of Palestine, and assigned a particular part of the country to each of the tribes. He died at the age of 110, and was buried at Timnath-serath, in Mount Ephraim (Josh. xxiv. 29, 30).

The author of the Book of Joshua and the time in which it was written are equally uncertain. But at whatever time it may have been written, the author appears to have compiled the greater part, if not the whole, of the work from very ancient documents, some of which were probably drawn up by Joshua himself.

The canonical authority of this book has never been disputed. In all the MSS. of the Old Testament it immediately follows the Pentateuch.

JOSS STICKS are small reeds covered with the dust of odoriferous woods and burned before idols in China.

JOUDPOOR. [RAJPOOTANA.]

JOUGS, an instrument of punishment formerly in use in Scotland and in some parts of the Continent. The jogs, called also jugs or joggs, consisted of an iron ring or collar fastened to a wall or post by several iron links. The collar opened by a hinge, and the culprit's neck was secured in it, by means of a staple and padlock. This form of punishment was in use for civil and ecclesiastical offences. Though the use of this instrument has for a century been discontinued, it may still be seen in some few country parishes of Scotland, hanging to the churchyard walls.

JOURDAN, MARSHAL, a soldier of fortune in the French army, and one of Napoleon's favourite generals. He first entered the army as a private soldier in 1778; became a chef-de-bataillon in 1791; and soon rose to be general of division. In this position he successfully commanded the armies of Ardennes, the North Moselle, the Sambre and Meuse, the Danube and Italy; and was present at the battles of Wattignies, d'Arlon, the capture of Charleroi, the battles of Fleurus and d'Aldenhoven, the capture of Bruxelles, Namur, Louvain, Liege, Cologne, Frankfort, the passage of the Rhine, &c.

He was governor of Naples in 1806, having been previously created a marshal of the empire. In 1811 he was governor of Madrid, and major-general to the king of Spain, Joseph Bonaparte, with whom he sustained a terrible defeat at Vittoria, by the allied troops under the marquis of Wellington. After this he retired from active military duty, and remained so with little interval until the restoration of the Bourbons, when he became a count and a peer of France, general-in-chief of the army of the Rhine, governor of Les Invalides, &c. He died at Paris in 1833. (*Mil. Cyel.*)

JOVIANUS, FLAVIUS CLAUDIUS, born in 331, served in the army of Julian in his expedition against the Persians, and when Julian was killed in 363, the soldiers proclaimed him his successor. Jovianus accepted from the Persians terms which were offensive to Roman pride; but he was obliged to submit, as his soldiers were in the utmost destitution. On his arrival at Antioch, he revoked the edicts of Julian against the Christians. He also supported the orthodox or Nicene creed against the Arians. He died on the 16th of February, in 364, being thirty-three years of age, after a reign of only seven months. The army proclaimed Valentinianus as his successor.

JOVINUS assumed the imperial title under the reign of Honorius, and, placing himself at the head of a mixed army of Burgundians, Alemanni, and others, took possession of part of Gaul, in 411. Ataulphus, king of the Visigoths, having made peace with Honorius, attacked and defeated Jovinus, who was taken prisoner and put to death at Narbo (Narbonne), in 412.

JOVIUS, PAUL. [*Giovio.*]

JUAN FERNANDEZ. [*Fernandez*]

JUAN DE ULLOA. [*Vera Cruz.*]

JUBILEE, THE YEAR OF, among the Jews, an important period of time, which occurred every seven times seven years, or rather every fiftieth year, when all slaves were set free. Those who had mortgaged their lands retook possession, and general rejoicings took place. In the year 1800, Pope Boniface instituted a sort of Jubilee for the Roman Catholic Church, to be observed once in every 100 years, when he granted a plenary indulgence and remission of sins to all who visited the churches of St. Peter and St. Paul at Rome, and remained there for fifteen days. The periods were afterwards remodelled by Clement VI. in 1350, to fifty years; by Urban VI. in 1839, to thirty-three years; and by Sixtus VI., to twenty-five years. In later jubilee years, the pilgrimages to Rome have gradually diminished, but the observance itself has been punctually maintained at each recurring period, with the single exception of the year 1800, in which, owing to the vacancy of the Holy See, it was not held.

JUDA, JUDEA. [*Jews; Palestine.*]

JUDAISM, the system of religion believed by the Jews, and all the laws, civil, political, and ritual, which are contained in the five books of Moses.

JUDAS MACCABÆUS succeeded his father Matthias, B.C. 166, as the leader of the Jews in their attempts to throw off the yoke of the Syrian kings (1 Macc. iii. 1). He was very successful against Antiochus and his successor Antiochus Eupator. Anxious, however, to render Judæa

independent, and feeling the difficulty of continuing the contest against the whole power of the Syrian empire, Judas sent ambassadors to Rome to solicit an alliance with the Roman people (1 Macc. i. 8; Justin, xxxvi. 3). This was readily granted by the Romans; but, before Judas could receive any assistance from his new allies, he ventured to attack the Syrian army under Bacchides, amounting to 22,000 with a force of only 800, and after an obstinate struggle was at length defeated, and perished in the contest, B.C. 160.

JUDAS TREE. [*Cercis Siliquastrum.*]

JUDE, THE EPISTLE OF SAINT, a book of the New Testament, was probably written by the Apostle Jude, who was surnamed Lebbeus and Thaddeus (Matt. x. 3; Mark iii. 18; John xix. 22). He is also called the brother of James (Luke vi. 16; Acts i. 13), and the brother of Christ (Matt. xiii. 55). The Epistle of Jude appears to have been written shortly before the destruction of Jerusalem.

The canonical authority of this epistle has been rejected by many, because the apocryphal books of Enoch and the Ascension of Moses are supposed to be quoted in it (v. 14, 9). But the greater number of the Fathers refer to it as a work of divine inspiration.

JUDGE (from the French *juge*, which is from the Latin *judex*). A judge in England and Wales is a man who presides in a court duly constituted, declares the law in all matters that are tried before him, and pronounces sentence or judgment according to law. There are judges of the three Superior Courts of Law at Westminster, judges in the Courts of Equity, judges in the Court of Bankruptcy called commissioners, judges in the Probate and Divorce and Admiralty Courts, and some others. Some judges are called recorders, and there are other names, but the name does not alter the nature of the office. When the judges simply are spoken of, the judges of the superior courts of common law are meant. There are fifteen judges of these courts: five in the Court of Queen's Bench, five in the Court of Common Pleas, and five in the Court of Exchequer. There are at present seven judges in equity.

The judges of the superior courts of law are appointed by the Crown. They hold their office during good behaviour, and notwithstanding the demise of the Crown (1 Geo. III. c. 23.). They can be removed by the Crown on the address of both houses of Parliament (13 Will. III., c. 2). The judges of the courts of equity are also appointed by the Crown.

Retiring pensions are given to the fifteen judges and to the judges in equity, under various acts of Parliament. The highest retiring pension is 5000*l.* which may be granted by the Crown to the lord-chancellor upon his resignation.

Judges of courts of record are not liable to prosecution for anything done by them as judges, but they may be prosecuted in Parliament. Nor are they liable to an action for any error in judgment or for wrongful imprisonment, at least when they are acting within their jurisdiction. Judges are punishable for bribery, by loss of office, fine, and imprisonment. The powers and duties of judges would form the subject of an elaborate treatise.

JUDGE-ADVOCATE, in military matters, an important functionary, appointed to officiate as public prosecutor on every general court-martial formed

for the trial of officers and soldiers accused of a breach of the Articles of War. There are different kinds of judges, as the judge-advocate-general, who is appointed under the sign-manual; the judge-advocate, deputed by commission from the Crown; the deputy-judge-advocate, acting under the authority of the judge-advocate-general; and the officiating judge-advocate, who is appointed by commanding officers abroad. The judge-advocate of the forces stationed in London is regarded as a civil officer, and allowed a salary from the civil department. The office is generally held by an experienced barrister in the confidence of the Crown. The duties of a judge-advocate are to register and record all the acts of a court-martial, and all the evidence, as nearly as practicable, in the exact words of the witnesses; to advise the court on points of law, of custom, and of form; and to call their attention to any deviation from the strict rules of order. It is also his duty to note down the opinion of each member of the court-martial as he delivers it, whether for or against the prisoner; but he is bound not to disclose the vote or opinion of any particular member.

JUDGE-ADVOCATE-GENERAL, the supreme judge in the administration of martial law. He is also the legal adviser of the Commander-in-Chief, and the Secretary of State for War. The salary is 2000*l.* a year, and the holder of the office must be a member of the House of Commons and of the Ministry. The *Deputy Judge-Advocate-General* is an officer holding a temporary commission as public prosecutor in every court-martial, at a salary of 1200*l.* The total cost of the department of the judge-advocate-general is estimated at 5445*l.* for the year 1866.

JUDGES' CHAMBERS. This name is given to the court near Chancery Lane, London, where a common-law judge sits nearly all the year round to dispose of applications which are chiefly matters of form, though necessary to the administration of the law.

JUDGES, *the Book of*, a book of the Old Testament, which gives an account of the history of the Israelites from the death of Joshua to that of Samson. The author of the book and the time in which it was written are equally uncertain. It is commonly ascribed to Samuel, though some have argued, from Judges xviii. 30, that it could not have been written till the time of the Babylonish captivity. The canonical authority of this book has never been disputed. It is placed in all the Hebrew MSS. immediately after the Book of Joshua. It is quoted by Philo and Josephus, and also by St. Paul in the Epistle to the Hebrews (xi. 32).

JUDGMENT is the sentence of the law pronounced by the court upon the matter in the record, and the remedy prescribed by law for the redress or punishment of injuries, the suit or prosecution being the vehicle by which the injury is brought before the court. Judgments are given under four heads of issues; on Demurrer, where the facts are admitted by the parties, and the law determined by the court; on Verdict, where the law is admitted and the fact disputed; by Confession or Default, where the defendant admits both the law and the fact; and on Non-suit or Retraxit, where the plaintiff acknowledges that neither the law nor the facts are sufficient to

support his case, and therefore abandons the prosecution.

Judgments are either interlocutory or final. Interlocutory judgments include all those which are given on account of the incomplete state of the case as brought before the court, and which do not go to the absolute merits of the case: such as judgments on pleas of abatement. But the largest class to which this term is applied are judgments which decide the right between the parties, but require some other proceeding to determine the amount to be recovered. This proceeding is commonly a writ of inquiry, directed to the sheriff, who impanels a jury, and proceeds to assess the amount of damages to which the party in whose favour the interlocutory judgment has been given is entitled. If, however, the suit is for a specific thing or sum, and the decision of the court determines whether the plaintiff is or is not entitled to recover the remedy he sues for, the judgment is final.

The mode of signing judgment, as it is termed, and thereupon suing out execution, in order to obtain the effect of the judgment, are matters that properly belong to treatises on legal procedure. The object of the execution is either to give the person who has obtained a judgment in his favour some particular thing, or compensation for it, or value out of the property of the defendant. Recent statutes have made great changes in the law as to the way in which judgments affect real property. These statutes are the Acts of the 1 & 2 Vict., c. 110, 2 & 3 Vict., c. 11, and 3 & 4 Vict., c. 82, by which decrees and orders of Courts of Equity and rules of Courts of Common Law, and orders of the lord-chancellor in matters of bankruptcy and lunacy, have the effect of judgments, and the security of the creditor has been extended from a moiety, which was given by 13 Edw. I., stat. 1, c. 18, West. 2, to the whole of the debtor's lands, including copyholds, and making leaseholds bound in the same manner as freeholds. And as all lands are included by the Acts over which the debtor may have a disposing power, judgments against a tenant in tail are binding on his issue; for the tenant might at any time have barred the entail. But the greatest alteration which those statutes worked was changing the effect of judgment before execution sued out, from a general lien to a specific charge upon the 'lands, tenements, rectories, advowsons, tithes, rents, and hereditaments' of which the judgment debtor might, at the time of entering up judgment, or at any time afterwards, be possessed, of any estate whatsoever, at law or in equity, or over which he might have any disposing power. All judgments were made binding on the persons against whom they are entered up, and against all persons claiming through them, the judgment creditor being entitled to the same remedies in a court of equity as if the debtor had by writing agreed to charge the lands, &c. The creditor is not, however, to proceed in equity to obtain the benefit of such a charge until the expiration of one year from the time of entering up such judgment; and, in case of bankruptcy, the judgment, unless entered up one year, is to give no preference to the judgment creditor beyond creditors for simple contract. A special proviso excepts purchasers, mortgagees, or creditors previous to the time when the act came into operation; and with respect to purchasers

for valuable consideration without notice, the rules of equity remain unaltered.

A judgment creditor, applying now for remedy to the Court of Chancery, will not be obliged to sue out the writ of *elegit* [ELEGIT]; for that which is agreed to be done is considered by a court of equity as actually performed, and the judgment creditor has, therefore, by virtue of his judgment alone, an equitable estate. If, however, a judgment creditor, having obtained any charge, or being entitled to the benefit of any security, should, before the property so charged or secured is converted into money and applied towards the payment of the judgment debt, cause the judgment debtor to be arrested, the benefit of such charge or security is deemed relinquished. The extent of such charge goes now to the interest at the rate of four per cent. on the judgment debt, as well as to the debt itself.

The late Acts affecting judgments are the 18 and 19 Vict., c. 15, the 23 and 24 Vict., c. 38, and the 23 and 24 Vict., c. 115, and now the last Act, which came into operation on the 29th July, 1865, and provides that no judgment (including registered decrees, orders of courts of equity, bankruptcy, and other orders, having the operation of a judgment), statute, or recognizance shall affect any land of whatever tenure until such land shall have been delivered in execution in pursuance of such judgment, &c.; and that every such execution shall be registered in the name of the debtor instead of in the name of the creditor; and every creditor to whom the land has been delivered in execution shall be entitled to an order of the Court of Chancery to be obtained in a summary manner for the sale of the debtor's interest in such land; and any other creditors with a charge on such land shall be served with notice of the order for sale, and the proceeds of such sale shall be distributed among the persons entitled thereto according to their respective priorities. This is a most important amendment in the law of judgments, and will lessen much the difficult questions which have often arisen between a purchaser of land and a judgment creditor. Still the questions that arise are intricate, and it would be difficult, even in an elaborate treatise, to say exactly what is the effect of the different acts referred to.

Judgments or rules or orders of inferior courts of record, in which a barrister of not less than seven years' standing shall preside, may receive the same effect as those of a superior court by a judge's order to remove them into a superior court. But until execution be actually sued out, they will not affect lands in the hands of purchasers, mortgagees, or creditors, except so far as they would affect them as judgments of an inferior court.

In criminal proceedings, after trial the defendant can move in arrest of judgment at any time before judgment is pronounced; but this can only be done upon error appearing on the face of the record, and no motion of this sort can be made in the defendant's absence, unless a verdict is found in which the jury reserve a point for the consideration of the court. After the judgment is recorded, a writ of error is necessary before it can either be reversed or altered. Formerly no judgment affecting the liberty of the individual could be pronounced in his absence; but this has been altered by the 11 Geo. IV. & 1 Wm.

IV., c. 70, which enacts that, upon trials for felonies or misdemeanours, judgment may be pronounced whether the person affected be present or absent, except only in such cases of information filed by leave of the Court of King's Bench, or in cases of information filed by the attorney-general where he prays that judgment may be postponed. The judgment of the court extends to the life and liberty of the offender, according to the punishment decreed to the offence against which the judgment is delivered. In some cases it extends to the compensation for forfeiture of the lands or goods, or both, of the offender; others induce a disability of holding offices or fix a lasting stigma on the offender; and a large proportion are merely pecuniary by stated or discretionary fines.

JUDICIAL COMMITTEE. [PRIVY COUNCIL.]

JUDICIAL SEPARATION. [DIVORCE.]

JUDITH, an apocryphal book of the Old Testament, contains an account of the invasion of Syria and Judæa by Holofernes, general of the Assyrians, and of the destruction of the Assyrian army, and the death of Holofernes through the courage and stratagem of Judith. The historical and geographical difficulties of this book are so great, and its narrative so improbable, that a great number of critics are disposed to consider it as a religious romance, probably written in the time of the Maccabees, to encourage the Jews in their struggles against the Syrian monarchs. Grotius considers it as an allegory, and Josephus, who seldom neglects an opportunity of extolling the valour of his countrymen, takes no notice of this story.

The book of Judith was originally written in Chaldee, from which it was translated into Latin by Jerome. It was also translated into Greek and Syriac. The English translation in the authorized version was made from the Greek.

JUGGURNAUTH, or JUGGERNAUT.

[VISHNU.]

JUGLANDACEÆ, a natural order of apetalous exogenous plants, consisting of trees or shrubs having eatable nuts and somewhat resinous leaves. The former are the walnuts and hickory nuts of the markets; the first produced by the genus *Juglans*, the latter by that called *Carya*. The timber of this genus is valuable, as likewise that of *Juglans niger*, the Black American Walnut.

JUGULAR VEINS are the large trunks by which the greater part of the blood is returned to the heart after having circulated in the head, face, and neck. There are two on each side; one external or superficial, and the other internal or deep.

JUGUM, among the Romans, a humiliating kind of punishment inflicted on their vanquished enemies. It consisted of two upright spears, with a third laid across, in the shape of a gallows; when those who had surrendered themselves as prisoners of war were compelled, by way of ignominy, to pass under the erection without arms or military accoutrements.

JUGURTHA, the illegitimate son of Manastabal, and grandson of Masinissa, was brought up under the care of his uncle Micipsa, king of Numidia, who sent him with a force to join Scipio Æmilianus in his war against Numantia in Spain. Jugurtha became a great favourite with Scipio. Micipsa adopted him, and declared him joint heir with his two sons Adherbal and Hiempsal. After Micipsa's

death (B.C. 118), Jugurtha effected the murder of Hiempsal, and Adherbal, escaping to Rome, appealed to the senate. Jugurtha, however, bribed some of the senators, and a commission was sent to Africa in order to divide Numidia between Jugurtha and Adherbal. The commissioners gave the best portion to Jugurtha, who soon after their departure invaded the territory of his cousin, besieged him in Cirta, and put him to a cruel death, B.C. 112. In the following year the Romans declared war against Jugurtha, and an army was sent to Africa under Calpurnius Bestia. After some fighting, Jugurtha obtained under favourable conditions the quiet possession of the usurped kingdom. But the treaty was not ratified at Rome, and Calpurnius being recalled, the Roman army under Aulus Posthumus was surprised by Jugurtha, and having passed under the yoke, evacuated Numidia. The new consul, Metellus, carried on the war with great vigour; but in the year B.C. 107 was supplanted in the command by Cains Marius, who took the towns of Capsa and Moleuca, and in a hard-contested battle defeated Jugurtha. After being exhibited in the triumph of Marius, he was put to death in prison. His two sons were sent to Venusia, where they lived in obscurity. The war against Jugurtha lasted five years; it ended in 106 B.C.

JUJUBE. The name of a plant and of its fruit, which is pulpy and resembles a small plum. The plant is a species of *Zizyphus*, a native of the East Indies. The fruit was formerly used in pectoral decoctions; but it is now in little reputation, except as a sweetmeat.

JULIAN ALPS. [ALPS.]

JULIAN PERIOD is a term of years often employed in chronology, in order to avoid the ambiguity attendant on reckoning any time antecedent to our era. The Julian period consists of 7980 years, and is reckoned as having begun 4713 years before our era, so that the present year, 1866, corresponds to 6579 Julian Period. The era of the creation, or Anno Mundi, which has been used by Christian and Jewish writers, cannot be considered a fixed point, as chronologists and controversialists are not agreed as to the precise time of its commencement, some placing the creation 4004 years B.C., others, such as the early Alexandrian Christians, 5502 B.C., and the Greeks and Russians at 5508 B.C. The Julian Period is produced by the multiplication of the lunar cycle 19, solar cycle 28, and Roman indiction 15.

JULIANESHAAB, 'Juliana's Hope,' a town and harbour in South Greenland, situated at the head of a sheltered fiord or creek, and enjoying a comparatively mild climate, considering its high northern latitude. Its principal trade is carried on with Denmark. Whalebone, reindeers' flesh, oil, and sealskins are exported. It has been selected as one of the chief stations on the proposed Great North Atlantic Telegraph Route (March, 1866), which is designed to connect Great Britain with America by a line of telegraphic wires from London, through Scotland, Shetland, and the Faroe Isles, to Iceland and the western shores of Greenland (Julianeshaab), across Davis' Straits to the coast of Labrador or Belle Isle, and to communicate through Canada with the vast telegraphic system of the United States. The total length of this route will be 1950 miles,

divided into five sections: Scotland to Faroe Isles, 250 miles; Faroe Isles to Iceland, 240 miles; Iceland to Greenland, 743 miles; Greenland to Labrador, 507 miles; Labrador to Canada, 210 miles. Population of district of Julianeshaab is about 2500, consisting of Danes, natives, and mixed blood. It is the largest settlement in the southern inspectorate of Greenland, and near it are the remains of most of the old colonies.

JULIANUS, FLAVIUS CLAUDIUS, son of Julius Constantius, brother of Constantine the Great, was born in 331. After Constantine's death, the soldiers massacred the brothers, nephews, and other relatives of that prince, in order that the empire should pass undisputed to his sons. Two only escaped from this butchery: Julian, then six years old; and his half-brother, Gallus, then thirteen years of age. Constantius exiled Gallus into Ionia, and intrusted Julian to the care of Eusebius, bishop of Nicomedia, and he was instructed in Greek literature by Mardonius, a learned eunuch. About the age of fourteen he was sent to join his brother Gallus in Cappadocia, where they were treated as princes, but closely watched. The youths were taught the Scriptures, and were even ordained lecturers, and in that capacity publicly read the Bible in the church of Nicomedia. The death of Constantine and Constantine having left Constantius sole master of the Roman world, that emperor, who was childless, sent for Gallus in March, 351, and created him Cæsar, and he allowed Julian to return to Constantinople to finish his studies. There Julian met with the sophist Libanius, who afterwards became his friend. Constantius soon after again banished him to Nicomedia, where he became acquainted with some Platonist philosophers. After the tragical death of Gallus in 355, he was recalled to court by the influence of the Empress Eusebia, when Constantius named him Cæsar, and gave him the government of Gaul, together with his sister Helena to wife. Julian made four campaigns against the Germans, in which he displayed great skill and valour, and freed Gaul from the barbarians. He spent his winters at Lutetia (Paris), and became esteemed for his equitable and wise administration. Constantius, always suspicious, ordered Julian to send him back some of the best legions in Gaul to be employed against the Persians. In 360, he therefore assembled the legions at Lutetia, and bade them farewell, when an insurrection broke out among the soldiers, who saluted him Augustus. Julian sent messengers to Constantius to deprecate his wrath, but the death of the emperor left the throne open to him in 361. He proceeded to Constantinople, where, being proclaimed emperor in December, 361, he reformed the prodigality of the household, issued several wise edicts, corrected many abuses, and established a court at Chalcedon to investigate the conduct of those who had abused their influence under the preceding reign. On assuming the purple, Julian had openly professed the old religion of Rome, and, though he had issued an edict of universal toleration, he soon showed a marked hostility to the Christians, and many were imprisoned, tortured, and even put to death. Julian has been called the Apostate, but it seems doubtful whether after his boyhood he had been a Christian in his heart. That he was no believer in the vulgar mythological fables is evident

from his writings, especially the piece called 'The Cæsars,' and yet he professed great zeal for the heathen divinities.

Julian, having resolved on carrying on the war against the Persians, repaired to Antioch. His neglected attire, his uncombed beard, and the philosophical austerity of his habits drew upon him the sarcasms of the population of Antioch. The emperor revenged himself by writing a satire against them, called 'Misopogon.' He set off on his expedition with a brilliant army, crossed the Euphrates, took several fortified towns of Mesopotamia, crossed the Tigris and took Ctesiphon, but here his progress ended. The close Roman legions were harassed by the light cavalry of the Persians, and reduced to great distress for want of provisions. Sapor, the Persian king, was, however, inclined to come to terms, when in a skirmish Julian received a mortal wound. He expired the following night, June 26, 363, with perfect calmness and composure.

JÜLICH-CLEVE-BERG, the name given to a former division of the possessions of Prussia on the Rhine, which now forms the governments of DÜSSELDORF and COLOGNE, and part of the government of Aachen in the Prussian Rhein-Provinz. The territory so named was composed of the three ancient duchies of Jülich, CLEVES, and BERG. The town of *Jülich*, from which the duchy of Jülich was named, stands on the Roer, about 26 miles W. from Cologne, and has 2890 inhabitants, who manufacture soap, leather, and woollen cloth. It is fortified; and the foundation of the place is attributed to Julius Cæsar.

JULIS, a genus of Labroid fishes, remarkable for its various colours, is distinguished by its smooth head, and gill covers without scales. Mantell conjectures that the more tortuous kinds of coprolites, long known by the name of Juli, may have been fossil fir cones.

JULIUS I., II., III. [POPE.]

JULY, now the seventh, was originally the fifth month of the year, and was called by the Romans, in regard to its numerical station, *Quintilis*. In the old Latin or Alban calendar, *Quintilis* had a complement of 36 days. Romulus reduced them to 31; Numa to 30; but Julius Cæsar restored the day of which Numa had deprived it, which it has ever since retained. Our Anglo-Saxon ancestors called July *Mæd-monath*, 'mead month,' from the meads being then in their bloom.

JUMNA, a river of India, tributary to the Ganges, which it joins at Allahabad, inclosing with that river the territory called the Doab. It rises among the peaks of the Himalayas, at an elevation of 10,849 feet, and the total length of its course is estimated at 860 miles, the breadth varying at different seasons from 100 to 600 yards. It is generally shallow, and, except to descending rafts, unfit for navigation; but its uses for agricultural purposes have been much increased. The cities of Delhi and Agra are on its banks.

JUNCA'CEÆ, a small order of endogenous plants, so named from *Juncus*, 'the rush,' which is considered its type, is composed of obscure herbaceous plants.

JUNCAGINA'CEÆ, a small and unimportant order of Endogens, consisting of marsh plants. *Triglochin* is the commonest genus, and inhabits the fresh or salt marshes of most parts of Europe.

JUNE, the sixth month of the year, named from the Latin Junius. Ovid, in his 'Fasti,' makes Juno assert that the name was expressly given in honour of herself. In another part of the 'Fasti' he gives the derivation à *junioribus* (the younger), as May had been derived from *Majores* (the elder). In the old Latin calendar June was the fourth month, and consisted of twenty-six days. Thirty days were afterwards assigned to it.

JUNGERMANNIA'CEÆ, a rather extensive natural order of cryptogamic plants, or Acrogens, resembling mosses in appearance, but very distinct from them in many points of structure. The species inhabit the trunks of trees, damp earth, or even the young shoots and leaves of other plants in cool moist climates, especially such as are temperate. Some have the stem and leaf formed into a frond, or thallus, resembling that of a lichen, but more commonly the species have leaves with stipules at their base.

JUNGFRAU ('the Maiden') is the name of a lofty summit of the Swiss Alps, on the boundary line between the cantons Berne and Valais, 13,671 feet above the sea. It is surrounded on all sides by rocks and precipices, and capped with perpetual snow; but its summit has been attained by several Alpine explorers, including Agassiz and Forbes. (See the various series of the *Vacation Tourist*.)

JUNIPERUS, a genus of hardy, evergreen, woody plants, belonging to the natural order *Conifera*. About twenty species are known, the most important of which are the following:

J. communis, Common Juniper, growing wild in all the northern parts of Europe. Occasionally the Juniper becomes a small tree. The fruit is used in considerable quantities in the preparation of gin, and in medicine as a powerful diuretic. Oil of Juniper is said to be the most powerful of all diuretics in doses of four drops.

J. Sabina, Savin, is found wild in the middle of Europe and the west of Asia, inhabiting the most sterile soil, and is frequently met with in this country in shrubberies. Like the common Juniper, it is a diuretic and uterine stimulant, but is so powerful that its use is highly dangerous, except in the hands of regular practitioners. It is a well-known violent emmenagogue. Oil of Savin is a local irritant, producing blisters, when applied to the skin; taken internally, it is drastic and emetic.

J. Bermudiana, Bermuda Red Cedar, is very little known in Great Britain, in consequence of its not bearing the climate without protection. It is a native of the Bermudas, where it becomes a large tree, with a soft fragrant wood, the value of which is well known from its use in cabinet-work and the manufacture of pencils.

JUNK, a Chinese vessel, often of large dimensions. It has a high forecabin and poop, and usually three masts. Though junks are clumsy vessels, incapable of much seamanship or speed, they have proved themselves sea-worthy on voyages extending to Europe and America. The Japanese junk is superior to the Chinese.

The term *junk* is applied by British sailors to the salt meat supplied to vessels for long voyages.

JUNO, a Roman divinity, who has been commonly confounded with the Greek *Hera*. She was the daughter of Kronos and Rhea, the sister and wife of

Jupiter, the goddess of marriage and childbirth, and the protectress of married women. Her worship was of very great antiquity at Argos and in the Peloponnesus. The two most celebrated temples of Juno were at Argos and Samos.

JUNO. [PLANETS, SMALL.]

JUNOT, MARSHAL, DUC D'ABRANTES, was a soldier of fortune, who first attracted Napoleon's attention by his bravery in the field. He was born at Bussy-le-Forges in 1771. He first began to study for the law; but the political events of 1791 induced him to enlist in the battalion of volunteers raised in the department of Côte d'Or. He served under Bonaparte at Toulon, where he became a captain, as well as aid-de-camp to Napoleon. He accompanied Bonaparte to Italy in 1796; and to Egypt in 1799. Having greatly assisted him, on the 18th Brumaire, in overthrowing the Directory, he was made commandant of Paris, and created general of division in 1801. Eventually, under the patronage of the emperor, he became Duc d'Abrantes, and a Marshal of France. To him was intrusted the task of invading Spain and Portugal in 1807-8, where for some time he exercised his military tyranny; but at length he was signally defeated by Sir Arthur Wellesley at the battle of Vimiero, and compelled to evacuate the country. From this period he lost favour with Napoleon, and was refused employment in the campaign of 1813. Shortly afterwards his mental faculties became disordered; and he died in 1813. **MADAME, DUCHESS OF ABRANTES**, wife of Marshal Junot, after the fall of Napoleon, was obliged to support herself by the efforts of her pen, in consequence of all her family estates being confiscated. Her principal work was 'Mémoires et Souvenirs historiques sur Napoleon,' published in 1831, which had a prodigious sale. But she was at length reduced to extreme poverty, and retired to a maison de santé, where she died in 1838.

JUPITER, the supreme Roman deity, borrowed from the Greek *Zeus*. Jupiter was originally called Jov-is Pater, or Dies-piter, or Diu-piter, the *Diu* becoming softened in pronunciation into *Ju*, in the same manner as the Latin word *diurnus* has become *journal*. Jupiter, or Diupiter, would therefore mean the Father of day or the air; the first part of the word contains the same root as the Latin adverb *diu* and adjective *diu-rnus*.

Cicero says ('De Nat. Deor.' iii. 21) that there were three deities of the name of Jupiter: one the son of Æther; the second the son of Heaven; and the third the son of Saturn.

The Roman poets attributed to Jupiter the same power and attributes with which the Greeks invested Zeus, who was, according to Homer, the son of Kronos and Rhea. His wife was Juno (Hera), and their children Vulcan (Hephestus) and Mars (Ares). [**JUNO.**]

Jupiter was usually represented as seated on an ivory throne, with a sceptre in his left hand and a thunderbolt in his right. The eagle, his favourite bird, was generally placed by the throne.

JUPITER, the name of one of the old planets, the largest of all the bodies except the sun, in the solar system. The astronomical history of this planet is so completely entangled in that of the progress of astronomy in general and pure mathematics, that it would be useless to attempt any separation.

The figure of Jupiter is sufficiently oblate to appear of a sensibly spheroidal form in a moderate telescope, the axis of revolution being to the equatorial diameter in the proportion of 15·84 to 16·84, according to the recent researches of Mr. Main. The apparent equatorial diameter varies between half and three quarters of a minute, being 37''·91, when the planet is at its mean distance from the earth. The real equatorial diameter is 11·46 times that of the earth, or upwards of 91,000 miles. It is more than 1300 times as large as the earth, and its mean density is nearly the same as that of the sun, or about one quarter of that of the earth.

The mass of Jupiter, from the time of Newton to the present, was supposed to be to that of the sun in the proportion of 2 to 2141; but the recent observations of various astronomers make it somewhat greater. Mr. Airy's result is that the mass of Jupiter is to that of the sun in the proportion of 1 to 1046·77, or 2 to 2094 nearly.

The planet revolves on its axis in about 10 hours. Its light and heat are to those of the earth as 37 to 1000. Its sidereal revolution is performed in 4332·5848212 mean solar days.

The four satellites of Jupiter appear to revolve on axes, each in the time of its revolution round the planet, in the same manner as our moon. The times of their revolutions are, roughly, $1\frac{3}{4}$, $3\frac{1}{2}$, 7, $16\frac{3}{4}$ days, and their distances from the planet 6, 10, 15, and 27 of his semidiameter.

In consequence of the smallness of the angle by which Jupiter's equator is inclined to the ecliptic, and of the nearness of the orbits of the satellites to the plane of the equator, all the satellites except the fourth, which sometimes escapes, undergo one eclipse once in every revolution. Since this is caused by the entry of the satellite into Jupiter's shadow, the eclipse is independent of the earth's position, and the observation can certainly be made, unless Jupiter be too near to the sun. It never happens that both the immersion and emersion can be observed, in the case of the first satellite, and rarely in that of the second; though it is otherwise with the third and fourth. The reason is, that the planet itself always hides a part of its own shadow, and the first satellite is so near the planet that it must either enter or leave the shadow behind the planet: which also happens, for the most part, in the case of the second satellite. Before the planet is in opposition its shadow is on the western side of the planet, and after opposition on the eastern; while before the opposition immersions only are visible, and after opposition emersions, in the case of the first and second satellites. The eclipses of the four several satellites last about $2\frac{1}{2}$, $2\frac{3}{4}$, $3\frac{1}{2}$, and $4\frac{1}{4}$ hours one time with another. (See Guillemin's *Wonders of the Heavens*; Professor Airy's *Popular Guide to Astronomy*; Herschel, *On Astronomy*, &c.)

JURA, Island, one of the Hebrides, Scotland, immediately N.E. of Islay. It is the most rugged of the group, the surface being mountainous throughout; and in the south are three peaks, called the 'Paps of Jura,' the principal of which is 2566 feet high. The length of the island from N.E. to S.W. is 24 miles, the breadth varying from 2 to 8 miles. The estimated area is about 84 square miles, or 58,400 Scotch acres, only 600 of which are arable. The population in 1861 was 844, and 14 sailors. With

the adjacent islands of Balnahu, Garvelloch, Pladda, &c., it forms a parish, with a total population of 1052. The principal village is *Jura*, on the eastern and most populous coast. Oats, barley, potatoes, flax, slate, and iron ore, are the chief products of the island, whose scenery is very picturesque.

JURA, a department in France, formed out of the province of Franche-Comte, and named from the range of mountains that traverses it, is bounded N. by the department of Haute-Saône, N.E. by that of Doubs, E. by Switzerland, S. by the department of Ain, and W. by those of Saône-et-Loire and Côte-d'Or. It lies between $46^{\circ} 17'$ and $47^{\circ} 20'$ N. lat., $5^{\circ} 13'$ and $6^{\circ} 9'$ E. long.; its greatest length from N. to S. is 72 miles, from E. to W. 39 miles. The area is 1928 square miles, and the population in 1863 was 298,053.

Surface and Soil.—The department is diversified by mountains, plains, and marshes. Two-thirds of its extent are covered with the JURA MOUNTAINS, of which the highest summits are Reculet, La Dôle, and Mont-Poupet. The surface presents throughout its whole length three very marked and distinct divisions:—1, The western part, which consists of a low plain about 7 miles wide; 2, the first mountain elevation, which, rising suddenly from the plain, forms a plateau nearly 10 miles wide; and, 3, the high mountain district to the east of the other two, consisting of lofty summits and deep valleys, and extending in width as far as the other two divisions together. The soil of the plain, which consists of a marly clay resting on alternate beds of earth and shingle, is very productive in wheat, rye, maize, buckwheat, hemp, &c. On the plateau the soil is calcareous and shallow; it yields barley, oats, maize, nuts, &c. Potatoes also are an important crop. Among the mountains the soil is stony and thin, some barley and oats are produced; but there is abundant pasture, on which, during summer, from June to October, great numbers of cattle and horses are fed. During that season the châteaux, or solidly constructed huts, on the heights, serve as habitations for the herds, stores for the dairy produce, and as sheds for the cattle; in these the cows are milked, and butter and cheese are made. There is one herdsman for every 20 cows, and one cheesemaker for every 80. The cows from the different communes pasture in separate inclosures, each about 300 or 400 acres in extent and surrounded by a wall of dry stones; they come of their own accord to the châtlet to be milked by the herdsman, and immediately after return to pasture, for they never lair in the châtlet. In these annual migrations of the cattle, the milking and the cheese and butter making are entirely managed by men. An account is kept of the quantity of milk given by the cows of each owner, so as to apportion a just share of the butter and cheese, or of their price when sold. On the 9th of October (St. Denis' Day) the little establishments are all broken up, for then or soon after the rigours of a boisterous winter set in; the herdsman tie their wardrobe, no great burden, between the horns of the best cows, and the descent is commenced. But as all the cattle do not come from the same village, the herdsman follows only his own; the others, led by some sage old cow, direct their steps to their own village, where finally separating each one repairs to the house of her own master.

The farm buildings in the mountain districts are solidly built of stone and lime, but only 7 feet high, and covered with lengths of split fir, which are kept from being blown away by numerous stones laid on them. They include a dwelling-house, stable, barn, and hay-loft, all under the same roof, and communicating with each other. All the animals lair in the same stable, which extends quite across the building, and in which they are arranged in two rows, head to head, and feed from a manger that runs from one end of the apartment to the other. The cattle are never littered; but the floor is covered with loose planks, and overhead there is a covering of the same; otherwise the animals could not stand the cold of the winter, which generally lasts from six to eight months. In that part of the structure appropriated to the family the chief apartment is about 13 feet square; in the centre stands a stove, whence the smoke issues through a tube carried up a wide chimney, which by means of a trap-door is kept closed on the windy side, and serves for a window all the year, and during the deep snows for a door also, the ascent being made by means of a short ladder. Adjoining this apartment is a chamber containing beds for the father, mother, and the daughters of the family; the sons and men-servants, if any, sleep in the hay-loft.

Rivers.—The department is drained by a great number, the principal being—the AIN; the DOUBS; the Oignon, which bounds it on the north [DOUBS]; and the Loue, which enters it from the department of Doubs, and running W. enters the river Doubs, a few miles S. of Dôle. Of these the Ain, the Loue, and the Doubs are navigable. Among the smaller rivers the most important are the Bienne, the Cuisance, and the Furiense. The north of the department is crossed by the Canal-du-Rhône-au-Rhin. There are numerous marshes and lakes in the department.

Climate.—The climate is cold in the mountains, where the snow lies for six months; in the plain, which is cold enough in winter, owing to the proximity of the snow in the highlands, the air is hot and close in summer, but on the plateau pure and healthy during that season. High winds are frequent at all seasons; they are attended by heavy rains in spring, and oftentimes in summer also.

Natural Products, &c.—The agricultural produce is sufficient for the consumption. Horned cattle are exceedingly numerous; there are but few sheep; poultry, bees, game, and fish are abundant. The produce of wine amounts to 9,000,000 gallons annually, the best growths being those of the districts about Arbois, Château-Chalon, and Lons-le-Saulnier.

Several iron mines are worked; gold, copper, lead, and coal are found; the peat beds are dug for fuel; marble, gypsum, alabaster, and lithographic stone are quarried. There are important salt-works at Salins and Montmorot.

The manufacture of iron and iron wares is the most important object of industrial activity. The other manufactures are paper, watch and clock works; turnery in wood, bone, ivory, and horn; coarse woollens, linen, mineral acids, salt, casks, steel, scythes, nails of all kinds, tiles, and leather. About ninety fairs are held in the year.

Divisions, Chief Towns, &c.—The department is

divided into four arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop.in1863.
Lons-le-Saulnier,	11	212	101,189
Poligny, . . .	7	152	73,242
St.-Claude, . .	5	82	50,839
Dôle, . . .	9	137	72,783
Total, . . .	32	583	298,053

In the arrondissement of Lons-le-Saulnier the chief town, *Lons-le-Saulnier*, which is also the capital of the department, is situated at the foot of high vine-clad hills that surround it on every side, except the west, $46^{\circ} 40' 28''$, $5^{\circ} 33' 11''$ E. long., at a distance of 255 miles S.E. from Paris, and has 9862 inhabitants. It is a pretty well-built town, and lighted with gas; the principal street is lined with arcades; and there are several handsome fountains. In the northern angle of the town are the important salt-springs, from which the water is constantly pumped up into a wooden canal that conveys it to the great salt-works at Montmorot, about a mile distant from the spring. This salt well was discovered in the fourth century, and to it the town owes its foundation and its name; it is always full, although its waters are constantly extracted, and yield annually 20,000 quintals of salt. The town is the seat of tribunals of first instance and of commerce, of communal and ecclesiastical colleges; it has also a public library, a museum, and a theatre. The manufactures consist of hosiery, potash, and leather; the commerce is considerable in salt, iron, timber, wine, brandy, cheese, &c. *St. Amour*, 18 miles S. from Lons-le-Saulnier, has marble-sawing mills, naileries, tan-yards, and 2343 inhabitants. *Baume-les-Messieurs*, 6 miles from Lons-le-Saulnier, is a small place, situated in a wild rocky gorge on the Seile, and is famous for its ancient Benedictine abbey, the church of which is in tolerable preservation, and contains tombs of the counts of Bourgogne.

In the arrondissement of Poligny, the chief town, *Poligny*, which is situated at the extremity of an extensive plain, and at the foot of a spur of the Jura chain, near the source of the Glantine, at a distance of 14 miles N.E. from Lons-le-Saulnier, has a population of 5401. It consists chiefly of four well-built streets, parallel to each other, and to the direction of the mountain. It is well supplied with excellent water from the numerous fountains that adorn the town. Poligny has a college, manufactures of pottery, casks, hosiery, glue, saltpetre, and oil, also ironworks, dyehouses, tan-yards, and hydraulic saw-mills. Marble and alabaster are quarried in the neighbourhood. The tribunal of first instance is at *Arbois*, a pretty town 6 miles to the northward, at a height of 940 feet. Arbois has a college and 6672 inhabitants, who manufacture earthenware, paper, oil, and leather, and trade in the excellent white wines of the district. There are ironworks, hydraulic saw-mills, nitre-works, and nurseries at Arbois. *Champagnole*, a well-built town, with 3193 inhabitants, situated at the foot of Mont-Rivel, on the right bank of the Ain, and near the village and extensive ironworks of *Sirod*, is a place of some

commercial activity. It has a large iron-wire factory, hydraulic saw-mills, naileries, &c. *Salins*, 8 miles N.E. from Poligny, situated on the slope of a hill above the Furieuse, and near a narrow gorge between two high mountains, has a college, a library of 6400 volumes, a handsome church dedicated to St.-Anatole, and 7361 inhabitants. In the centre of the town are numerous salt-springs, and one of the greatest salt-works in France, which are inclosed by thick walls, flanked with towers, and extending 306 yards in length by 100 in breadth. Sulphate of soda, brandy, and leather are also manufactured, and in the neighbourhood there are gypsum-quarries, paper-mills, and ironworks. This town is inclosed by walls defended by two forts.

In the arrondissement of St.-Claude, the chief town, *St.-Claude*, situated between three wooded and rocky mountains, at the confluence of the Tacon with the Bienne, which is here crossed by a suspension-bridge, and at a distance of 25 miles S. by E. from Lons-le-Saulnier, has tribunals of first instance and of commerce, a college, and 6316 inhabitants. The town, which is the residence of the bishop of St.-Claude, is well built, and ornamented with some pretty promenades and handsome fountains. The cathedral church of St.-Pierre is the principal building. The place is famous for turnery in bone, ivory, horn, and wood; buttons, tobacco, and musical boxes, wind instruments, combs, hardware, pins, crape, cotton-yarn, leather, paper, tiles, and pottery are also manufactured. *Morez*, on the Bienne, is situated in a gorge formed by two mountains, which rise almost perpendicularly to the height of 1200 feet, and scarcely leave room between their naked sides for two rows of houses and the street that separates them. The population amounts to 4762, who maintain themselves by manufacturing iron, iron-wire, cotton thread, leather, and watch and clock movements.

In the arrondissement of Dôle the chief town is DÔLE.

The department forms the see of the bishop of St.-Claude, is included in the jurisdiction of the Cour Imperial and University Academy of Besançon, and belongs to the 7th Military Division, of which Besançon is head-quarters. To the Chamber of Deputies it returns two members. (*Annuaire pour l'An 1866*.)

JURA MOUNTAINS, the name given to a mountain system which consists of several parallel chains extending along the frontiers of France, Savoy, and Switzerland, in a direction from S.S.W. to N.N.E. from the Rhône and the Lake of Geneva to the left bank of the Rhine, towards the north, where it is connected by some lower elevations with the Vosges. The length of the system is about 180 miles; the breadth varies from 30 to 50 miles. The highest summits of the Jura Mountains are found in the most eastern chain, which is connected with the Bernese Alps and extends between France and Switzerland; the other chains diminish in height towards the west, and do not form continuous unbroken ranges, but rather consist of isolated elevations, connected at their bases. Very few of the valleys among these mountains are transversal; most of them run in the direction of the length of the chains. The highest points in the crest of the eastern chain are

those of Reculet, Tendre, La-Dôle, and Colombier, which rise respectively to 5959, 5543, 5513, and 5494 feet above the sea level; the mean height of this chain is about 4800 feet. The highest point in the second chain does not much exceed 4300 feet. The highest part of these mountains, which is full 3000 feet lower than the line of perpetual snow on the Alps, is covered with forests of pine and other resinous trees; further down, the beech, the ash, the lime, and the oak flourish; and the lower slopes are occupied with vineyards or cultivated for the production of maize or barley. The mountains also abound in excellent pasture, on which great numbers of cattle are reared and fed, and a great quantity of cheese is made. [JURA, Department.] Wolves are common; the brown bear and the wild cat are said to be met with, but rarely.

On the eastern side the chains of the Jura present in general steep abrupt flanks, but on the west they slope down by almost insensible degrees. They are composed of a hard gray limestone, mixed with alternate beds of marl and clay; in some places alabaster, gypsum, asphalt, coal, marble, and petrifactions of various kinds, especially those called oolites, are found. Iron mines, sulphurous and salt springs, abound; stalactitic grottoes and waterfalls are numerous; among the latter is the magnificent Saut du Doubs. [DOUBS.] An important and interesting feature of the Jura system, which gave name to the Jurassic formation, is the number of erratic stone blocks that are found high up the eastern slopes, at points opposite the opening of the great valleys which descend from the high Alps. Various theories have been proposed to account for the appearance of these massive blocks of a different kind of stone to that which prevails in the Jura; of these the theory of Venturi and Agassiz, who respectively ascribe the transfer of these blocks to floating ice and to glaciers at some long distant epoch, seems the most probable.

JURISDICTION. This term is the Latin word 'Jurisdictio,' which simply signifies the 'declaration of jus or law.' He who had 'jurisdictio' was said 'jus dicere,' to declare the law. The whole office (officium)

of him who declared the law was accordingly expressed by the word *Jurisdictio*. (Dig. 2, tit. 'De Jurisdictione.') *Jurisdictio* was either voluntary (*voluntaria*) or litigant (*contentiosa*). The *jurisdictio voluntaria* related to certain acts, such for instance as those forms of manumission and adoption which must be done before a *magistratus* in order to be valid. The *jurisdictio contentiosa* related to litigation, and such legal proceedings were said to be 'in jure,' before the *magistratus*, as opposed to the proceedings before a *judex*, which were said to be 'in judicio.' The *magistratus* was said 'jus dicere,' or 'reddere,' when he exercised his functions; and 'magistratus' and 'qui Romæ jus dicit' are accordingly convertible terms.

Jurisdiction in England means the jurisdiction of Parliament, which is, according to Sir Edward Coke, 'most capacious,' and according to other writers 'omnipotent;' and it also means an authority which a court of law or equity has to decide matters that are litigated, or questions that are tried before it.

The courts at Westminster have jurisdiction over all England and Wales; but the jurisdiction of other courts is limited by being confined to certain limits of space and to certain kinds of causes or matters in dispute. When the jurisdiction of a court extends over all England, it may still be limited as to the kind of causes which it tries. Thus the superior courts of law and the courts of equity have their several jurisdictions as to matters which they hear and determine. The ecclesiastical courts also have their separate jurisdiction; and other courts, such as the Court of Bankruptcy, County Courts, and others, have their several jurisdictions. If proceedings are commenced against a man before a court which has no jurisdiction in the matter brought before it, the defendant may answer by alleging that the court has no jurisdiction; which is called pleading to the jurisdiction. When a party is convicted by a court that has no jurisdiction in the matter, the proceedings may be moved into the Court of Queen's Bench by the writ of *Certiorari*, and quashed. By the 28 and 29 Vict., c. 99, a limited jurisdiction in equity has been given to the County Courts.

END OF VOL. VII.

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LACE.



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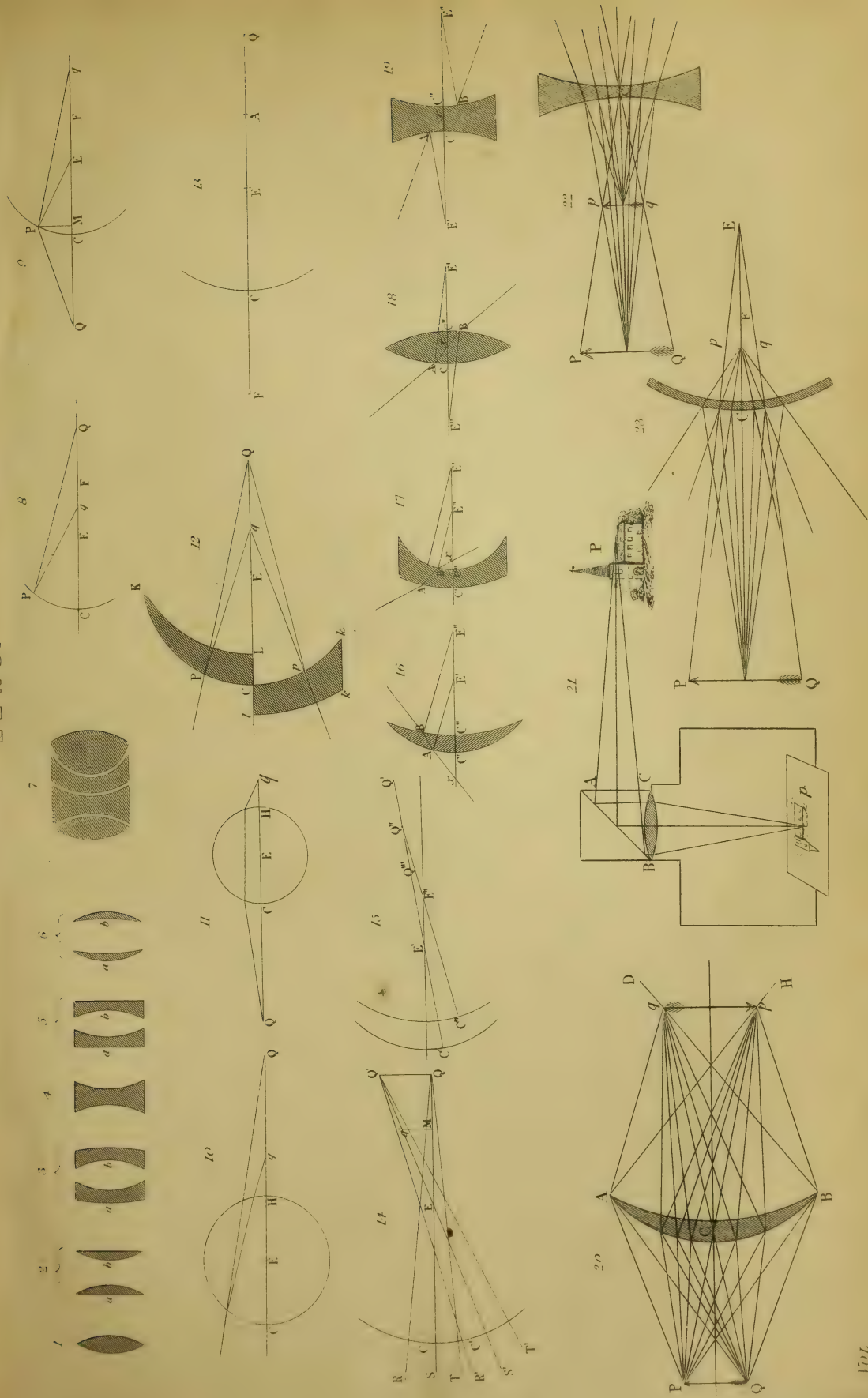
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Compound leaves.



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LENS.



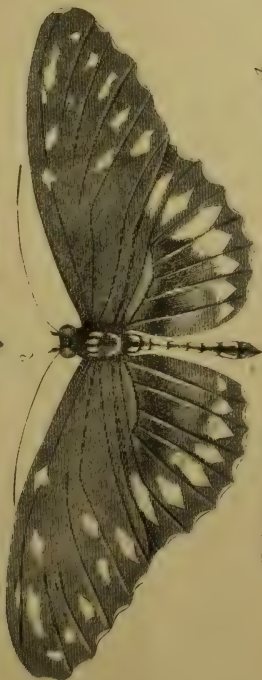
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LEPIDOPTERA AND HEMIPTERA.

LEPIDOPTERA.



*Heliconia
Hermathura*



*Heliconia
Heathesia*



Epicallia Panditha South American Butterfly.



Calydna alomisa



Fulgura andulapida
(Chinese Lantern Fly)



Xanorhis canoides



Plant lice of the Rose.



Coccus, or
Cochineal
Insect (male)



Notonecta glauca
Water boatman.

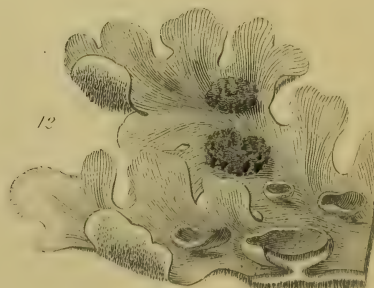
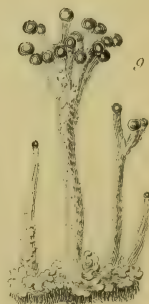
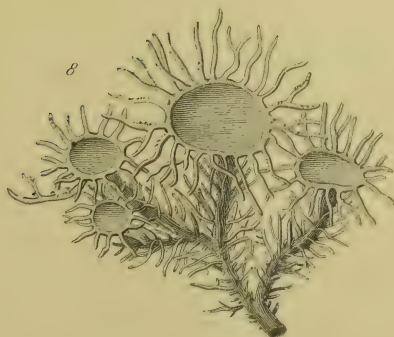


female

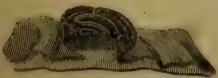
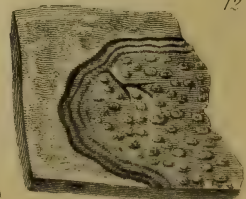
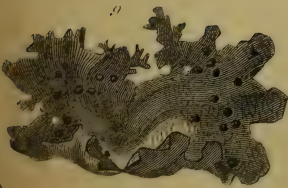
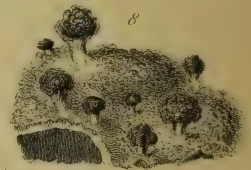
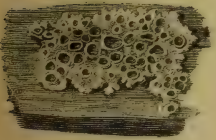
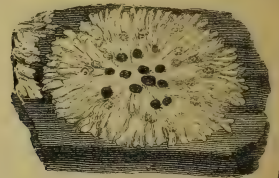
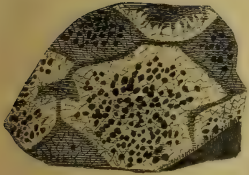
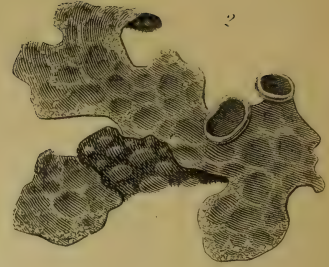
♀ 10 Aphid Rose

HEMIPTERA.

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LIGHT.



Fig. 1

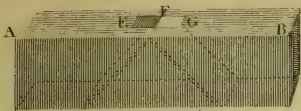


Fig. 2

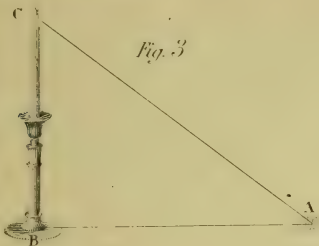


Fig. 3

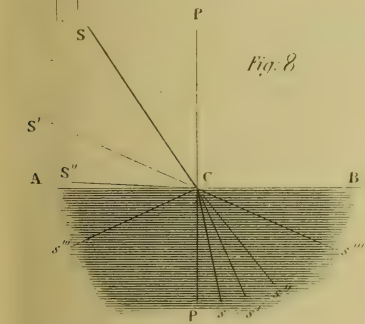


Fig. 8

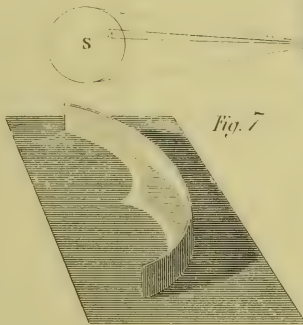


Fig. 7

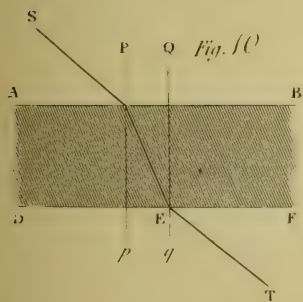


Fig. 10

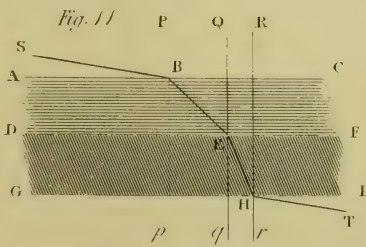


Fig. 11

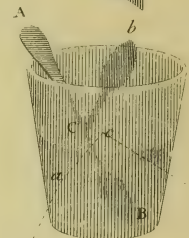


Fig. 9

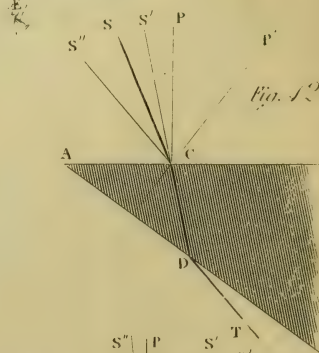


Fig. 12

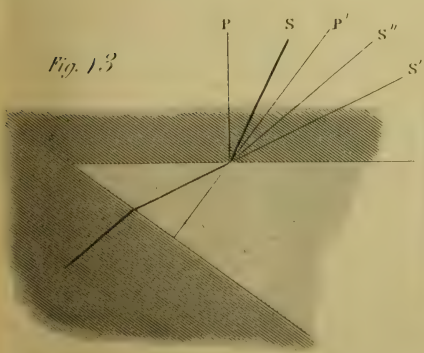


Fig. 13

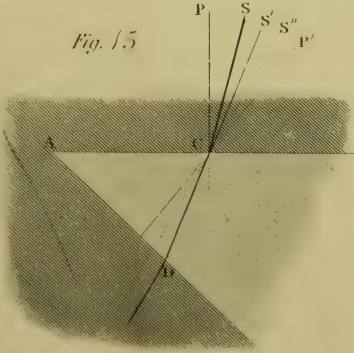


Fig. 15

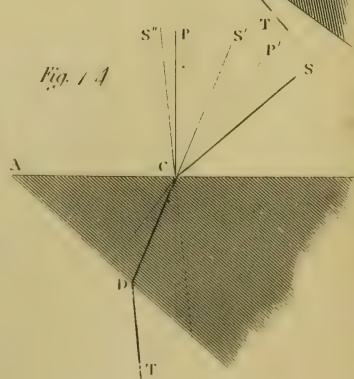


Fig. 14

Fig. 1

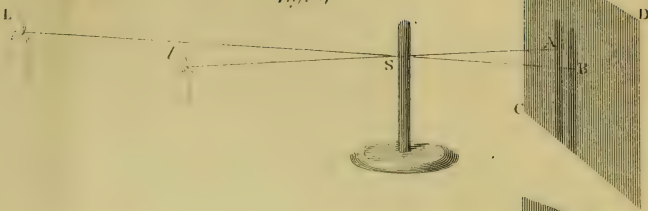


Fig. 4

Fig. 5



Fig. 6



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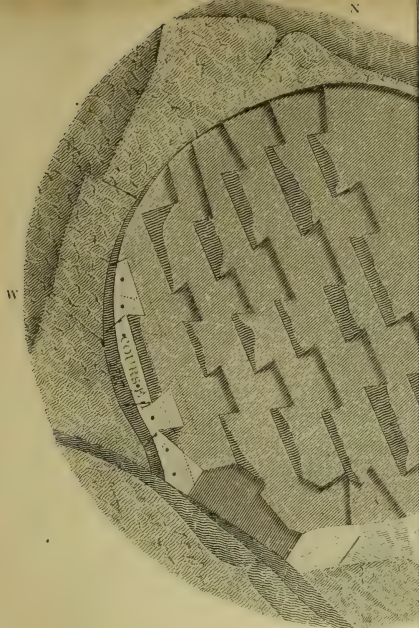


Fig. 3

Fig. 6

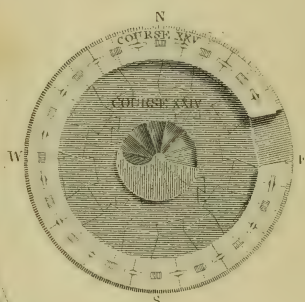


Fig. 7

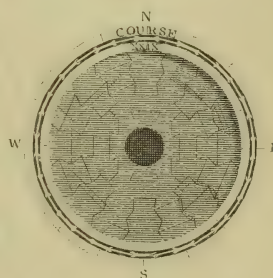
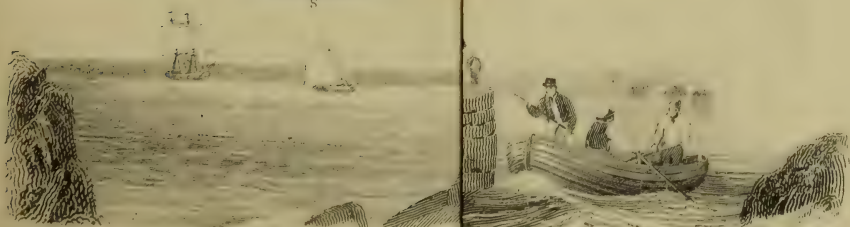
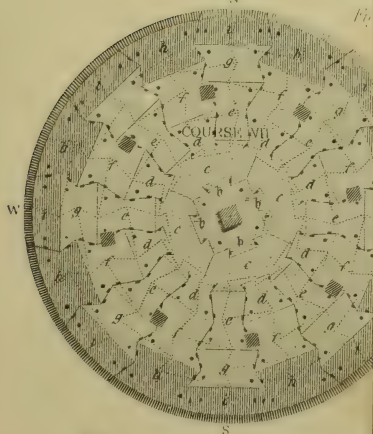


Fig. 8



Vol. Semi Elevation of the Eddystone Lighthouse from East to West.

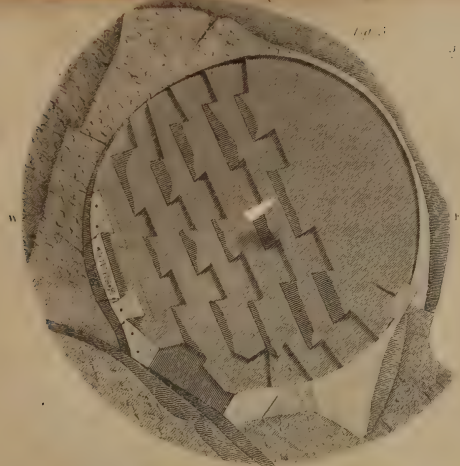


Fig. 3

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Fig. 2



Fig. 4

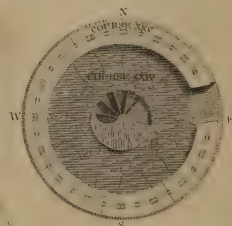


Fig. 5



Fig. 6

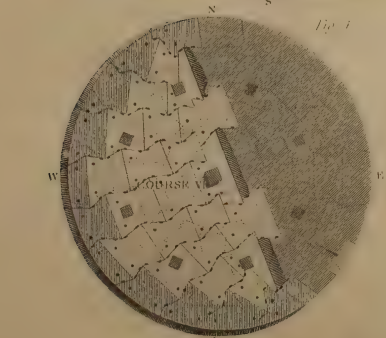


Fig. 1

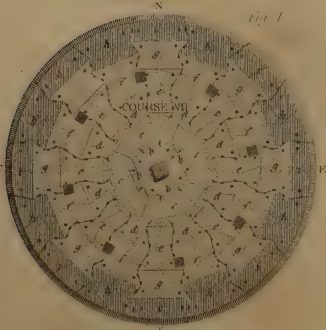
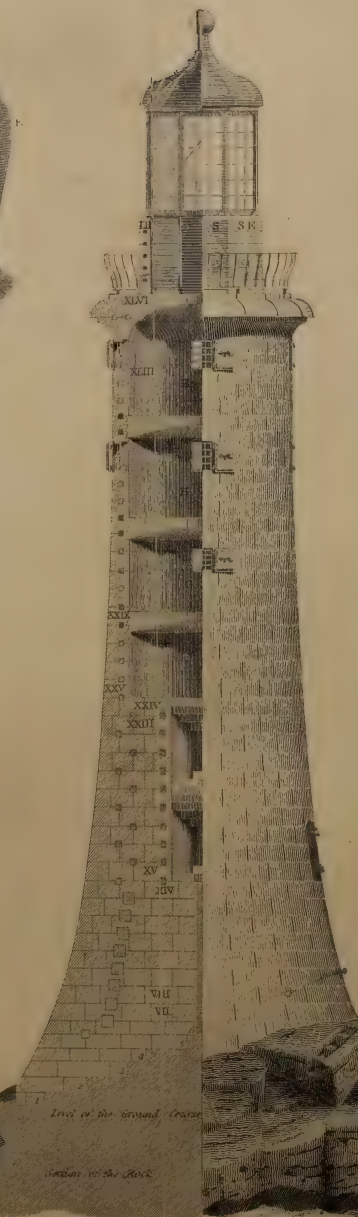
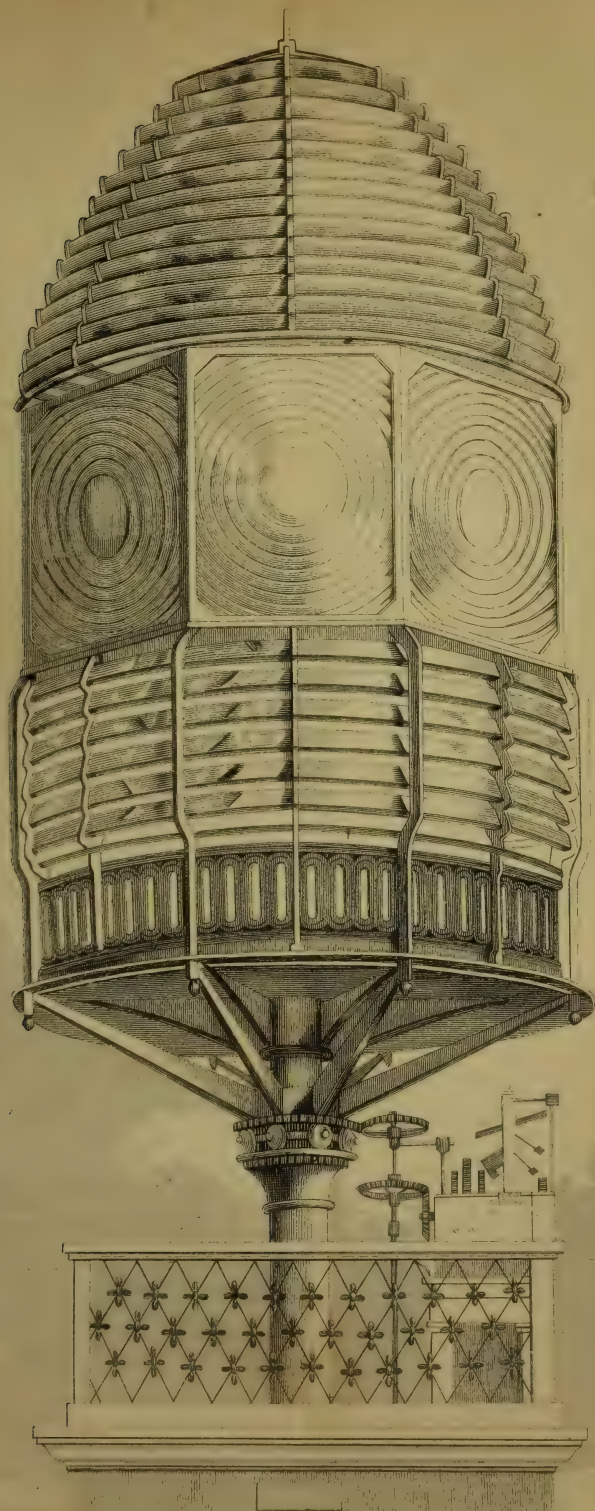


Fig. 1



Level of the ground

Section of the rock



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LIGHTHOUSE.

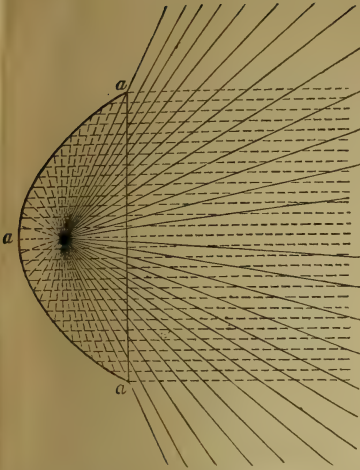


FIG. 1.—SECTION OF FACET REFLECTOR.

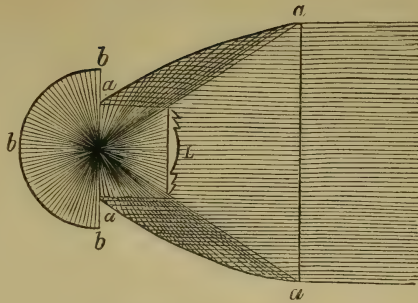


FIG. 2.—SECTION OF HOLOPHOTAL REFLECTOR

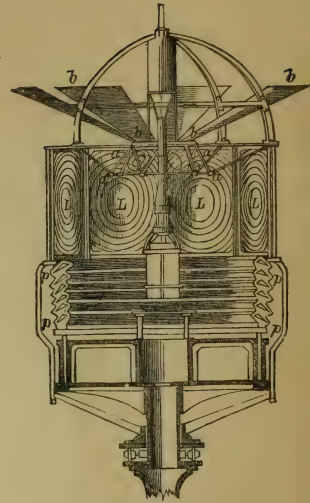


FIG. 5.—FRESNEL'S REVOLVING APPARATUS.

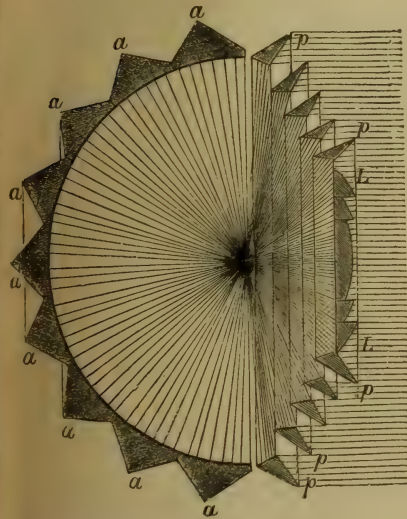


FIG. 3.—SECTION OF DIOPTRIC HOLOPHOTE.

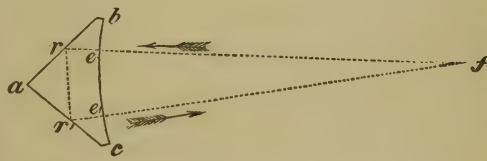


FIG. 4.—SECTION OF PRISM, WITH RAY.

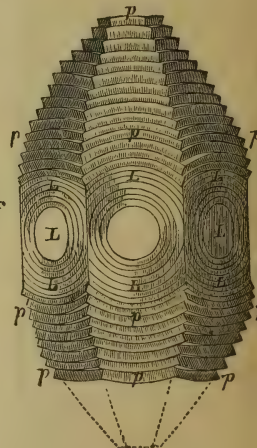


FIG. 6.—STEVENSON'S REVOLVING APPARATUS.

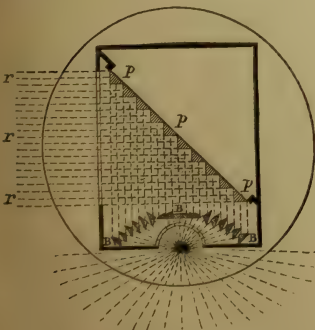
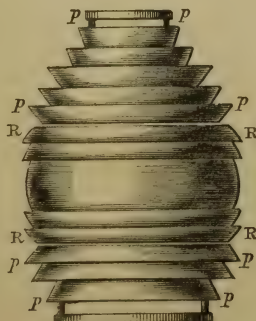
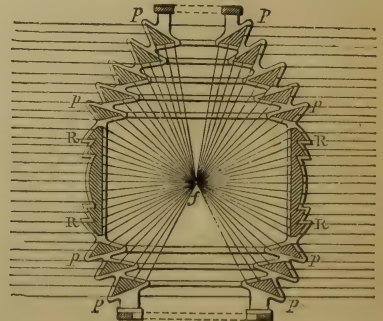


FIG. 7.—APPARENT LIGHT.



Elevation.



Section.

FIGS. 8, 9.—FRESNEL'S "BEE-HIVE" APPARATUS.

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LIGHTHOUSE.

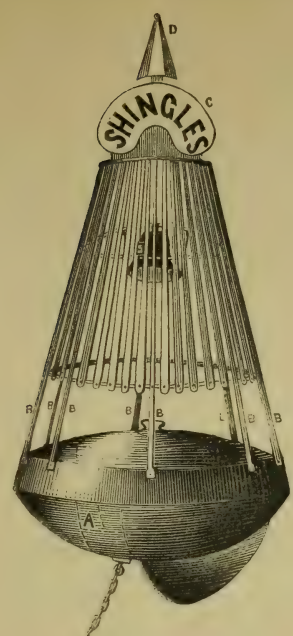
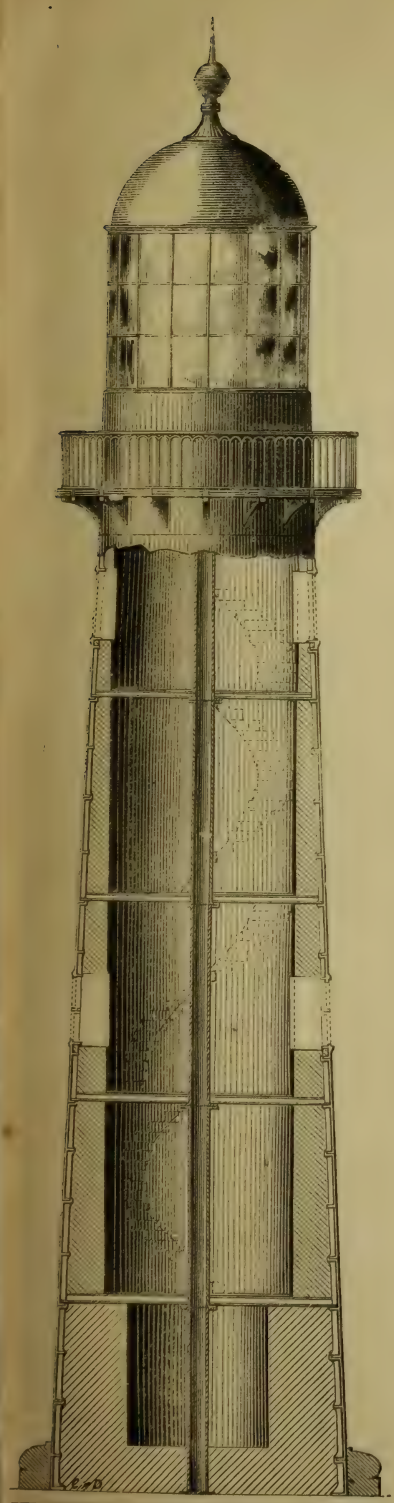


FIG. 1.—PEACOCK'S
REFUGE BUOY-BEACON.



Sectional Elevation.

FIG. 2.—FASTNET ROCK LIGHTHOUSE.



FIG. 3.—MAPLIN SANDS LIGHTHOUSE.

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LOCK.

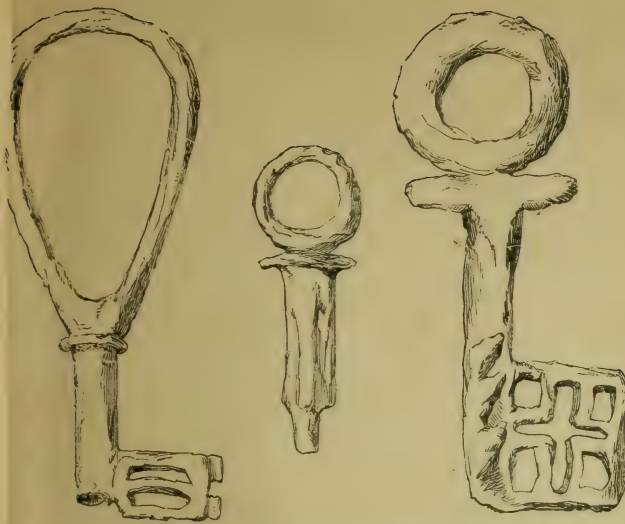


FIG. 1.—SPECIMENS OF KEYS IN THE BRITISH MUSEUM FROM POMPEII AND HERCULANEUM.

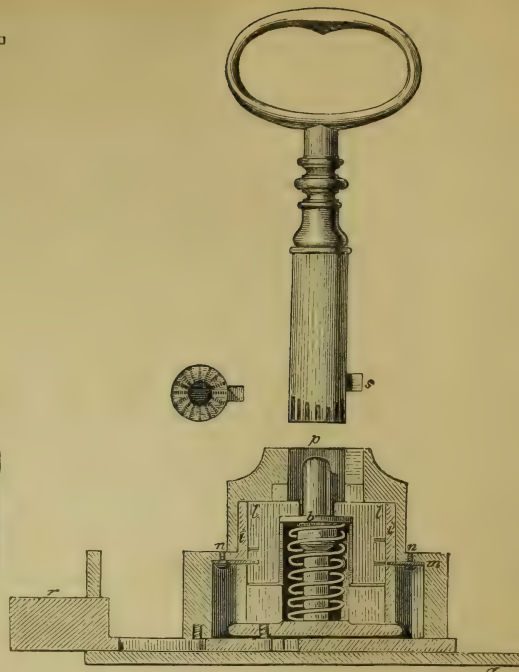


FIG. 2.—SECTION OF BRAMAH LOCK, WITH ITS KEY.

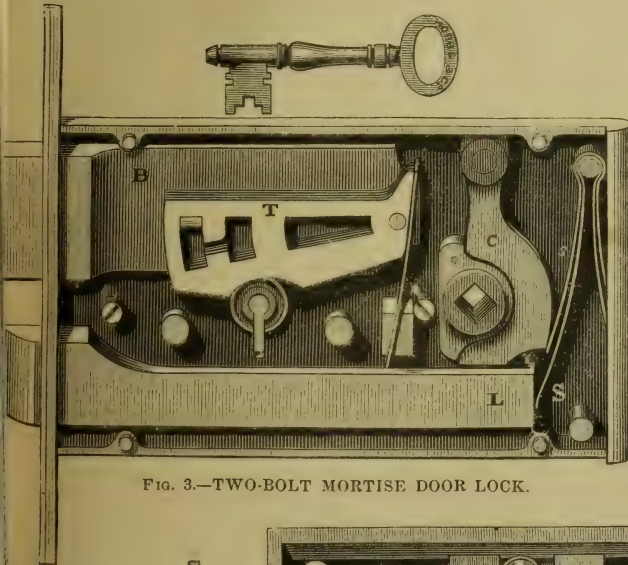


FIG. 3.—TWO-BOLT MORTISE DOOR LOCK.

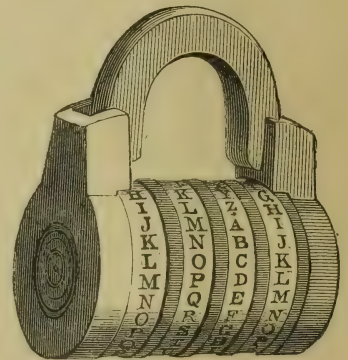


FIG. 5.—PUZZLE OR LETTER LOCK.

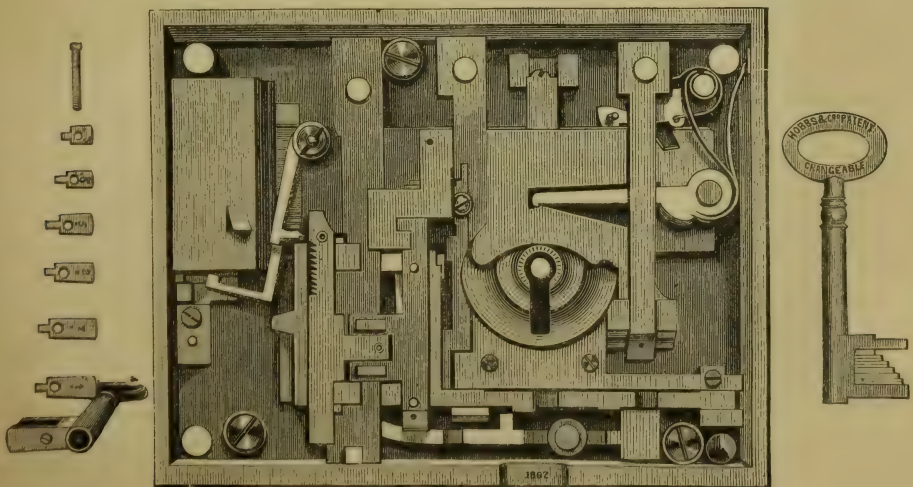


FIG. 4.—HOBBS & CO'S PATENT CHANGEABLE BANK LOCK.

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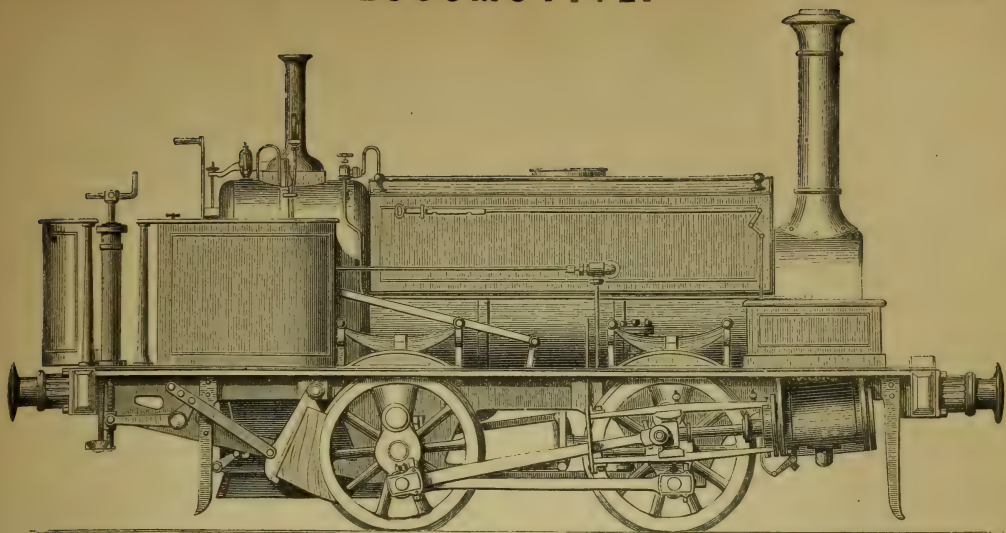


FIG. 1.—MANNING, WARDLE, & CO'S SMALL LOCOMOTIVE—ELEVATION.

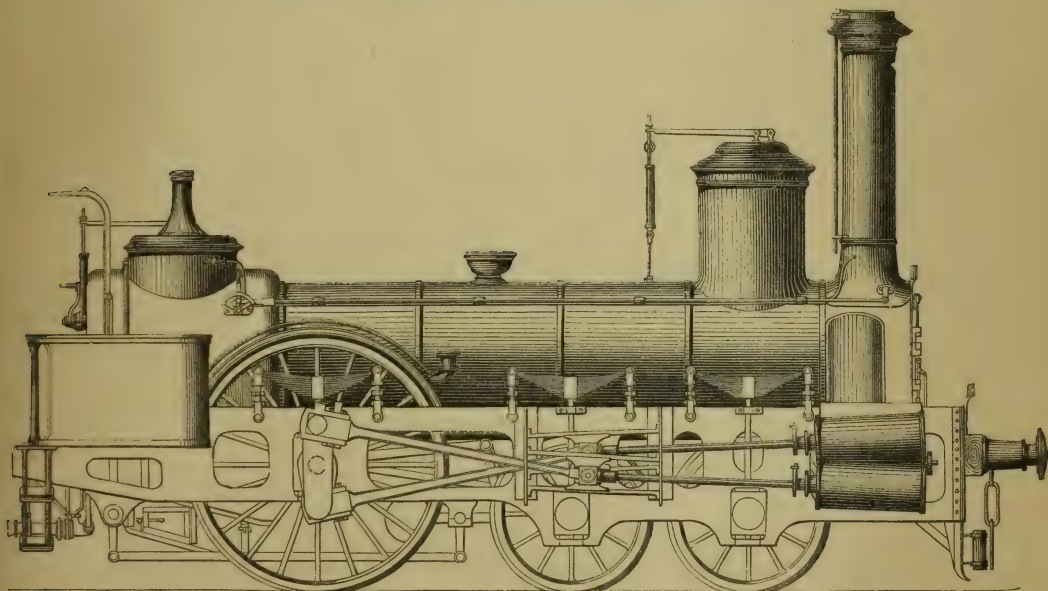


FIG. 2.—AUSTRIAN EXPRESS LOCOMOTIVE—SIDE ELEVATION.

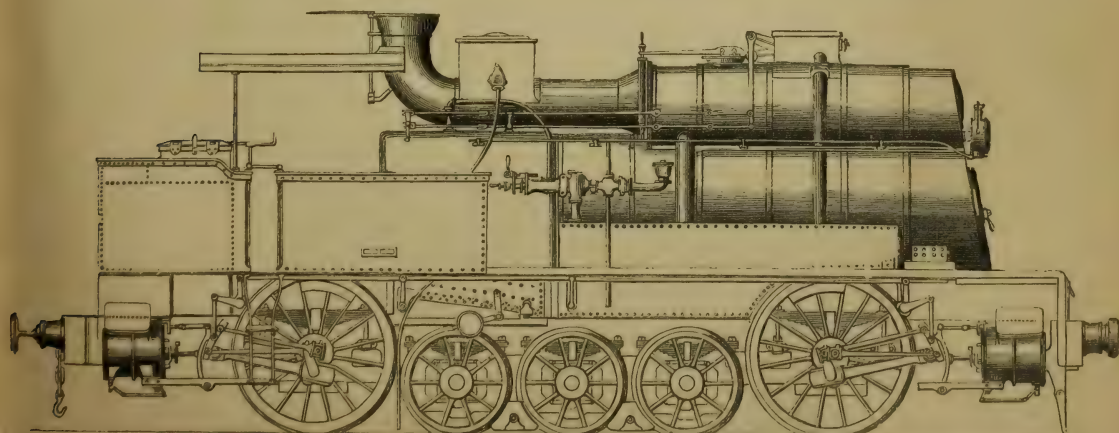


FIG. 3.—FRENCH TEN-WHEELED FOUR-CYLINDERED LOCOMOTIVE—ELEVATION.

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LOCOMOTIVE.

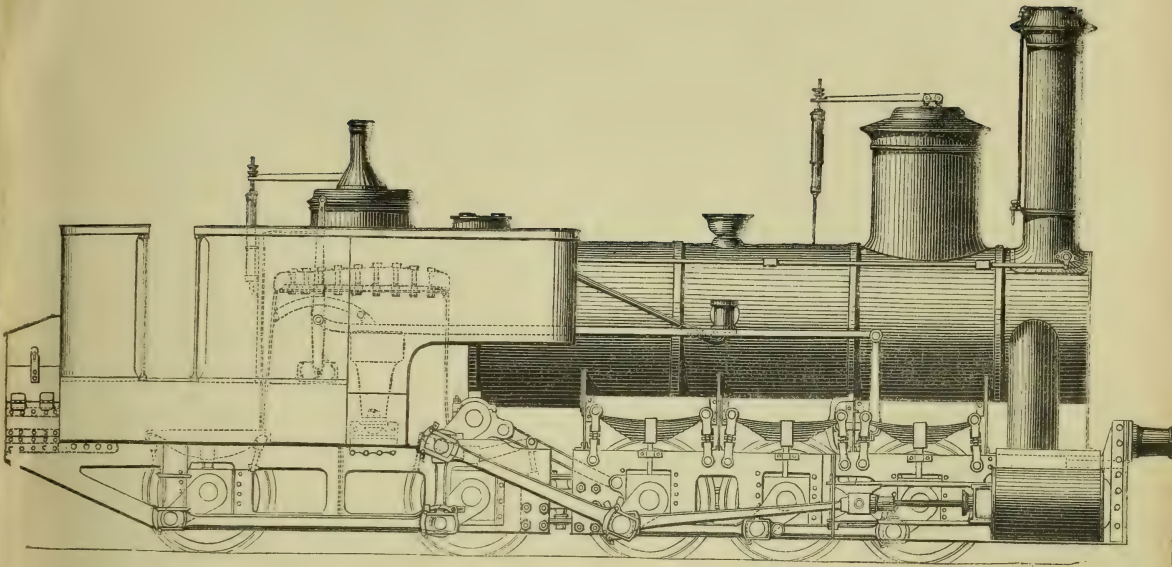


FIG. 1.—AUSTRIAN HEAVY TRAFFIC LOCOMOTIVE—ELEVATION.

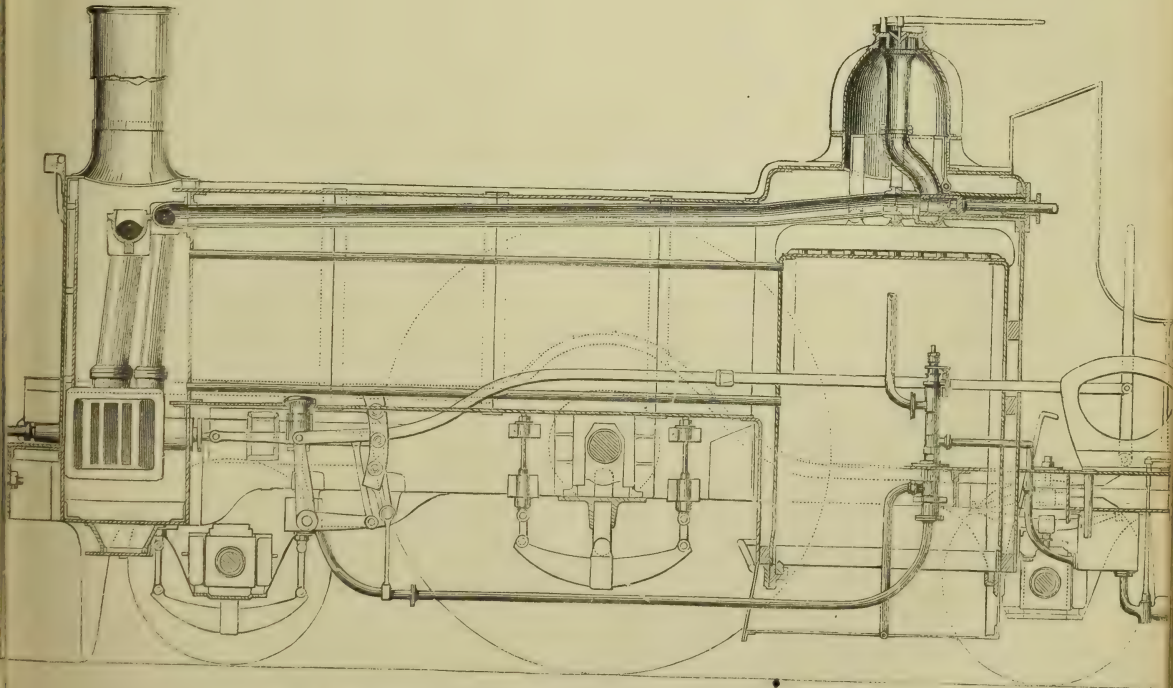


FIG. 2.—NEILSON'S EXPRESS LOCOMOTIVE—SECTIONAL ELEVATION.

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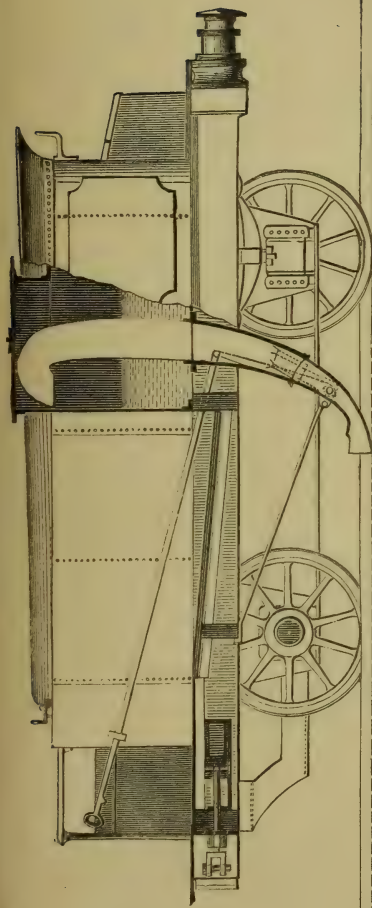


FIG. 1.—RAMSBOTTOM'S FEED WATER PICKING-UP APPARATUS.

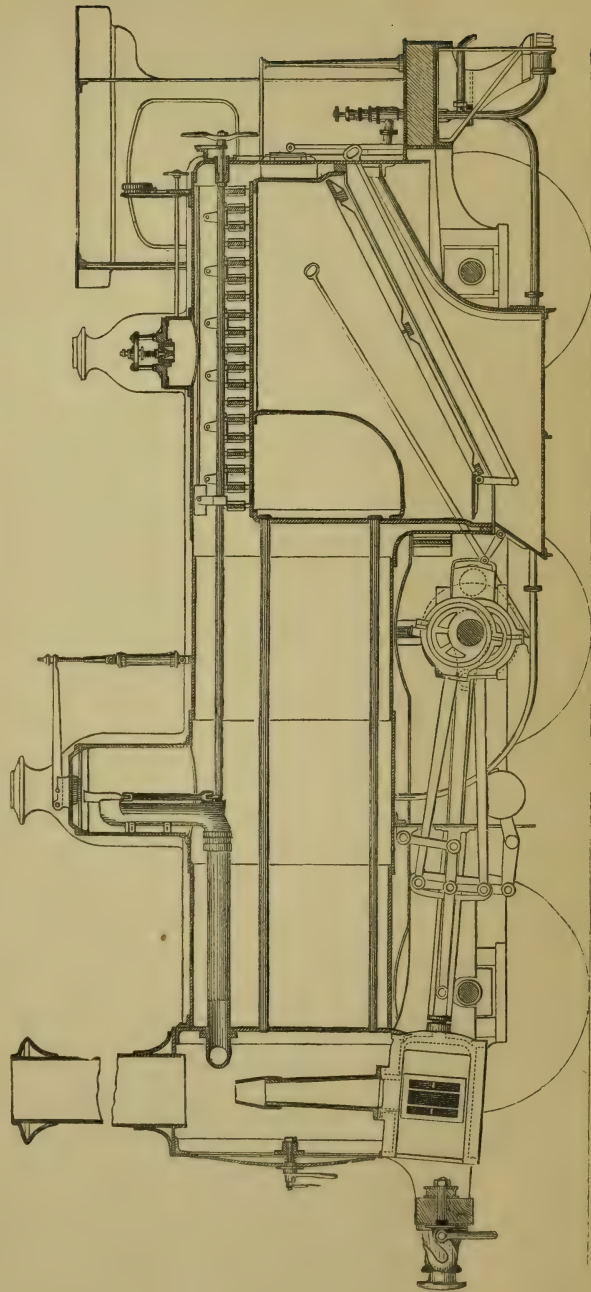
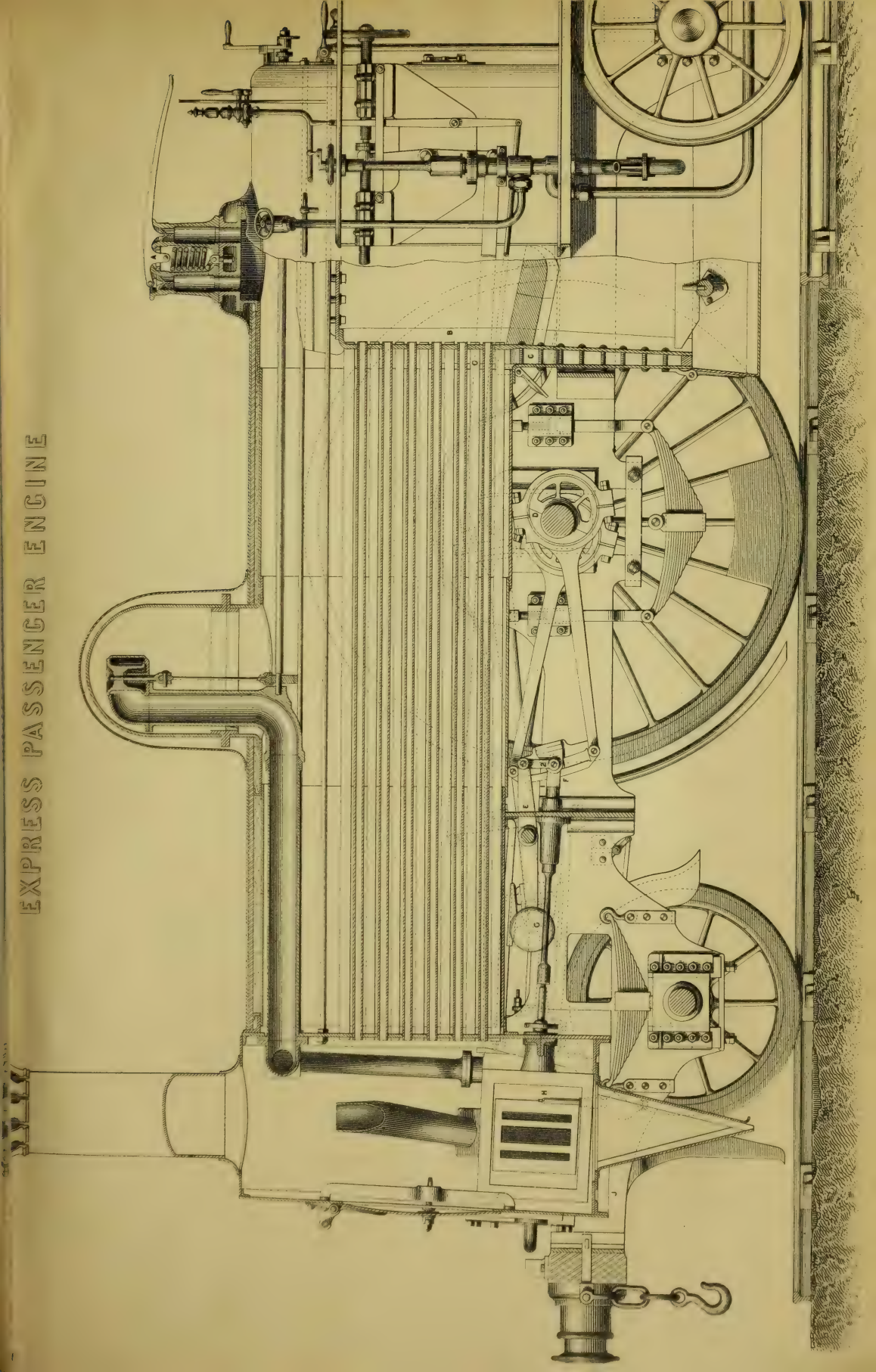


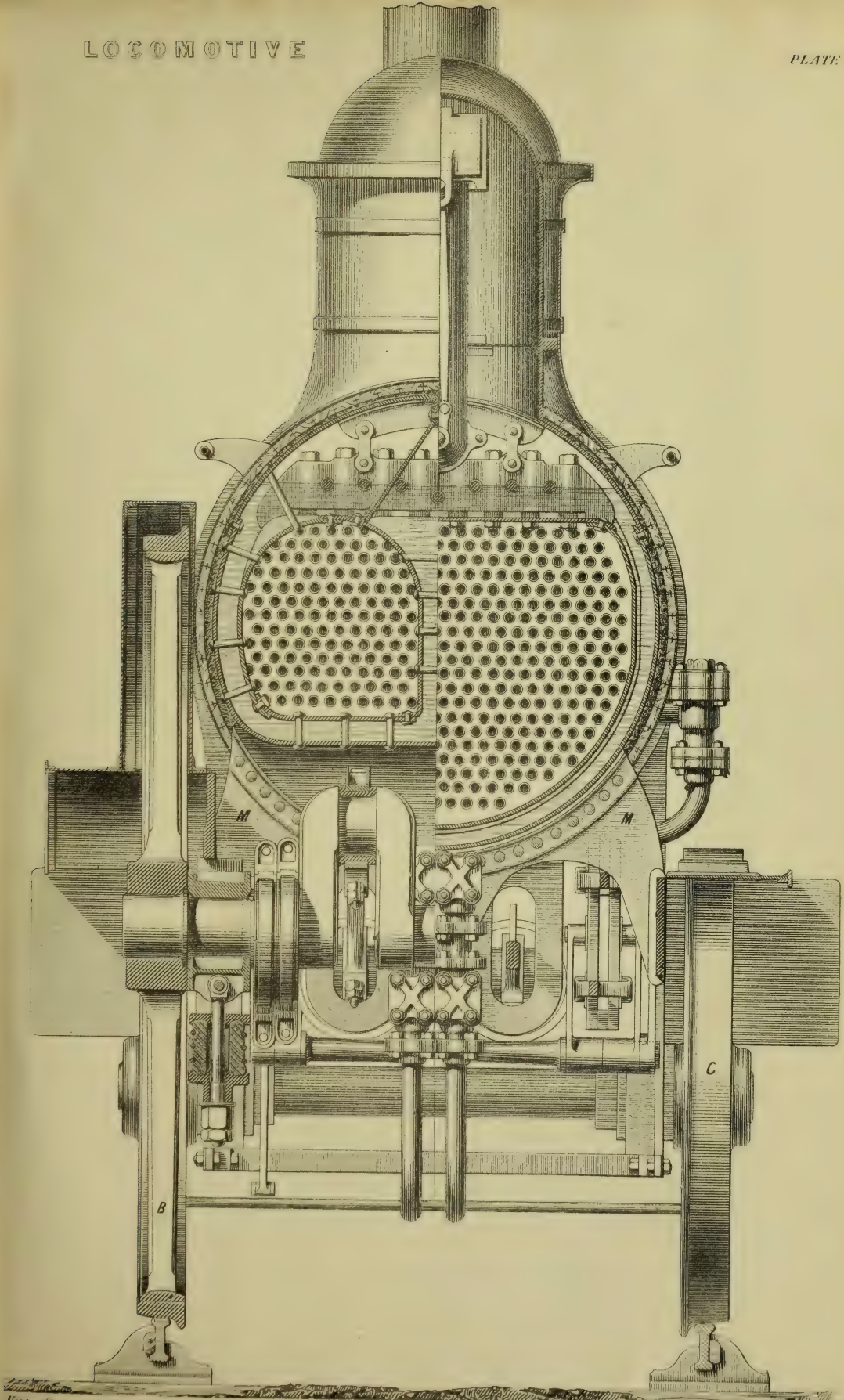
FIG. 2.—SHARP, STEWART, & CO.'S LOCOMOTIVE—LONGITUDINAL SECTION.

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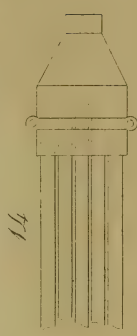
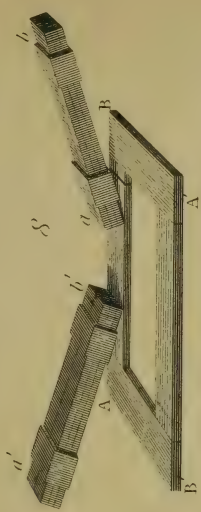
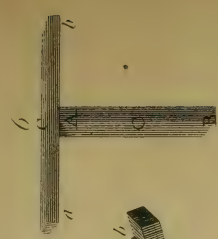
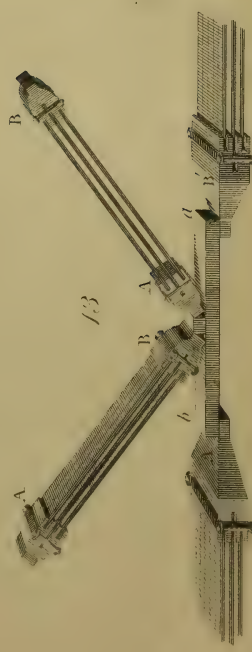
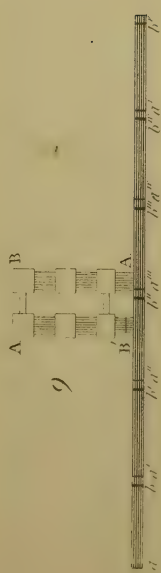
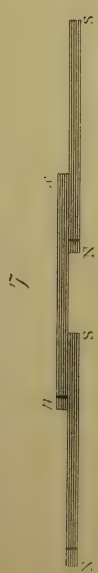
EXPRESS PASSENGER ENGINE



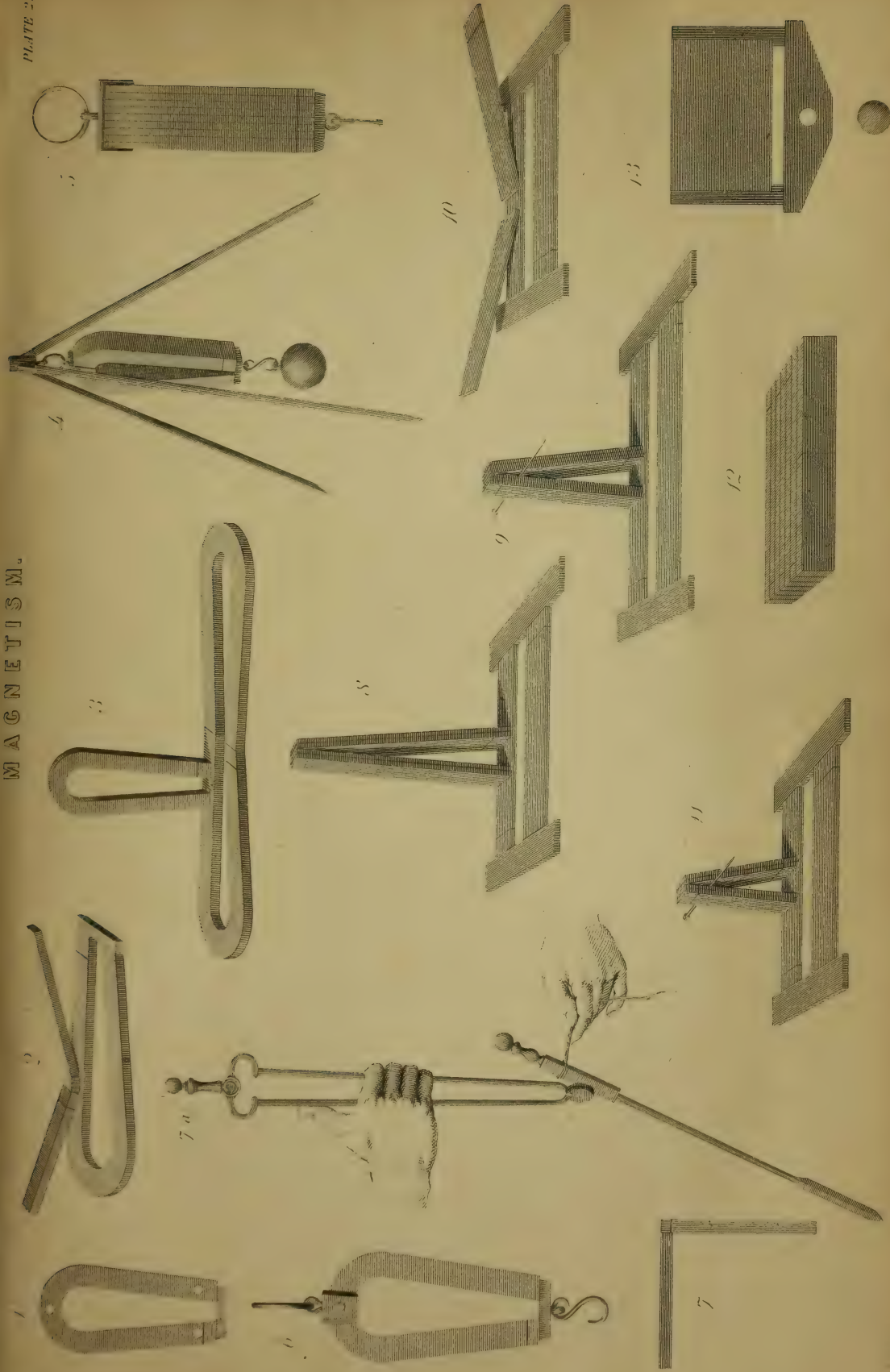
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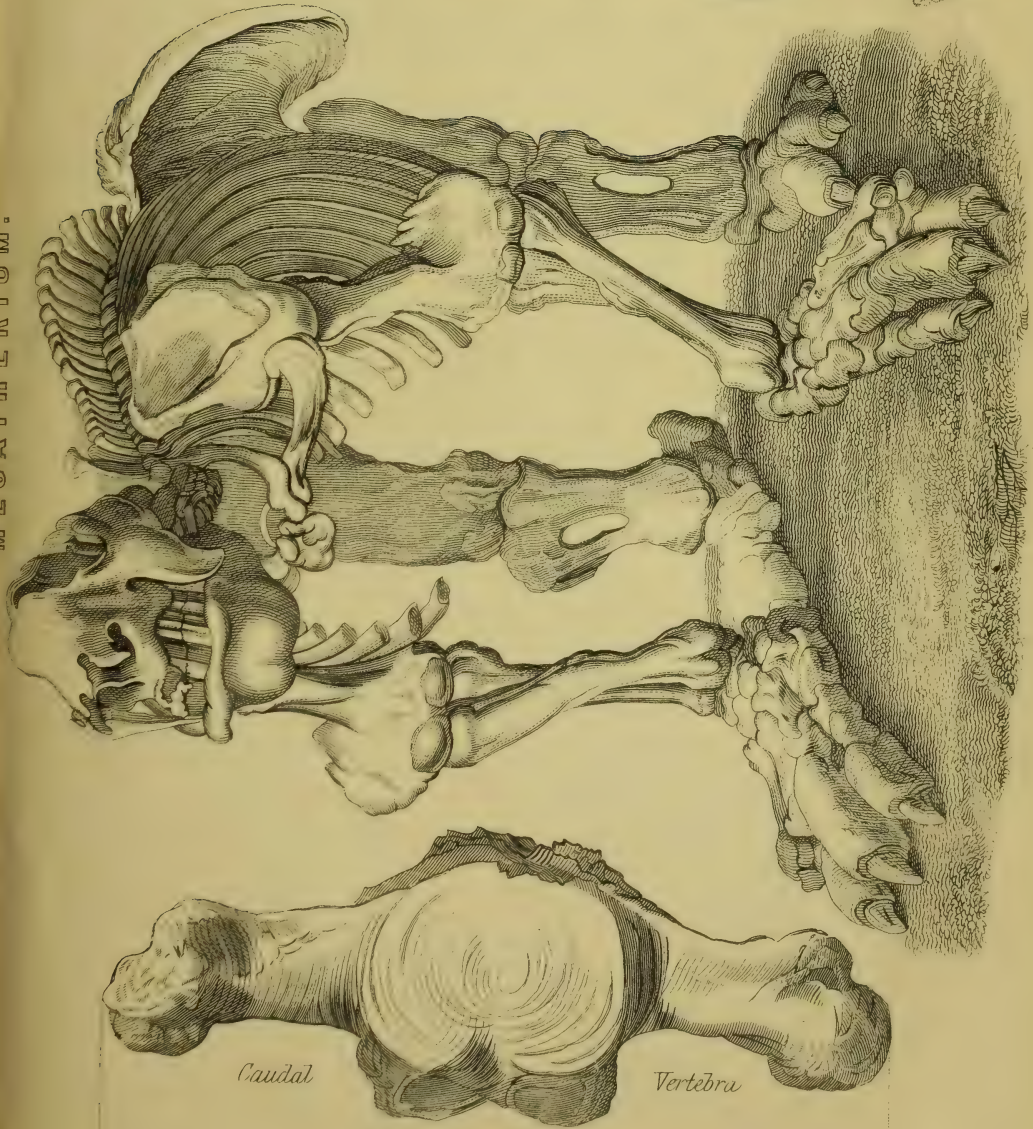
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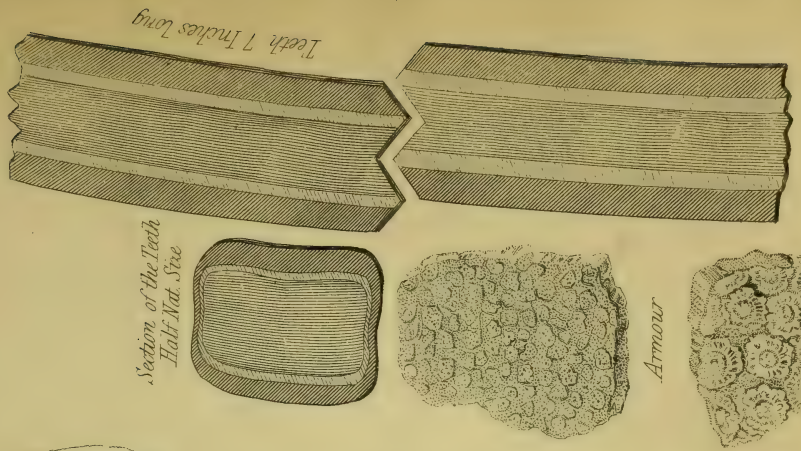
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Caudal

Vertebra

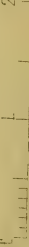
15 inches



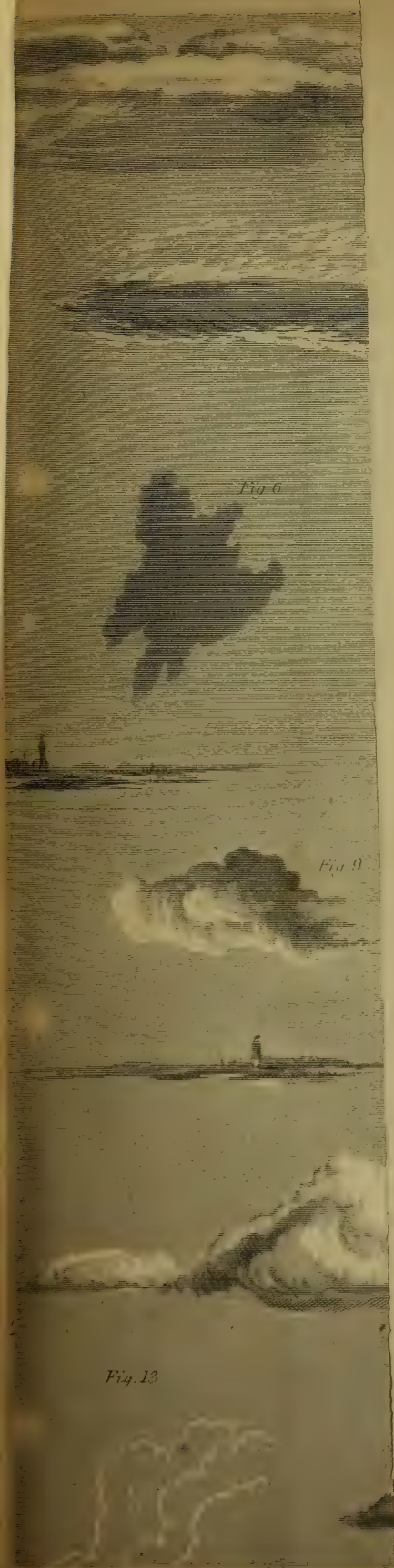
Section of the Teeth
Half Nat. Size

Teeth 7 Inches Long

Armor

Scale of  2 Feet

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Incubation of Clouds. Shadows.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 7

Fig. 6

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 15

Fig. 13

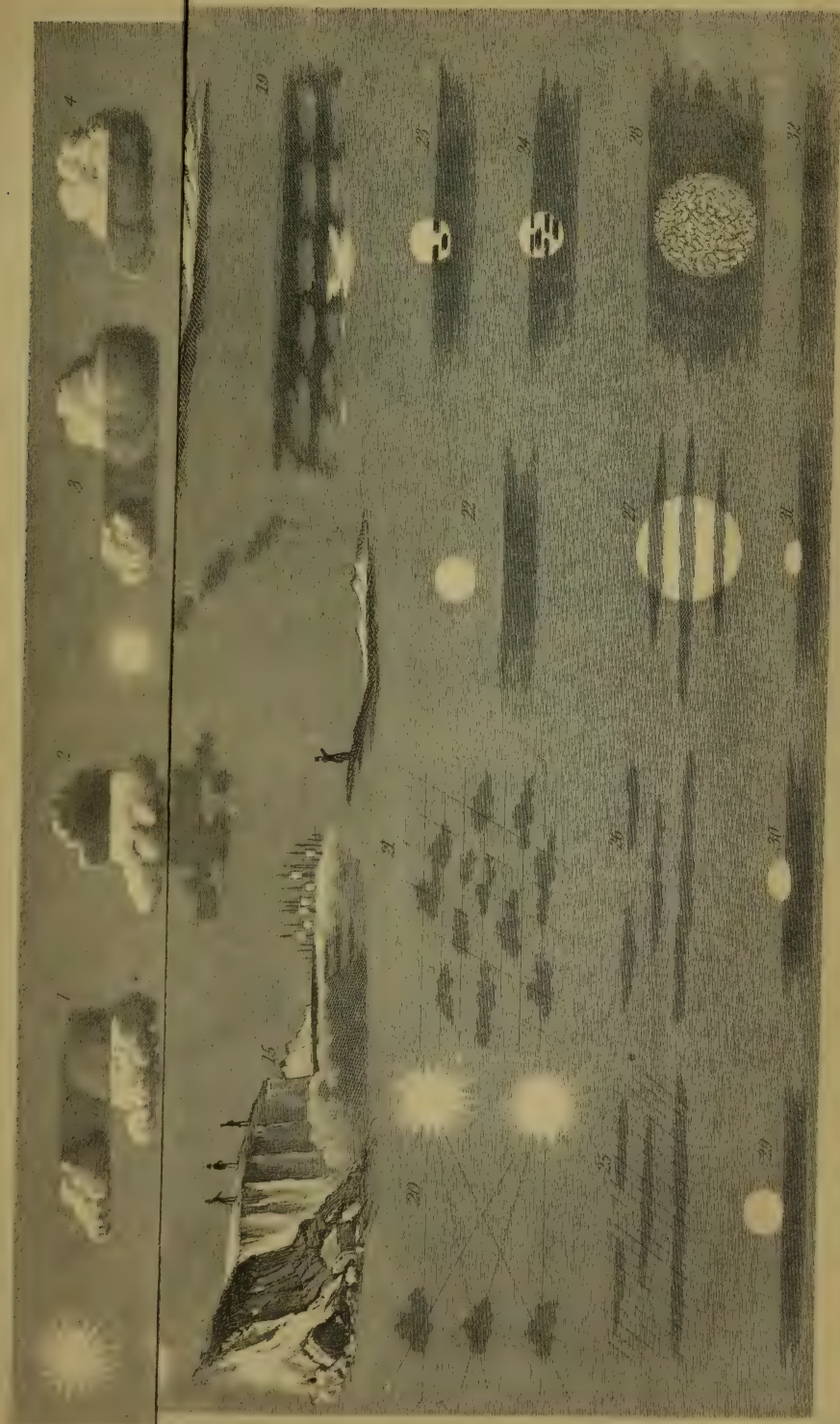
Fig. 14



METEOROLOGY.

PLATE 2.

Shubert, & Co.



Reuben K. G. G.



Hills—Chandos.

Fig. 1

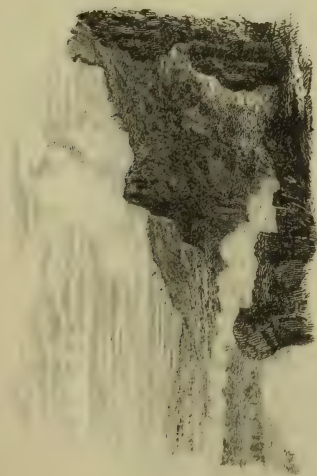


Fig. 2



Fig. 3

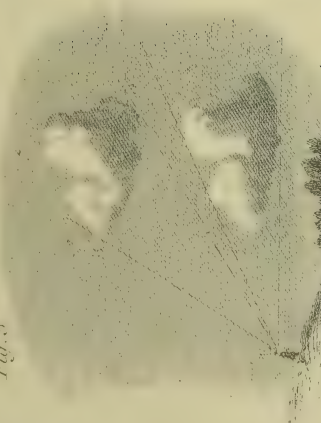


Fig. 3

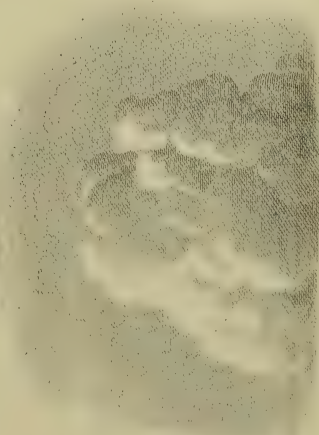
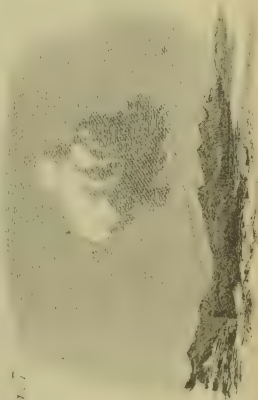


Fig. 7



Vol. 8

Fig. 4

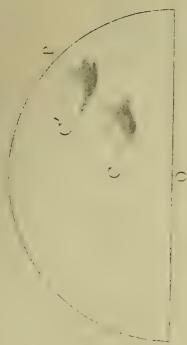
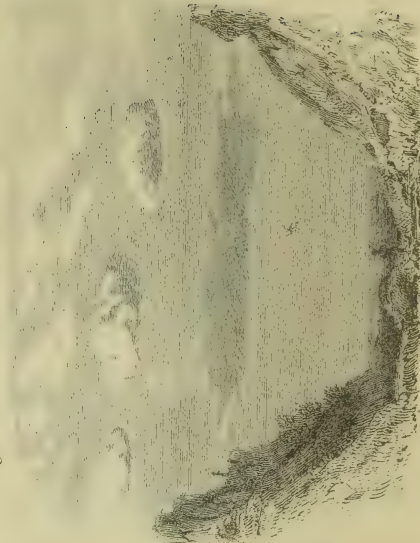


Fig. 6



Fig. 9



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Rising Clouds

Fig. 1



Fig. 2

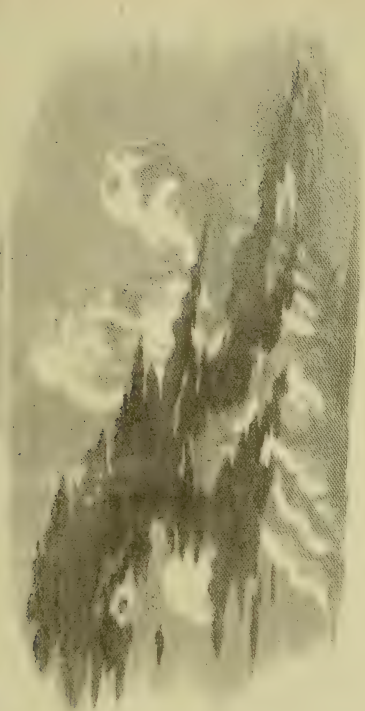


Fig. 4

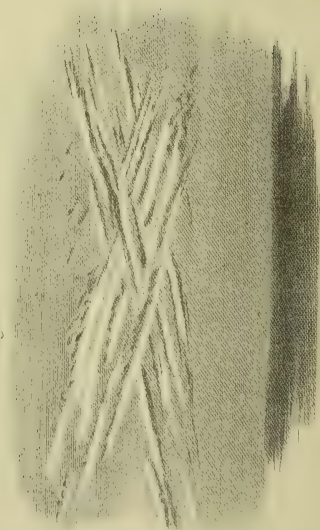


Fig. 3

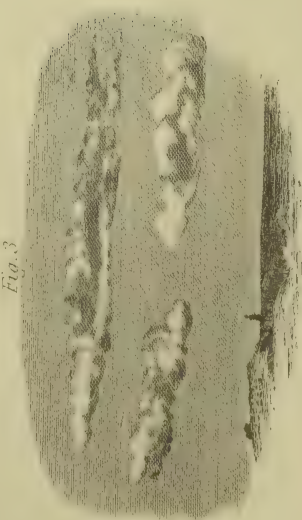


Fig. 5



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THE
NATIONAL ENCYCLOPÆDIA:
A DICTIONARY OF
UNIVERSAL KNOWLEDGE.

JURISPRUDENCE.

JURISPRUDENCE, from the Latin *Jurisprudentia*, which signifies 'a knowledge of law.' Persons who were skilled in the law were called by the Romans *jurisprudentes*, or simply *prudentes*; and sometimes *jurisconsulti*. Jurisprudence means more than being simply acquainted with the rules of law, as they exist in any given system: it means such an acquaintance with them as implies a knowledge of the law as a whole or system, a knowledge of the several parts, of their relation to one another, and to the whole. The Roman *jurisprudentes*, who were writers on law, gave to the several rules of law which related to any given division of the whole matter a certain order and consistency; they developed, and explained, and arranged that which existed as an incoherent mass. Their influence on the development of law was great, both directly and indirectly; and the compilation of Justinian called the 'Digest,' or 'Pandect,' which is entirely composed of extracts from the writings of the Roman jurists, gave to their opinions the force of law in the Roman empire. The Roman jurists also wrote institutional or elementary treatises on that part of the law which they called *Privatum Jus*, of which the 'Institutiones' of Gaius are an example.

Jurisprudence generally, or general jurisprudence, is conversant about those principles which are inseparable from all systems of law, or common to all systems of law; for however systems of law may differ in fact, and however much they may appear to differ in form, there are fundamental principles which are common to all. The notions of possession, of property, of things which can be objects of property, of most of the ordinary contracts of life, of testaments, of intestacy, and the like, are essentially the same. The notions of person, natural and artificial, of right, of duty, and many other things, are universal, and necessarily the same. It is the business of general jurisprudence to explain all these common notions, and to reduce the whole matter which they comprehend to some general form or system, with which all particular systems of positive law may be compared. This has been done in various ways by various writers; but the best examples that we have are by the German writers on law. When general jurisprudence becomes a regular part of a law student's discipline, it will lead to a more comprehensive study of the matter of our own law, to a more correct conception of its parts, and their relations to one another; and consequently to a nearer approximation of the

JURY.

particular law of England to the true measure or standard of general law, in those cases in which our particular system deviates from it. The study of general jurisprudence would be a sure though a slow corrective of many of the evils under which our actual society suffers.

JURY is an assembly of men authorized to inquire into or to determine legal facts, and bound by an oath to the faithful discharge of their duty. The etymological derivation of the term is obviously from *jurō*, 'to swear,' whence we find this institution called in law Latin *jurata*, and the persons composing it *jurati*; in French *les jurés*, and in English *the jury*. In English law, when the object is inquiry only, the tribunal is sometimes called an inquest or inquisition, as in the instance of a grand jury or coroner's inquest; but when facts are to be determined by it for judicial purposes, it is always styled a jury. When the trial by jury is spoken of in popular language at the present day, it signifies the determination of facts in the administration of civil or criminal justice by twelve men sworn to decide them truly according to the evidence produced before them.

Inquiry into facts on behalf of the Crown by means of juries was frequent in England long before the trial by jury was commonly used in courts of justice for judicial purposes. Besides these juries of inquiry (*inquisitoria jurata*), there were accusatory juries (*jurata delatoria*), who presented offences committed within their district or hundred to the king or his commissioned justices. These inquests were immediately connected with the administration of justice, their duty being to charge offenders, who, upon such accusation, were put upon their trial before judges, and were afterwards condemned or 'delivered' by them according to the result of the trial. Though the character and duties of these accusatory juries are involved in much obscurity, there is little doubt that they formed the origin of our present grand juries. The number of persons composing juries of inquiry and accusatory juries was arbitrary, and might consist of more or occasionally of fewer than twelve men.

The third species of jury is the institution by which disputed facts are to be decided for judicial purposes in the administration of civil or criminal justice, and which is in modern times familiar to us under the denomination of *trial by jury*. The time at which this species of trial originated in England has been the subject of much discussion; and the

question, whether it was known to the Anglo-Saxons or was introduced by the Conqueror, has been warmly debated.

The traces of the trial by jury, in the form in which it existed for several centuries after the Conquest, are more distinctly discernible in the ancient customs of Normandy than in the few and scanty fragments of Anglo-Saxon laws which have descended to our time. The trial by twelve compurgators, which was of canonical origin, and was known to the Anglo-Saxons and also to many foreign nations, resembled the trial by jury only in the number of persons sworn. Besides this, the trial by compurgators, under the name of Wager of Law, continued to be the law of England until it was abolished, in 1833, by the Statute 3 & 4 Will. IV., c. 42, s. 13, and is treated by all writers, and noticed in judicial records ever since the Conquest, as a totally different institution from the trial by jury. The trial *per sectatores* or *per pares* in the county court, which has sometimes been confounded with the trial by jury, was in truth a totally different tribunal. The sectatores or pares were, together with the sheriff or other president, judges of the court, as are the suitors in the county courts at the present day. But the incidents of the mode of trial prevalent in Normandy long before the Conquest, correspond in a striking manner with those of our trial by jury as it existed for centuries afterwards. Thus in Normandy offenders were convicted or absolved by an inquest of good and lawful men summoned from the neighbourhood where the offence was surmised to have been committed. The law required those to be selected to serve on such inquest who were best informed of the truth of the matter; and friends, enemies, and near relatives of the accused were to be excluded. These incidents, though unlike our present mode of trial, are nearly identical with the trial by jury as it is described first by Glanville and afterwards by Bracton, and correspond almost verbally with the form of the jury process which has continued to the present day, by which the sheriff is commanded to return 'good and lawful men of the neighbourhood, by whom the truth of the matter may be better known, and who are not akin to either party, to recognize upon their oaths, &c.' On the other hand (as Madox remarks, in his 'History of the Exchequer,' p. 122), 'if we compare the laws of the Anglo-Saxon kings with the forms of law process collected by Glanville, they are as different from one another as the laws of two several nations.'

Though there are some traces of the trial by jury in the four reigns which immediately succeeded the Norman Conquest, it was not till a century afterwards, in the reign of Henry II., that this institution became fully established and was reduced to a regular system. The law of Henry II. introduced the trial by assize or jury in real actions, as a mode of deciding facts which the subject might claim as a matter of right. In the reign of John we first begin to trace the use of juries for the trial of criminal accusations. It is quite clear, however, from Bracton and Fleta, that at the end of the thirteenth century the trial by jury in criminal cases had become usual, the form of the proceedings being given by them in detail. (Bracton, p. 143.) Introduced originally as a matter of favour and indulgence, it gained ground with

advancing civilization, gradually superseding the more ancient and barbarous customs of battle, ordeal, and wager of law, until at length it became, both in civil and criminal cases, the ordinary mode of determining facts for judicial purposes.

It is a popular error that the stipulation for the *judicium parium* (or judgment by equals) in Magna Charta referred to the trial by jury. Coke, in his commentary upon Magna Charta, expressly distinguishes between the trial by peers and the trial by jury (2nd Inst. 48, 49); but Blackstone says, 'The trial by jury is that trial by the peers of every Englishman, which, as the grand bulwark of his liberties, is secured to him by the Great Charter.' ('Commentaries,' vol. iv., p. 349.) This is confounding two distinct modes of trial. The *judicium parium* was the feudal mode of trial, where the *pares*, or *convassalli ejusdem domini*, sat as judges or assessors with the lord of the fee to decide controversies arising between individual *pares*.

Until about the reign of Henry VI. the trial by jury was a trial by witnesses. The present form of the jurors' oath is that they shall 'give a true verdict, according to the evidence.' At what precise time this form was introduced is uncertain; but for several centuries after the Conquest, the jurors both in civil and criminal cases were sworn merely to *speake the truth*. Hence their decision was accurately termed *veredictum*, or verdict; whereas the phrase 'true verdict' in the modern oath is not only a pleonasm, but is etymologically incorrect, and misdescribes the office of a juror at the present day.

The earliest traces of the examination of witnesses or of evidence being laid before juries in England, which formed the commencement of a total change in their character, occur in the reign of Henry VI. The change was introduced by slow degrees, and though distinctly discernible in the reign of Henry VI., was not completely effected before the times of Edward VI. and Mary.

This view of the original character and office of the jury seems to account for the practice of fining or otherwise punishing juries by the court when they gave an unsatisfactory verdict—a practice which was partially continued, though not without remonstrance by legal authorities, after the nature of the institution had been changed. If juries, who were merely witnesses sent for to inform the courts of facts which they were presumed certainly to know, returned a wilfully false verdict, they were guilty of a contempt of justice, and might properly be punished; but when their character was changed, and their verdict depended, not on their own knowledge of the facts, but upon the impressions produced on their minds by the evidence, such a course of summary punishment became intolerable injustice, and though occasionally practised in the sixteenth century, was declared to be illegal soon after the Restoration by the celebrated judgment in Bushell's case, reported in Vaughan's Reports, p. 135.

The juries now in use in England in the ordinary courts of justice are grand juries, petty or common juries, and special juries. Grand juries are exclusively incident to courts of criminal jurisdiction; their office is to examine into charges of crimes brought to them at assizes or sessions, and if satisfied that they are true, or at least that they deserve more

particular examination, to return a bill of indictment against the accused, upon which he is afterwards tried by the petty jury. A grand jury must consist of twelve at the least; but in practice a greater number usually serve, and twelve must always concur in finding every indictment. No further qualification is required for grand jurors (except in the case of grand jurors at the sessions of the peace, provided for by the Jury Act) than that they should be freeholders, though to what amount is uncertain; or freemen, lawful liege subjects, and not aliens or outlaws.

Until the end of the thirteenth century the only qualification required for petty or common juries, for the trial of issues in criminal or civil courts, was that they should be 'free and lawful men': *freemen*, as holding by free services or free burgesses in towns; and *lawful* men, that is, persons not outlawed, aliens, or minors, but entitled to the full privileges of the law of England. The Statute 6 George IV., c. 50, entirely remodelled the law respecting juries. By this statute 'every man (with certain specified exceptions) between the ages of twenty-one years and sixty years, who has within the county in which he resides 10*l.* a year in freehold lands or rents, or 20*l.* a year in leaseholds for unexpired terms of at least twenty-one years, or who, being a householder, is rated to the poor-rate in Middlesex on a value of not less than 30*l.*, and in any other county of not less than 20*l.*, or who occupies a house containing not less than fifteen windows, is qualified and liable to serve on juries in the superior courts at Westminster and the courts of the counties palatine, for the trial of issues to be tried in the county where he resides, and also to serve on grand juries at the sessions of the peace, and on petty juries, for the trial of issues triable at such sessions in the county in which he resides.' The exceptions are—peers, judges of the superior courts, clergymen, Roman Catholic priests, dissenting ministers following no secular employment but that of a schoolmaster, serjeants and barristers-at-law, and doctors and advocates of the civil law actually practising; attorneys, solicitors, and proctors actually practising; officers of courts actually exercising the duties of their respective offices; coroners, gaolers, and keepers of houses of correction; members and licentiates of the College of Physicians actually practising; surgeons, being members of one of the royal Colleges of Surgeons in London, Edinburgh, or Dublin, and actually practising; apothecaries certificated by the Apothecaries' Company, and actually practising; officers in her majesty's navy or army on full pay; pilots licensed by the Trinity House; masters of vessels in the buoy and light service; pilots licensed by the Lord Warden of the Cinque Ports, or under any Act of Parliament or charter; household servants of the sovereign; officers of customs and excise; sheriffs' officers, high constables, and parish clerks.

Lists of all persons qualified to be jurors are made out by the churchwardens and overseers of each parish, and fixed on the church door for the first three Sundays in September in each year; these are afterwards allowed at a petty sessions, and then delivered to the high constable, who returns them to the next quarter-sessions for the county. The clerk of the peace then arranges the lists in a book, which is called the 'Jurors' Book' for the ensuing year, and

afterwards delivers it to the sheriff. From this book the names of the jurors are returned in panels to the different courts.

Special juries are composed of such persons as are described in the 'Jurors' Book' as esquires, and persons of higher degree, or as bankers or merchants; and it is the duty of the sheriff to make a distinct list of such persons, which is called the 'Special Jurors' List.' When a special jury is ordered by any of the courts, which must always be the result of a special application of one of the parties, forty-eight names are taken by ballot from this list in the manner particularly described in the statute, which are afterwards reduced to twenty-four by means of each party striking out twelve; and the first twelve of these twenty-four who answer to their names in court are the special jury for the trial of the cause. This applies only to trials in London or Middlesex, one set of forty-eight special jurors being summoned to each of the assize courts, who try all special jury cases.

The mode of objecting to a jury by the parties is by challenge. Challenges are of two kinds: challenges to the *array*, and challenges to the *polls*. The challenge to the array is an objection to the whole panel or list of jurors returned for some partiality or default in the sheriff or the under-sheriff by whom it has been *arrayed*. Challenges to the polls are objections to particular jurors, either on the ground of incompetency (as if they be aliens, or of insufficient qualification within the provisions of the Jury Act, 6 Geo. IV., c. 50), or of bias and partiality, or of infamy, as having been convicted of some infamous crime. Upon these challenges, the cause of objection must in each case be expressly shown to the court; but in trials for capital offences the accused is entitled to challenge *peremptorily* (that is, without giving any reason) thirty-five jurors. The king, however, as nominal prosecutor, has no right of peremptory challenge, though he is not compelled to show his cause of challenge until the panel is gone through, and unless a full jury cannot be formed without the person objected to.

One of the jury is appointed the foreman, and he generally delivers the verdict of the jury to the judge in court.

The trial by jury, originally established in France in criminal cases by the National Assembly, was retained in the French code. An account of the proceeding and of the qualifications and formation of the jury will be found in the 'Code d'Instruction Criminelle,' liv. ii. tit. 2, chaps. iv. and v. [CODES, LES CRIM.]

Anciently in Scotland all offences were tried by juries; at present all prosecutions of a higher nature must proceed by an assize or jury of fifteen men, who determine their verdict by a majority of voices. In 1815 a statute (55 Geo. III., c. 42) was passed, which established a jury court, not as a separate and independent tribunal, but as subsidiary to the Court of Session, for the trial of particular questions of fact to be remitted for trial by the judges of the Court of Session at their discretion. It was provided by the Act that, if the jury are not unanimous in twelve hours, they shall be discharged, and a new trial granted. The judges of this court, called the 'Lords Commissioners of the Jury Court in Civil

Cases,' are appointed by commission, and consist of a chief judge and two other judges. The Stat. 59 Geo. III., c. 35, which recites that the introduction of the trial by jury in civil cases by the former Act had been found beneficial, enacts a variety of improvements in the machinery of the jury courts, and makes them a permanent part of the judicial establishment of Scotland. By the Stat. 2 Geo. IV. and 1 Will. IV., c. 69, the jury court as a separate tribunal was abolished, and the trial by jury was united with the ordinary administration of justice in the Court of Session.

JURY MAST, a mast erected in a ship to supply the place of one carried away in a tempest or in an engagement.

JUSSIEU, ANTOINE LAURENT DE, an

eminent French botanist, was born at Lyons in 1748. He arrived in Paris in 1765 for the purpose of completing his education as a medical practitioner, and in 1770 he was nominated botanical demonstrator in the Jardin du Roi. Shortly afterwards he drew up a memoir upon a new method of arrangement, which was read before the Academy of Sciences, and was afterwards carried into effect in the Jardin.

From 1774 to 1789 De Jussieu was constantly occupied in demonstrating to his class of botany; and as his new method was thus brought perpetually before him, with all its advantages and disadvantages in practice, he was able to alter and improve it yearly. The result was the following scheme, under which were arranged all the natural orders known to the author:—

Index Methodi
Ordines Naturales complectentis.

Stamens					Class				
Acotyledones,					1				
Monocotyledones,	{	{	Stamina hypogyna,		2				
			“ perigyna,		3				
			“ epigyna,		4				
			Stamina epigyna,		5				
			“ perigyna,		6				
			“ hypogyna,		7				
			Corolla hypogyna,		8				
			“ perigyna,		9				
			Dicotyledones,	{	Monopetalæ,	“ epigyna,	{ Antheris connatis,	10	
							{ Antheris distinctis,	11	
Polypetalæ,	Stamina epigyna,				12				
	“ hypogyna,				13				
	“ perigyna,				14				
	Diclinal irregularis,				15				

In the state of science when this system was promulgated its excellence was most remarkable, nor is it certain even now that in any way it can be much improved.

His ‘Genera Plantarum’ is now obsolete; but to the last day of his existence Jussieu preserved that brilliant combination of sound philosophical principles with a profound knowledge of facts which has placed him so far above all his countrymen as a botanist.

In 1789, when the ‘Genera Plantarum’ was published, the political state of France compelled Jussieu to mingle in the busy scenes of public life. In 1790 he was made a member of the municipality of Paris, and was charged with the direction of its hospitals and charities. In 1793 the Jardin du Roi was re-organized, and renamed the Jardin des Plantes; and De Jussieu became professor of rural botany. He was afterwards director and treasurer of the Museum of Natural History, and recommenced, in 1802, his botanical writings. These, amounting in number to fifteen, were continued in the ‘Annales du Museum’ till 1820. He employed himself between his eighty-third and eighty-eighth year in dictating a new edition of his ‘Introductio in Historiam Plantarum.’ He died on September 15, 1836.

JUSTICES, LORDS. The kings of England have been, ever since the Conquest, in the habit of appointing, as occasion required, one or more persons to act for a time as their substitutes in the government either of the whole kingdom or of a part of it. When William I. returned to Normandy the year

after the Conquest, he left his half-brother Odo, bishop of Bayeux, and William Fitzherbert, to be *Custodes Regni*, or guardians of the realm, during his absence; and similar appointments were very frequent under the early Norman and Plantagenet kings.

The most familiar case of the appointment by the Crown of a representative to exercise the supreme executive power, not in a colony or dependency, is that of the appointment of a governor for Ireland, who bears the name of the lord lieutenant, or of a council of government composed of lords justices.

In England lords justices and regencies have been repeatedly appointed since the Revolution, on occasion of the king going abroad; and the appointment has usually, if not always, been made by royal letters patent under the great seal, in the same manner as the lords lieutenant or lords justices of Ireland have always been appointed. In some cases, however, the aid of Parliament has been called in for certain purposes. The two judges who form one of the courts of appeal in Chancery are called the lords justices.

JUSTICES OF THE PEACE are persons appointed to keep the peace within certain prescribed limits, with authority to act judicially in criminal causes, and in some of a civil nature arising within those limits, and also to do certain other things in which they act not judicially but ministerially, *i.e.*, as servants of the Crown performing official acts, in respect of which they are intrusted with no judicial discretion. The authority of justices of the peace is derived from the king's prerogative of making courts for the administration of the law, or is created by

different statutes; their duties are expressed in the royal commission appointing them to the office, or are prescribed by those statutes.

Justices of the peace are appointed either by Act of Parliament, by royal charter (in the case of justices in boroughs not within the Municipal Corporation Act, the charter usually appointing certain municipal officers to be justices, and prescribing the manner in which vacancies in the offices are to be filled up), or by a commission from the Crown under the Statute of 1 Edward III. The form of the commission of the peace has from time to time been altered, and the authority of the justices enlarged. As now framed, it consists of two distinct parts, and contains two separate assignments or grants of authority. Of these the former gives to any one or more justices, not only all the power relating to the maintenance of the peace which was possessed by the conservators at common law, but also all the additional authority mentioned in the statutes. The latter assignment defines the power of justices when the whole body, or such of them as choose to attend, act together in general sessions. [SESSIONS.] The jurisdictions of justices in quarter sessions in criminal cases is defined by 5 & 6 Vict., c. 38.

Justices appointed by Act of Parliament or by the king's charter are not removable except for misconduct; but the authority of a justice appointed by the king's commission may be determined at the pleasure of the Crown, either directly by writ under the great seal, or impliedly, by making out a new commission from which his name is omitted. But until notice of the revocation of the authority, or publication of a new commission, the acts of the justice are valid in law; and the warrant of a justice remains in force until it be executed, although he die before its execution. The commission is also determined by the death of the king by whom it was issued; but by 6 Anne, c. 7, s. 8, all offices, civil and military, are to continue for six months after the demise of the Crown, unless sooner determined.

By 6 & 7 Vict., c. 73, s. 33, no attorney or solicitor while in practice is capable of being a justice of the peace. Justices of the peace have in general no authority over matters arising out of the district for which they are appointed, but they may secure the persons of those who are charged before them with felony or breach of the peace; and by the Municipal Corporation Act, s. 111, in every borough to which the king does not grant a separate court of quarter-sessions, the justices of the county within which such borough is situated are to exercise in it the same jurisdiction as in any other part of the county.

The judicial authority of a justice out of sessions is both civil and criminal—civil, where he is authorized by statute to adjudicate between master and servant, or to enforce the payment of rates, tithes, &c., or the observance of the regulations of friendly societies, &c.; criminal, where he requires surety of the peace or a recognisance for the peace or for good behaviour, or where he acts in the suppression of riots, or where he acts with summary power to decide upon the guilt or innocence of the party accused, according to the view which he may take of the evidence, and to punish the offender. But all proceedings before justices, whether civil or criminal, if removed into the Queen's Bench, are there treated

as belonging to the Crown side of the court. It is impossible here to enter into the particulars of the accumulated authority committed to these magistrates, but the reader is referred to Burns' 'Justices of the Peace.'

The office of justice of the peace was attempted to be introduced into Scotland by the Act 1587, c. 82, but without success. By the passing of the Act 1661, c. 38, however, a foundation was laid for the introduction of the system; and by the articles of union in 1707, and 6 Anne, c. 6, s. 2, the powers and duties of these magistrates in Scotland are now for the most part assimilated to the law of England on the subject. There is not, however, a *custos rotulorum* in the Scotch commission, and the *quorum* has never been introduced into the Scotch practice. (Hutcheson's *Justice of the Peace*; Barclay's *Digest*; Dunlop's *Parish Law*.)

The institution of justices of the peace has been adopted in most of the British colonies, and has with some modifications been retained in the United States of America.

JUSTICIA, a genus of acanthaceous Exogens, whose numerous species inhabit all the tropical parts of the world, preferring, however, damp woods to dry and open plains. It is especially in the forests of Brazil and India that they occur. Many of them are never woody, and some are bushes or small trees. A small number are valued by gardeners as objects of ornament. As now limited, Justicia scarcely contains a plant of any importance.

JUSTICIARY COURT (in Scotland.) The High Court of Justiciary is the supreme criminal tribunal in Scotland. Its jurisdiction extends to all crimes, and includes the whole of Scotland: and no appeal lies from its decisions. The constitution of this court was settled by the Act 1672, c. 16, enlarged and extended by subsequent statutes. At present it consists of the presidents of the two divisions of the Court of Session, and five other Lords of Session, any three being a quorum. It sits at Edinburgh from time to time during the year, according to the amount of business to be transacted: and holds circuits twice a year at the more important county towns for the more effectual distribution of justice throughout the kingdom. At these circuit courts appeals may be heard from the judgment of inferior judges in criminal cases, inferring neither death nor demerabration; and also in civil causes where the sum in dispute does not exceed 25*l.* sterling.

In other cases the sentences of inferior judges in criminal causes are brought by bill of suspension or advocacy before the High Court of Justiciary at Edinburgh, and in civil causes before the Court of Session. The jurisdiction of the High Court includes the cognizance of the crimes of treason, except where the accused is a peer, in which case he is tried by a Commission of Oyer and Terminer in the English manner. This court has also jurisdiction in all cases of new crimes.

JUSTIFIABLE HOMICIDE. [MURDER.]

JUSTIFICATION is used in theology to signify the acceptance of a sinner by God, and is frequently employed by the sacred writers as equivalent to the forgiveness of sin. Thus, St. Paul says, 'Be it known unto you therefore, men and brethren, that through this man is preached unto you the forgive-

ness of sins: and by him all that believe are justified from all things, from which ye could not be justified by the law of Moses.' (Acts xiii. 38, 39.) The Protestants and Roman Catholics differ respecting the signification that should be attached to the word justification.

The *originating cause* is the love of God towards his fallen creatures. (Rom. iii. 24; Eph. ii. 8.) The *meritorious cause* is, according to the 11th article of the Church of England, and the opinion of most Protestants, 'the merit of our Lord and Saviour Jesus Christ, and not our own works or deservings' (Rom. iii. 24; v. 18; Eph. i. 7; Col. i. 14); but the Roman Catholic Church maintains that good works, penances, and the intercession of saints also contribute to our justification. The *instrumental cause* is faith in the vicarious sacrifice of Christ; since the merit of Christ's sacrifice does not produce our pardon unless we believe in its efficacy. This is directly contrary to the doctrine of the Antinomians or Solifidians.

JUSTIFICATION, PLEA OF. This amounts to an admission of doing that which is complained of, such as libelling or slandering, and asserts that the libel or slander is true, and therefore justified.

JUSTINIAN'S LEGISLATION. The history of the Justinian legislation naturally divides itself into two periods, during the first of which the emperor's efforts were mainly directed to the methodizing and arrangement of the existing body of law, whilst during the latter his labours were chiefly addressed to supplementing its defects by new constitutions of his own. To the first period (528-534) belong:—
1. *Codex Vetus*. On 13th February, 528, shortly after ascending the throne, Justinian issued a commission to ten jurists, with Johannes the ex-quæstor of the palace at their head, and including Tribonian and Theophilus, to form a collection of the legislative enactments (*constitutiones*) of his predecessors from the time of Hadrian downward. Partial compilations of these had already been made. The codices of Gregorianus (306) and Hermogenianus (365) embraced the constitutions of all the heathen emperors for the three hundred years from Augustus to Constantine the Great; while the *Codex Theodosianus*, compiled by eight jurists at the order of Theodosius II., in 438, contained those of the Christian emperors from Constantine to his own time. From these materials, as well as from the 'Novellæ' of Theodosius, the code of Justinian was to be prepared. In about fourteen months (7th April, 529) this task was completed; and the new code, consisting of twelve books, and now entirely lost, received the force of law, and was made applicable to every subject of the empire.

2. *Pandectæ*, or *Digesta*. The following year (15th December, 530) Justinian commissioned Tribonian and sixteen others to digest the writings of the elder jurists into a regular and systematic exposition of Roman law, suited to the extended limits and the increased civilization of the empire. Full authority was given to the commission to abbreviate and to reject, and ten years were allotted for the accomplishment of the work. The commission having selected thirty-nine jurists of the greatest eminence, chiefly from the period which has been sometimes called the age of the Antonines—that is, from

Hadrian to the death of Alexander Severus, proceeded to divide into three classes all the books (numbering about 2000 works) from which extracts were to be made, and to form themselves into three sections—one for each of the several classes of treatises. 'The first section read and extracted from the books on the *jus civile*, to which belonged the *Libri ad Sabinum*; the second section extracted from the books on the *Prætorian edict*, especially from *Ulpianus ad Edictum*; and the third section, from practical and casuistical writings, especially from *Papinian's Responsa* and *Pauli Questiones*. Three branches of extracts were thus formed—the Sabinus branch, the Edict branch, and the Papinian branch. From these the single titles of the *Pandects* were composed. The foundation of each title was that which furnished most fragments.' (Mackeldy, 'Comp. of Modern Civil Law,' ed. Kauffmann, London, 1845, p. 52.) The extracts from Ulpian form more than one-third of the whole work; those from Paulus are next in number. In this way upwards of three millions of lines are said to have been condensed into 150,000.

The Digest was completed in less than three years. It was published on the 16th December, 533, and received the force of law on the 30th of the same month. All reference to the older jurists was in future forbidden; and all commentaries upon it were prohibited. Literal translations into Greek (*versiones xarà τῶδα*) were, however, permitted.

The work is divided into fifty books, subdivided into titles and laws.

3. *Quinquaginta Decisiones*.—During the compilation of the Digest, Justinian published his 'Fifty Decisions,' being the resolution of certain moot points of law, the contradictory opinions of the schools of Sabinus and Proculus upon which had been a source of annoyance and perplexity to Tribonian and his colleagues.

4. *Institutiones*.—While the Digest was being prepared, Justinian commissioned Tribonian and two other jurists, viz., Theophilus, professor of law at Constantinople, and Dorotheus at Berytus, to draw up an elementary work for the use of students, based upon the *Institutes* of Gaius and the *Codex Vetus* of Justinian. This work, which treats only of the *privatum jus*, was published on the 21st November, 533, and received the force of law on the same day as the Digest. It is in four books, and subdivided into titles.

5. *Codex Repetite Prælectionis*.—The old code having been found full of errors, a new edition of it was published, and obtained legal force on the 17th November, 534. This is the code we at present possess, the former one being now entirely lost.

To the second period of the Justinian legislation (535-565) belong the 168 *Novellæ Constitutiones*, written for the most part in Greek, and the thirteen *Edicta Justiniani*. Down to the time of Basil the Macedonian, in 867, the different compilations of Justinian remained the sole source of law. That emperor, however, made a reconstruction of the whole *corpus juris*, under the title of *Basilicæ*, which with various modifications continued in force till the fall of the Byzantine empire in 1453, during the reign of Constantine XIV.

JUSTINIANUS, FLAVIUS, born near Sardica in Mesia, in 482 or 483, of obscure parents, was

nephew by his mother's side to Justinus, afterwards emperor. The elevation of his uncle to the imperial throne, in 518, decided the fortune of Justinian, who, having been educated at Constantinople, had given proofs of considerable capacity and application. Justinian adopted Justinian as his colleague; and a few months before his death he crowned him in presence of the patriarch and senators, and made over the imperial authority to him, in April, 527. Justinian was then in his forty-fifth year, and he reigned above thirty-eight years, till November, 565, when he died. By means of his generals, Belisarius and Narses, he completely defeated the Vandals and the Goths, and restored Italy and Africa to the empire. Justinian was the last emperor of Constantinople who, by his dominion over the whole of Italy, reunited in some measure the two principal portions of the ancient empire of the Caesars. The wars of Justinian's reign are related by Procopius and Agathias.

Justinian must be viewed also as an administrator and legislator of his vast empire. In the first capacity he did some good and much harm. He was both profuse and penurious: personally inclined to justice, he often overlooked, through weakness, the injustice of subalterns; he established monopolies of certain branches of industry and commerce, and increased the taxes. But he introduced the rearing of silkworms into Europe; and the numerous edifices he raised, and the towns he repaired or fortified, attest his love for the arts, and his anxiety for the security and welfare of his dominions. He was, or professed to be, a poet and philosopher, a lawyer and theologian, a musician and architect; but the brightest ornament of his reign is the compilation of a code of Roman law. [JUSTINIAN'S LEGISLATION.] His love of theological controversy led him to interfere with the consciences of his subjects, and his penal enactments against Jews and heretics display a spirit of intolerance which has ever since been a dangerous authority for religious persecution.

Justinian died at eighty-three years of age, on the 14th November, 565, leaving no children, and was succeeded by his nephew, Justinus II.

(Ludewig, *Vita Justiniani Magni*; Gibbon, ch. xl.-xliv.)

JUSTINUS, commonly called JUSTIN MARTYR, one of the early Fathers of the Christian church, was born in Palestine, at a place then called Neapolis. Justin was carefully instructed in the learning of the Grecian schools of philosophy, and in the course of his studies he visited Alexandria, then a celebrated seat of learning. With a mind deeply imbued with the Platonic philosophy, he became sensible of the simple beauty of Christianity, and made a public profession that he received it as divine truth about 132.

Among the Fathers of the primitive church he is eminent by the Apologies and Defences which he published. His first Apology for Christianity was addressed to the Emperor Antoninus Pius and his adopted sons, at a time when the Christians were suffering rather from popular fury than from the regular authority of the state, and it prevailed so far as to obtain for them some favourable concessions from the emperor. His second Apology was addressed to the successor of Antoninus, Marcus Aurelius, on the occasion of several Christians having been put to death for their faith. The usual place of his resi-

dence was Rome, where he was put to death, a martyr to Christian truth; but the time is uncertain.

JUSTS, or JOUSTS, martial exercises or private combats which took place during the mediæval periods between knights and other distinguished persons of chivalrous spirit. They differed in some respects from tournaments, which consisted of many men in troops, while juts were contentions between man and man. On some occasions the combatants were on foot with spears, swords, or axes, and a barrier breast-high between them. In the Middle Age these juts became authorized by custom as trials of military prowess.

JUTE, the fibre of a plant of the genus *Corchorus*, and natural order *Tiliaceæ*. The plant is widely diffused in tropical countries, but is especially cultivated in India, yielding the jute of commerce, and the fibre employed in making gunny-bags. The inner bark is separated by maceration, in lengths from 6 to 12 feet, and constitutes the fibre of jute. It is only during the last thirty years that this material has come into use in Europe, and its progress has been extensive. It is chiefly used for making coarse bags, in which all the Indian produce of sugar, rice, pepper, ginger, saltpetre, gums, seeds, &c., is imported, and also the cotton of America and other places. Jute is also woven into mats and coarse carpets, and similar articles of domestic use.



Jute (*Corchorus capsularis*).

It does not make good rope, on account of its liability to rot from moisture. But by its extensive use in coarse bagging it takes the place of hemp, thereby setting free more of that article for the purposes of sailcloth and cordage.

Jute is usually imported in bales of about three and a half hundredweights each, and varies in price from 16s. to 24s. per cwt. The following table gives the imports into the United Kingdom for the years 1860-68:—

	Cwts.	£	Average Price.		
			£	s.	d.
1860	816,787	660,613	0	16	2
1861	904,092	703,961	0	15	9
1862	963,774	930,634	0	19	4
1863	1,232,335	1,549,928	1	4	11
1864	2,036,537	2,250,667	1	1	8
1865	2,108,942	1,774,992	0	16	10
1866	1,638,174	1,495,533	0	18	3
1867	1,597,192	1,442,977	0	17	10
1868	2,180,137	1,949,864	0	17	11

The exports of jute from the United Kingdom in 1868 were 415,266 cwts; of jute manufactures 43,127,402 yards, value 705,567*l.*; and of jute yarn 8,108,747 lbs. value 127,911*l.* The chief seat of the trade in Great Britain is Dundee, to which town the manufacture was exclusively confined for some years.

Sunn hemp (*Crotalaria juncea*), belonging to a family of plants which yield the pulses of India, has been used in cordage, but for textile purposes has been completely superseded by jute.

JUTES, a people who in the fifth century appear to have been settled in the northern part of the Danish province of Jutland, which took its name from them. They took part in the expedition of the Saxons to England, waged war with Charlemagne, and under the name of Normans (Northmen) frequently desolated the coasts of Germany and France.

JUTLAND, a large province of Denmark, formerly comprising the whole of the peninsula which projects northwards from Prussia and Germany, but since 1864 restricted to that part of it belonging to Denmark north of Schleswig, extending from 55° 23' to 57° 44' N. lat., and from 8° 7' to 10° 48' E. long. It is bounded E. by the Little Belt and the Kattegat, N. by the Skagerrack, and W. by the German Ocean. The southern part of the peninsula, extending from the frontier of Holstein to an irregular line from Kolding Bay to a point on the west coast opposite the extremity of the isle of Fanøe, constitutes the Prussian province of Schleswig.

Jutland is about 180 miles long, with a breadth varying from 70 to 100 miles. The area is 9597 square miles, and the population in 1860 was 699,939. Few countries have such an extensive line of coast (523 miles) in proportion to their area as Jutland, which is indented with numerous bays and inlets. Of these inlets, the *Lümfjord* extends across the north of the province, first in a western, and then in a south-western direction for about 100 miles. It contains numerous islands; the largest, called Mors, is 23 miles long and 11 broad, and has 6000 inhabitants. In 1825 the North Sea broke through the narrow strip of land between it and the *Lümfjord*, and the breach being gradually enlarged, the northern part of Jutland is now an island. The apparent advantage of this extensive line of coast is much diminished by the shallowness of the sea, and the innumerable little islands, sand-banks, and shoals, which render access difficult. The west coast is bordered by a chain of sand-hills, within which there are many good pastures. The southern part of the west coast is alluvial soil, extremely fertile, but swampy and unhealthy, and requiring dikes to protect it from the inroads of the German Ocean. The east coast is more elevated, and is well wooded, fertile in grain, and populous. The peninsula terminates northwards in the promontory of Skagen, from which a line of low hills runs through the whole length of Jutland. The rivers are very small; lakes are numerous. The principal river is the Guden, which is navigable for 50 miles, and is joined by the Silkeborg Canal. Others of less importance are the Stor, Skjern, Warde, and Lonborg. The highest point of the watershed is the Himmelsberg, 550 feet above the sea-level. The productions are corn, hemp, flax, tobacco, and some timber. The horses are large. The breed of black cattle is good, and numbers of

them and of hogs are exported to Holstein. Fish and game are abundant. The manufactures comprise linens, yarns, and hosiery for domestic use. The climate is very variable, with frequent fogs and rains; the winters are not very rigorous, but the summer is often extremely hot. The north-west wind, called *Skai*, which is especially felt in May and June, is so severe on the west coast as to wither the tops of the trees. The inhabitants are principally engaged in agriculture and seafaring pursuits. Jutland has belonged to Denmark since about 850. It is one of the few peninsulas that project northwards.

The peninsula is divided into ten amts or cantons:—AALBORG, AARHUUS, Hjørring, Ribe, Ringkjøbing, RANDERS, Skanderborg, Thisted, Viborg, and Weile. The town of *Viborg* is situated on a small lake nearly in the centre of the peninsula, and has 4861 inhabitants. It is surrounded with ramparts, has six gates, and is pretty well built. There are manufactures of woollen fabrics, leather, and tobacco. Its public garden contains the stone on which Hans Taussen, the Danish Luther, proclaimed the Reformation. *Ribe*, or *Ripen*, is a walled town with 2600 inhabitants. It is situated on the Rips, 2 miles from the German Ocean, within the territory of Schleswig. Only small vessels can come up to the town of that name. The fortress of *Fredericia* commands the northern entrance to the Little Belt; the town has 6261 inhabitants, four churches, a synagogue, a custom-house, and several manufactories. [BELT.] *Silkeborg*, the youngest town in the Danish dominions, is built on a site which twenty years ago was a waste. It has extensive and most successful paper manufactories. [DENMARK; SLESWIG-HOLSTEIN.]

JUVENAL. This name is variously written *Decius* (or *Decimus*) *Junius Juvenalis*. His birth-place was perhaps Aquinum, a Volscian town; and he is said to have been born somewhere about A.D. 40, under Caligula, and to have died, aged upwards of eighty, under Hadrian. In fact, nothing certain is known about him.

The relative merits of Juvenal and Horace as satirists have been warmly contested. It is a question on which men will form opposite opinions, as their tempers are more fit to relish brilliancy and playfulness, or earnest and dignified declamation. Juvenal is said to have spent much time in attendance on the schools of the rhetoricians; and the effect of this, in an age not remarkable for purity of taste, may be observed in a tendency to hyperbolical inflation, both of thought and style. His writings are addressed to the encouragement of virtue no less than to the chastisement of vice; and parts of them have been recommended by Christian divines as admirable storehouses of moral precepts. Still they lie open to the objection of descending so minutely into the details of vice as to minister food as well as physic to the depraved mind. The editions of Juvenal are very numerous; that of Ruperti, which has been much used in England, has a copious but not a valuable commentary. The edition of Heinrich, 8vo, Bonn, 1839, has a useful body of notes. He is translated into English by Holiday, Dryden (who, however, only translated five satires of the edition which bears his name), Gifford, Hodgson, and others.

K.

K has the same sound which C has before the vowels *a, o, u*. A reference to that consonant will therefore suffice for the power of the letter. Although this letter is now superfluous, it was not so when the characters of an alphabet were syllabic in power. Thus the letter *k* appears to have denoted at one time the syllable *ka*, while another character represented *ko*, and so on. Hence in the Greek and Hebrew alphabets the former was called *kappa, kaph*; the latter *koppa, koph*. This accounts for the fact, that in Latin the letter *k* was never used except before the vowel *a*, precisely as *q* is found only before *u*, and the Greek *koppa* only before *o*. Even our own alphabet seems to imply such a limit in the use of this consonant, when it gives it the name *ka*, not *ke*, though the latter name would better agree with *be, ce, de, &c.* K is silent before *n*, as in *know, knife, knee*. As a contraction, K stands for knight, as K.B., Knight of the Bath; K.G., Knight of the Garter; K.C.B., Knight Commander of the Bath; K.T., Knight of the Thistle; and K.H., Knight of Hanover.

KAABAH, or BAIT-ULLAH ('house of God'), the name of the sanctuary of Mohammed's Mosque at Mecca. It stands in the centre of the building, and, as described by its name (*Kaabah, i.e., 'cube'*), is an oblong, massive, windowless structure, built of fine gray granite in horizontal courses of masonry of irregular depth; the stones tolerably fitted together, and held by excellent mortar like Roman cement. According to the measurement of Captain Richard F. Burton, who visited it in 1853, at the risk of his life, and from whose 'Pilgrimage to El Medinah and Mecca' this account is principally derived, it is 22 paces (55 feet) in length, and 18 paces (45 feet) in breadth. Its height has been differently stated. Burckhardt gives it at from 35 to 40 feet, but to Captain Burton it appeared greater than its length. It stands upon a base called El Shazarwan (from the Persian *Shadarwan*, 'a cornice or canopy'), two feet in height, of penthouse shape, projecting about a foot beyond the wall, and composed of fine white marble polished like glass. The roof is flat, with a slight depression from S.W. to N.W. The only door which affords entrance is on the east side, and about seven feet from the ground. At the south-east corner, and between four and five feet from the pavement of white marble which surrounds the building, is placed the famous Hajar el Aswad, or Black Stone, an aerolite covered with a thick shaggy coating, glossy and pitch-like, worn and polished. 'Within this stone,' says an Arab tradition, 'Allah inclosed the covenant which he made with the sons of Adam. On the Great Day of Fealty and at the Judgment it will appear to bear witness to all who have touched it.' All Moslems agree that this stone was originally white, but became black by reason of men's sins.

KAABAH.

It is curious, however, to observe that the Hajar, as well as the Kaabah itself, are revered as holy emblems by four different faiths—the Hindoo, Sabbean, Gueber, and Moslem; and Captain Burton is also of opinion that it is connected with many Jewish traditions about Abraham. More recently, too, Bishop Colenso ('Pentateuch,' part v., app., p. 265, et seq.) has adopted the theory first advanced by Professor Dozy of Leyden, that this stone is an image of the god Baal of Simeonitish origin, and worshipped by the Israelites during the reign of King Saul. There can, however, be little doubt that the Hajar of the present day, and which is described by Burckhardt as composed of a dozen smaller stones of different sizes and shapes, joined together with cement, but looking as if the whole had been broken into many pieces by a violent blow, and thus united again, is the image of that *Hobal* (whether or not it may afterwards be decided that this divinity is the same as Baal) which was in the form of a man, and after the capture of Mecca, was broken in pieces by the orders of Mohammed. On the north-west side of the Kaabah are two large slabs of fine verde antico, which, according to Mohammedan tradition, mark the place where Ishmael and his mother Hagar are buried; and close to the door of this building is a slight hollow in the ground, lined with marble, and sufficiently large to admit of three persons sitting, called *El Maajan* ('the place of kneading'), where it is believed Abraham and his son Ishmael kneaded the chalk and mud which they used in building the Kaabah.

At the annual season of pilgrimage the Kaabah is decorated from top to bottom with the *Kiswah*, a robe of honour of black and gold, composed of silk and cotton tissue, and inscribed with sentences from the Koran. A gold embroidered curtain, denominated the *Burka*, or face veil, connecting the building in idea, perhaps, with the ancient practice of typifying the church visible as a virgin or bride, is hung across the door; while the old *Kiswah* of the year before is sold, and the proceeds appropriated by the Beni Shagbah family, the hereditary guardians of the sacred building. Entrance to the Kaabah can be obtained ten or twelve times during the year gratis, and by pilgrims as often as they can collect among themselves a sum sufficient to tempt the guardians' cupidity. 'Nothing is more simple,' says Captain Burton (vol. iii. p. 288), 'than the interior of this celebrated building. The pavement, which is level with the ground, is composed of slabs of fine and various coloured marbles, mostly, however, white, disposed chequerwise. The walls, as far as they can be seen, are of the same material, but the pieces are irregularly shaped, and many of them are engraved with inscriptions. The upper part of the walls,

together with the ceiling, at which it is considered disrespectful to look, are covered with handsome red damask, flowered over with gold, and tucked up about six feet high, so as to be removed from pilgrims' hands. The ceiling is upheld by three cross-beams, whose shapes appear under the arras; they rest upon the eastern and western walls, and are supported in the centre by three columns, about twenty inches in diameter, covered with carved and ornamented aloe wood. At the Freki corner there is a dwarf door, called *Bab el Taubah* ('of repentance'), leading into a narrow passage built for the staircase by which the servants ascend to the roof: it is never opened except for working purposes. The *Aswad* ('propitious') corner is occupied by a flat-topped and quadrant-shaped press or safe, in which at times is placed the key of the Kaabah. Both door and safe are of aloe wood. Between the columns, and about nine feet from the ground, run bars of a metal which I could not distinguish, and hanging to them were many lamps said to be of gold. This completes the upholding work of the hall.

The Kaabah is supposed to have been built and rebuilt ten times:—1. By angels, in obedience to the commands of Allah; 2. by Adam; 3. by Seth; 4. by Abraham and Ishmael; 5. by the Amalikah, descended from the great grandson of Ham, son of Noah; 6. By the Beni Turham, the children of Kahtan, fifth descendant from Noah; 7. By Kusay bin Kilab, governor of Mecca, and fifth forefather of the Prophet; 8. By certain Arab tribes, under the direction of Mohammed; 9. by Abdullah bin Zubayr, nephew of Ayesha, the wife of the Prophet, in A.H. 64; 10. by Hajjaj bin Yusuf, at the orders of Abd el Malik, in A.H. 74. Since then it has been frequently repaired, especially by the Abbassides and by the Sultan Murad Khan.

Many wonderful and miraculous legends are related in connection with this building. It is said that ravenous beasts will not approach it; nor will birds perch upon the house, except to be cured of sickness, for fear of defiling the roof. Though small, it will contain any number of devotees; and invalids recover health by rubbing themselves against the Kiswah and the Black Stone. A hundred thousand mercies descend upon it daily; and from whatever corner of it rain comes up, there is plenty in the lands that lie in that direction. (Burton, iii. 196.) But towards the end of time an Abyssinian host is prophesied to destroy it; though ages must elapse before that fatal event will take place.

KABOOL. [AFGHANISTAN.]

KABOOL, or CABOOL, a river in Afghanistan, which rises in the Oonna mountains, about lat. $34^{\circ} 20' N.$, and falls into the Indus, near Attock, after a course of about 340 miles. It is the only great affluent which the Indus receives from the W., and flows with extraordinary rapidity.

KABYLES. [ALGIERS.]

KAEMPFER, ENGELBRECHT, was born September 16, 1651, at Lenggo, in Westphalia. He passed through several schools, and finally studied medicine and natural science at the University of Cracow for three years, and at Königsberg for four years more. From Prussia he went to Sweden, where he solicited and obtained the place of secretary to an embassy which was then going to Persia. In 1684

the embassy arrived at Ispahan, then the capital of Persia. The information which Kaempfer collected during his travels and his residence in Persia is embodied in his 'Amœnitates Exoticæ.' When the embassy returned to Europe in 1685, Kaempfer entered as surgeon into the service of the Dutch East India Company, served in the Persian Gulf, and, sailing from Bender Abbassi, in 1689, for Batavia, visited most of the countries on the western shores of Hindustan. At Batavia he occupied himself chiefly with the natural history of the island of Java. In 1690 he went from Batavia to Japan, as physician to the embassy which the Dutch East India Company annually sent to the Japanese court. He remained at Nagasaki, in Japan, from September, 1690, to November, 1692, and during this time he accompanied two embassies to Yeddo. His observations on Siam and Japan are given in his great work entitled 'The History of Japan,' the original of which has never been published; but a translation was made from a copy in the possession of Sir Hans Sloane by J. G. Scheuchzer, and published in England in 2 vols. folio, 1727. Kaempfer returned from Japan to Batavia, which he left in 1693 for Amsterdam. In April, 1694, he took the degree of doctor of physic at the University of Leyden. On his return to his native place, he was appointed physician to his sovereign. He died November 2, 1716.

KEMPFERIA, a small genus of Indian *Scitamineæ*, or *Zingiberaceæ* of some authors, of which the species are indigenous to the islands of the Archipelago and the southern parts of the continent of India, as Bengal and the districts on its eastern frontier.

KAFFA, called also *Feodosia*, is a town built on the south-eastern shores of the Crimea, in $45^{\circ} 6' N.$ lat. and $85^{\circ} 20' E.$ long., on a wide open bay, which is more than twenty miles across. The town stands on the most western angle of this bay, and its harbour is protected by a projecting cape. In ancient times it was called *Theodosia*, and was included in the Greek kingdom of the Bosphorus. According to the author of the 'Periplus of the Euxine,' it was a Milesian colony.

In 1474 Kaffa was taken from the Genoese by the Turks, but still continued a considerable place, though its population had decreased from 80,000, which it had when the commerce of the Genoese was most flourishing, to 20,000 individuals. The wars which the Russians, in the latter half of the last century, carried on in these parts, ruined Kaffa, and still more the emigrations which took place when the Russians got possession of it in 1782. Towards the end of the last century Pallas describes it as a heap of ruins, inclosed by strong and lofty walls, which were fortified by towers, at the distance of 20, 40, and 60 fathoms from each other. In this ruined state the town remained up to the year 1806, when Russia declared it a free harbour. Fishing is the principal occupation of the inhabitants, who numbered, according to the last return, 8435. Grain and wool are the principal articles exported. The town contains many memorials of its former greatness.

KAFFA, a country in Eastern Africa, south of Abyssinia. The capital is Soonee, containing, according to the accounts of travellers, between 6000 and 7000 inhabitants, who call themselves Christians.

KAFFRARIA. [CAFFRARIA.]
KAFIRISTAN. [CAFRISTAN.]

KAGOSIMA, a town of Japan, in a deep bay at the south end of the island Kiusiu. It was bombarded by a British squadron on the 15th August, 1863, when it was burned, and its forts silenced, as a punishment for the murder of the British resident.

KAHIRA, or CAIRO, more properly *Al-Kahira*, which was its former name, but now called by the natives *Musr*, 'the victorious,' the capital of modern Egypt, is situated in $30^{\circ} 2' N.$ lat., and $31^{\circ} 15' E.$ long., between the eastern bank of the Nile and the ridge of Mokattam, and near the apex of the Delta of the Nile. Cairo occupies about three square miles. It is surrounded by a wall, the gates of which are shut at night, and is commanded by a large citadel situated at an angle of the town, on one of the lower elevations of the contiguous ridge, in which is the residence of the Pasha.

The open spaces in the city are few, and the greater number of the streets are so narrow that two laden camels can scarcely pass abreast, and in many there is hardly room for one. This arrangement excludes, as it was intended, the rays of the sun, and places the thoroughfares in shadow. In the cool of the evening the crowd is incessant, the variety of costumes striking, and the street cries are deafening and discordant.

In the neighbourhood of Cairo are Schoobra, with a country-house and fine gardens of the pasha; Abou Zabel, where are a school of medicine, anatomy, and surgery, and a large military hospital, all created by Mehemet Ali. Nearly opposite Cairo, on the left bank of the Nile, are the great pyramids of Ghizeh.

Cairo still maintains the reputation of being the best school of Arabic literature; and for Mohammedan theology and jurisprudence the fame of its professors remains unrivalled. There is a newly-founded museum for the collection of Egyptian antiquities.

The city of Cairo is the seat of government, and the residence of the viceroy, being also on the railroad from Alexandria to Suez. The population, including the suburbs of Boulak and Fostat, or Old Cairo, is estimated at 254,000, comprising Mohammedans, Copts, Jews, and numerous foreigners. The climate is healthy, and varies little, the mean temperature in the winter being $58^{\circ} 5'$, and in summer, $85^{\circ} 1'$ Fahrenheit. Rain falls ten or twelve times a year, but only lasts for one or two hours.

Beside the viceroy's palace, the citadel contains the arsenal, mint, public offices, and the magnificent new mosque of Mehemet Ali. The citadel itself is commanded by forts placed on the extremity of the chain of Mokattam, on the slopes of which Cairo is built.

A series of gardens and plantations separate the city proper from its suburbs—Boulac and Misr-el-Aatik. Cairo is divided into several distinct quarters, according to the religion and race of its inhabitants, as the Coptic quarter, the Jews' quarter, and the Frank or foreigners' quarter—all of which are separated by gates. Shepherd's Hotel, a large and well-conducted establishment, is the great resort of the English.

The edifices of Cairo comprise many of the finest remains of Arabian architecture, all dating from the

reign of the Arabs, and the ancient sultans of Egypt. Among them are about 400 mosques, with picturesque minarets, several of the ancient gates, an aqueduct for conveying water from the Nile to the citadel, the ancient works of the citadel itself, and the palace and well of Joseph. At Old Cairo are the seven towers, still called the Granary of Joseph, and serving their ancient purpose. In the island of Rhoda is the celebrated Nilometer, a graduated column for indicating the height of the water during the annual inundation of the river; on the south of the city, outside the walls, are the tombs of the Mamelukes, who were inveigled into the city by Mehemet Ali and indiscriminately massacred; and on the north-east the celebrated obelisk of Heliopolis, which is the oldest in the world, having been erected about a century before the arrival of Joseph in Egypt. Cairo is traversed by a canal for irrigation, which commences at Old Cairo. There is a branch railway of one mile to Boulak, the port of the city, and telegraphic lines connect it with Alexandria, Suez, and Damietta.

Cairo was long the chief *entrepôt* for the commerce of Egypt, and its trade has greatly increased since the opening of the railway to Alexandria and Suez. The bazaars are well supplied with goods of every description, and thronged with crowds of visitors of all nations: caravans arrive annually from Mourzook, Sennaar, and Darfur. There are four primary government schools, excellent schools conducted by the American missionaries, who also preach in Arabic, a museum of Egyptian antiquities, a magnetic observatory, hospitals, and a lunatic asylum. Two newspapers are published here—one in Turkish, and the other in Arabic.

Cairo was founded by the Arabs in 970; its citadel was built by Saladin in 1176; and it was the capital of the sultans of Egypt till the time of the Turkish conquest in 1507; since which it has been the residence of the pashas, governors of the province. It was taken by the French in 1798, and held by them for three and a half years.

(Lane's *Account of the Manners and Customs of the Modern Egyptians*; Martineau, *Experiences of Eastern Life*; A. W. Kinglake, *Eöthen*; Bartlett, *The Nile Boat*; Malte Brun, *Géographie Universelle*, &c.)

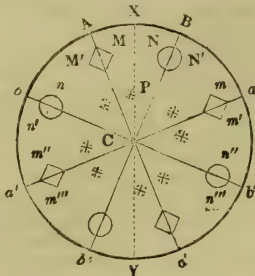
KAISARIYEH, or CÆSAREA, one of the most important cities in Asia Minor, situated in a plain to the north of the Erjish Dagh, in about $38^{\circ} 41' N.$ lat., $35^{\circ} 25' E.$ long., has a population variously estimated at from 25,000 to 50,000, consisting of Greeks, Turks, and Armenians. The streets are narrow and dirty, and the squares and market-places also abound with filth, and the naturally healthy climate is poisoned by the absence of all sanitary arrangements. The inhabitants are noted for their commercial enterprise, and the town is the *entrepôt* for a large extent of country. The bazaars are well supplied with European manufactured goods. The Armenians have a bishop and two churches, and the Greeks also have a church. Kaisariyeh is identical with the ancient Cæsarea, the capital of Cappadocia, originally called Mazaca, which name was changed to that of Cæsarea when Cappadocia became a Roman province.

KALE, the name given (1) to a species of cabbage,

the *Brassica oleracea* of botanists. This is the vegetable known to the kitchen gardener as Greens. It does not run to a heart, like the common cabbage, but is marked by the open head of its dark green or purplish-coloured leaves. The variety termed *German greens* is much used as a winter vegetable. From the close clustering form of the edges of its leaves it is sometimes named *Curly Greens*. (2) *Kale*, with a prefix, as *Sea-kale* (*Crambe maritima*), is another plant much used for the table. It is a native of the south of Europe, but is now extensively cultivated in Britain.

KALEIDOSCOPE, a name compounded of three Greek words (*kalos*, *eidōs*, and *skopos*), and denoting the exhibition of beautiful forms, is the designation of an optical instrument which was invented by Sir David Brewster, and made public in 1817.

The essential parts of the instrument consist of two plane mirrors of glass, having their posterior surfaces blackened in order to prevent any reflection of light from thence. Each mirror is from six to ten inches long, and of a trapezoidal form; the larger end about an inch and a half wide, and the shorter end about three-quarters of an inch; and the two are placed in contact with one another at the wide end of each, so as to form a dihedral angle, the like ends being placed together. The object to be viewed is disposed contiguously to the larger ends, and the eye should be near the opposite extremity, but a little above the line of contact. The effects produced by the reflections of the light may be understood from the following explanations:—



Let A C, B C, be the two extremities of the mirrors on the side farthest from the eye of the observer. These lines, and the sectoral space between them, will be visible by rays coming directly to the eye; and, at the same time, rays from the line A C falling at a certain angle of incidence on the mirror which passes through B C will, on being reflected from thence to the eye, give rise to the image C a of that line; in like manner rays from the line B C falling at an equal angle of incidence on the mirror passing through A C will, after reflection, give rise to the image C b of the line. These, with the intermediate rays, produce the first reflected sectors B C a and A C b. Other rays from the sector A C b at the surface of the mirror A C will fall on the mirror B C; and while a portion of them arrive at such angles of incidence as to be reflected to the eye and produce the perception of the sector a C b', another portion of them will be reflected back to the mirror A C at such angles of incidence as to be re-reflected

to the eye and cause the perception of the sector a' C b'. In a similar manner the rays first reflected from B C a will, by subsequent reflections, give rise to the perceptions of the sectors b C a', b' C a''.

Thus it is easy to perceive that an object, as M, on A C, with its immediately reflected image M', will give rise to the appearances of similar figures at m m', m'' m'''; and an object, as N, on A B, with its immediately reflected image N', will give rise to the appearances of similar figures at n n', n'' n''': also an object, as P, between A C and B C, will appear by reflection similarly situated in all the other sectors.

Sir David Brewster found means to obtain multiplied images of such objects as flowers, trees, and even persons or things in motion: and thus the importance of the instrument was greatly increased. Some kaleidoscopes have been executed in such a manner that the two mirrors may be placed at any required angle with one another; by which means the images in the visible field of view may be varied at pleasure. The instrument is capable also of being constructed so that the multiplied image may be projected on a screen, and thus made visible at one time to many spectators. Again, Dr. Roget has shown ('Annals of Philosophy') that the properties of the instrument may be greatly extended by employing, instead of two, three and even four plane mirrors, united together at their edges so as to form a hollow prism, or a frustum of a pyramid, the reflecting surfaces being towards the interior. These are called polycentral kaleidoscopes.

Sir David Brewster's account of his invention is contained in his 'Treatise on the Kaleidoscope,' Edinburgh, 1819, of which a new edition was published in 1860. The instrument is very useful to pattern-drawers and others, as it supplies them with an almost endless variety of suggestions.

KALENDAR, or **CALENDAR**, a register or distribution of the year, accommodated to the uses of life, containing the order of days, weeks, months, festivals, &c., as they occur in the course of the year. It is so called from the *kalendæ*, or kalends, which among the Romans denoted the first day of every month. The kalendar being of civil institution, varies according to the different distributions of time in different countries. Those which we shall take more particular notice of are the Roman, the Julian, the Gregorian, and the Reformed Kalendars: a slight mention of the others will be sufficient.

Romulus, according to tradition, formed what is deemed the original Roman kalendar, by which the year was divided into ten months only, consisting of an unequal number of days, and began with March. The total number of days was 304. It was, however, soon discovered that the civil year, as thus constituted, was much shorter than the solar year. Romulus therefore added two intercalary months to every year; but these months were not inserted in the kalendar, nor were any names assigned to them until the following reign. Some Roman antiquaries maintained that the old kalendar continued in use till the time of Tarquinius Priscus.

Numa, in imitation of the Greeks, divided the year into twelve months, according to the course of the moon, consisting in all of 354 days: according

to Pliny ('Hist. Nat.,' xxxiv. 7), he afterwards added one day more to make the number odd, which was thought a more fortunate number. But as ten days, five hours, forty-nine minutes were wanting to make the lunar year correspond to the course of the sun, he intercalated every other year an extraordinary month, called *Mensis Intercalaris*, or *Mercedonicus*, between the 23rd and 24th of February. This month appears to have consisted alternately of twenty-two and twenty-three days during periods of twenty-two years, the last biennium in the twenty-two years being entirely passed over.

Julius Cæsar, when he had made himself master of the state, resolved to put an end to this disorder, by abolishing the use of the intercalations, and for that purpose, B.C. 47, adjusted the year according to the course of the sun, and assigned to the months the number of days which they still contain. He also added an intercalary day to February every four years. To make everything proceed regularly, from the 1st of the ensuing January, he inserted in the current year, besides the intercalary month of twenty-three days, which fell into it, two extraordinary months between November and December, the one of thirty-three, the other of thirty-four days; so that this year, which was called the last year of *confusion*, consisted of fifteen months, or 445 days. These sixty-seven days were inserted in order to set the year right, which was sixty-seven days in advance of the true time.

All this was effected by the care and skill of Sosigenes, an astronomer of Alexandria, whom Cæsar had brought to Rome for that purpose; and a new kalendar was formed from his arrangement by Flavius, digested according to the order of the Roman festivals, and the old manner of computing the days by kalends, nones, and ides, which was published and authorized by the dictator's edict.

This is the *Julian* or Solar year, which continues in use to this day in all Christian countries, without any other variation than that of the *old* and *new style*, which was occasioned by a regulation of Pope Gregory XIII., in 1582, who, observing that the vernal equinox, which at the time of the council of Nice, in 325, had been on the 21st of March, then happened on the 10th, by the advice of astronomers caused ten days to be thrown out of the current year, between the 4th and 15th of October; and to make the civil year for the future to agree with the real one, or with the annual revolution of the earth round the sun, or, as it was then expressed, with the annual motion of the sun in the ecliptic, which is completed in the 365 days, 5 hours, 49 minutes, he ordained that every 100th year should not be leap year, excepting the 400th.

This alteration of the style was immediately adopted in all Catholic countries; but not in Great Britain till the year 1752, when eleven days were dropped between the 2nd and 14th of September, so that this month contained only nineteen days; and thenceforth the new or reformed style was adopted, as it had been before in the other countries of Europe. The same year also another alteration was made in England, by which the legal year, which before had begun on the 25th of March, began upon the 1st of January; this alteration first took place on the 1st of January, 1752. (See the

Statute 24 Geo. II. c. 23.) By this statute the whole Gregorian kalendar was adopted.

Of the three parts into which the Romans divided their month, the *kalenda*, or kalends, are noticed at the commencement of this article. They were so called (a *calando* vel *vocando*) from the pontifex calling out to the people that it was new moon. The fifth day of the month was called *Nonæ*, the nones, and the thirteenth, *Idus*, the ides, from the verb *iduarè*, to divide; because the ides nearly divided the month. The nones, from *nonus*, the ninth, were so called because, counting inclusively, they were nine days from the ides. In March, May, July, and October, the nones fell on the 7th, and the ides on the 15th of the month. The mode of fixing any particular day was by saying that it was so many days before the kalends, nones, or ides, next immediately following. Thus the 28th of April was the fourth day before the kalends of March; the 4th of March was the fourth day before the nones of March; and the ninth of March was the seventh day before the ides of March.

The Attic year consisted of twelve lunar months of 30 and 29 days alternately; an intercalary month of 29 or 30 days was inserted every two years; but as this was $7\frac{1}{2}$ days too much, the intercalary month was sometimes omitted. The full Attic month consisted of 30 days, and was divided into three decades.

KALENDAR, REVOLUTIONARY. A Report was made to the National Convention, 6th October, 1793, on the new Kalendar by Fabre d'Eglantine; and a decree was passed on 4 Frimaire (24th November, 1793) for the establishment of the new Kalendar. The Committee of Public Instruction was commissioned to cause the new Kalendar to be printed in various forms, with plain instructions for its use. The instructions ('Instruction sur l'Ere de la République,' &c.) were drawn up by Romme. The Republican Kalendar is explained in a French work, in its sixth edition: 'Concordance des Calendriers Républicain et Grégorien,' Paris (6me édition), 1812, 8vo.

The year was to begin at the midnight of Paris Observatory which precedes the true autumnal equinox. It was to consist of 365 days, with 12 months of 30 days each (the 30 days being three decades of 10 days each), and 5 complementary days, which were called *sansculotides* (a name afterwards repealed). A sixth complementary day was to be added, according to the words of the decree, 'selon que la position de l'équinoxe le comporte;' which adds, 'the period of four years, at the end of which this addition of a day is ordinarily necessary, is called the *Franciade*,' (Art. 10 of the Decree; and the remarks of Romme in the 'Instruction,' &c., s. iii., 'De la Longueur de l'Année.' The first year of the French Republic began at midnight, the 22nd September, 1792. The second year began on the 22nd, 1793, at midnight (Art. 5 & 6 of the Decree). The Gregorian reckoning was restored from and after January 1, 1806, by an imperial ordonnance, dated 22 Fructidor, An XIII. (September 9, 1805).

Though every period of four years was a *Franciade*, and the last year of the *Franciade* was called *Seatile* (having six complementary days), yet in fact An IV., An VIII., &c., are not leap years. The following list is actually made from the work above mentioned:—

		Sept.	
An I.	begins	22,	1792
II.	"	22,	1793
Sext. III.	"	22,	1794
IV.	"	23,	1795
V.	"	22,	1796
VI.	"	22,	1797
Sext. VII.	"	22,	1798
VIII.	"	23,	1799
IX.	"	23,	1800
X.	"	23,	1801
Sext. XI.	"	23,	1802
XII.	"	24,	1803
XIII.	"	23,	1804
XIV.	"	23,	1805

When the Gregorian year is not leap year, the beginnings of the months are as follows, according as the republican year begins on September 22, 23, or 24:—

1 Vendémiaire	is Sept.	22,	23,	24.
1 Brumaire	is Oct.	22,	23,	24.
1 Frimaire	is Nov.	21,	22,	23.
1 Nivose	is Dec.	21,	22,	23.
1 Pluviose	is Jan.	20,	21,	22.
1 Ventose	is Feb.	19,	20,	21.
1 Germinal	is March	21,	22,	23.
1 Floréal	is April	20,	21,	22.
1 Prairial	is May	20,	21,	22.
1 Messidor	is June	19,	20,	21.
1 Thermidor	is July	19,	20,	21.
1 Fructidor	is Aug.	18,	19,	20.

But when the Gregorian year is leap year, the beginnings of the months are as follows, according as the republican year begins on September 22, 23, or 24:—

1 Vendémiaire	is Sept.	22,	23,	24.
1 Brumaire	is Oct.	22,	23,	24.
1 Frimaire	is Nov.	21,	22,	23.
1 Nivose	is Dec.	21,	22,	23.
1 Pluviose	is Jan.	20,	21,	22.
1 Ventose	is Feb.	19,	20,	21.
1 Germinal	is March	20,	21,	22.
1 Floréal	is April	19,	20,	21.
1 Prairial	is May	19,	20,	21.
1 Messidor	is June	18,	19,	20.
1 Thermidor	is July	18,	19,	20.
1 Fructidor	is Aug.	17,	18,	19.

For instance, what is 14 Floréal, An XII? The republican year begins September 24, 1803, so Floréal falls in 1804, which is Gregorian leap year. Look at the third Table; and when the year begins September 24, the first of Floréal is April 21: consequently the 14th is May 4, 1804.

KALGUEV, or KOLGUEV, is a considerable island in the Arctic Ocean, in the Russian government of Archangel, and situated to the north of the peninsula of Schemonkonski. It lies between 68° and 69° 40' N. lat., and 47° 30' and 48° 10' E. long., and is about 66 miles in diameter. The surface is undulating; it has some low mountains, which rise in the centre, two small rivers, and several brooks of fresh water. The cliffs are covered with an incredible number of sea-birds; the interior is full of polar bears, foxes, &c. Except a few Samoides there are no settled inhabitants. It is resorted to every

summer by traders from the mainland, who procure here large quantities of skins, eggs, and feathers.

KALHARI, or KALIHARI DESERT, is a vast tract of southern Africa, between lat. 20° 30' and 28° S.; long. 18° 30' and 26° E. It is partly inhabited by the Bosjesmans, whose hair grows like short thick bristles—a peculiarity which is considered to mark the greatest specific difference between any of the races of mankind. Rain rarely falls in this district, and no water is to be had except at a few springs or 'sucking places,' which the miserable natives who wander over it in search of game carefully conceal. Little of the interior is known, but its eastern side has been skirted by Dr. Livingstone. In many places it is well wooded, and largely covered with thorn trees.

KALI, an Arabic word, signifying the ashes which remain after the combustion of vegetable substances. Hence the word *alkali*.

KALISZ, Province. [POLAND.]

KALMIA, a genus of plants belonging to the natural order *Iricaceæ*. *K. latifolia* is a native of N. America from Canada to North Carolina, on the sides of stony hills. The leaves and flowers of this genus are poisonous, and the honey of bees which collect the juice is injurious. *K. angustifolia*, Haulm-leaved Kalmia, is a native of North America from Canada to the Carolinas, in bogs and swamps, and sometimes in dry mountain lands. It is a shrub one or eight feet in height, with dark red flowers. It is called Sheep-laurel in North America, because it is supposed to be very injurious to sheep; and the partridge is said to become poisonous as food after feeding on it.

KALMUCKS. [MONGOLIA.]

KALONG. [CHEIROPTERA.]

KALUGA, a government of European Russia, lying between 53° 24' and 55° 21' N. lat., 33° 20' and 37° E. long., is bounded W. and N.W. by Smolensk, N.E. by Moscow, E. by Tula, and S. by Orel. The area measures 11,022 square miles; and the population at the last census was 1,007,471. The surface is level, but here and there broken by a low hill or the wooded banks of the numerous rivers that flow through it. Forests cover about half the area, the arable lands about one-third. The soil for the most part is sandy clay. The Oka and its numerous feeders are the principal rivers. There are lakes and marshes in the centre and west of the government. The rivers, several of which are navigable for barges, or available for floating timber, are frozen from November to March. The soil of Kaluga being generally poor requires abundance of manure: the chief products are rye, oats, barley, wheat, hemp, lint, and flax. Barely enough for the consumption is produced. Horned cattle are scarce, but the horses are excellent. Horticulture is carefully attended to. The mineral products are bog iron, mill-stones, lime, gypsum, and turf. There are several great iron forges. The manufactures comprise metallic goods and cutlery, cotton, leather, beet-root sugar, soap, and distilling. The commerce is principally with Archangel. Oil and spirits are exported. Sail-cloth is made both for the European and American market, and coloured cloths for the China trade. *Kaluga*, the capital of the government, is situated in 54° 30' N. lat., and 36° 5' E. long., on the Oka, and has 32,335

inhabitants. It is surrounded with a rampart converted into a public walk. The streets are narrow, and for the most part consist of wooden houses. The best buildings are the bishop's palace, the residence of the governor, and the principal church. There are manufactures of muskets, cloth, oil, paper, cotton, pottery, soap, and vitriol, tanneries and sugar refineries; and a good trade is carried on in corn, sheep-skins, Russian leather, and wax. Kaluga has long been a place of banishment for political offenders.

KAMES, HENRY HOME, LORD, an eminent Scotch lawyer and author, was the son of a well-descended country gentleman of reduced circumstances. After receiving his early education under a private tutor, he studied civil law and jurisprudence at the University of Edinburgh. In 1723 he was called to the bar, where his industry and natural powers soon raised him into repute as a successful pleader. After a brilliant and laborious career he was appointed, in 1752, one of the judges of the Court of Session by the title of Lord Kames. In 1763 he was nominated a lord of justiciary in the Scotch Supreme Criminal Court. Three years later he came into possession, by right of his wife, of the fine estate of Blair-Drummond, and with characteristic ardour devoted himself to the development of its resources. He died at the advanced age of eighty-seven, on the 27th of December, 1782.

Lord Kames was not only a fortunate lawyer and a successful judge, but a writer of eminence on critical and metaphysical subjects. His mind was active, keen, and discriminative, and these qualities are conspicuous in all his works. Those which now preserve his fame, and are still appreciated by the philosophical student, are the 'Art of Thinking,' first published in 1761, and the 'Elements of Criticism,' produced in the following year. Both these books are distinguished by clearness of judgment and ingenuity of thought.

KAMI, a Japanese title applied to any deified hero or saint, and to the deceased mikados or spiritual sovereigns. The number of the Kamis is unlimited, and their functions are widely different. Some preside over the elements; some over the forces and phenomena of nature. Their worship is called *Kami-ro-mitsi*, or the 'Way of the Kami.'

KAMPTULICON. [FLOOR CLOTH.]

KAMPEN. [OVERSSEL.]

KAMTCHATKA, a peninsula projecting from the north-eastern parts of Asia into the Pacific, in a direction nearly due south, lies between 51° and 59° 55' N. lat., and between 155° and 165° E. long. Its length is above 800 miles, and its width varies between 30 and 200 miles. The interior of the peninsula is generally rugged. A mountain range running east of the river Kamtchatka is distinguished by several high summits, which are of volcanic origin, and most of them still active. One of these summits, the Plutchevsky, is 16,000 feet above the sea-level. The mountains approach close to the eastern coast, which is composed of high rocks, rugged cliffs, and bold promontories, forming numerous inlets, the entrances to which are blocked up by reefs of rocks. The western shore, along the Sea of Okhotsk, is very low and sandy. The best part of the peninsula is the vale of the Kamtchatka River, which towards its southern extremity is 40 miles across, but grows narrower as it proceeds northward. Its length is

180 miles. Its soil is deep and rich, composed of a black earth, and exhibits a considerable degree of fertility. The Kamtchatka River, about 250 miles long, is the only important one in the peninsula.

The climate of Kamtchatka, when compared with that of Europe under the same latitude, is very severe. Winter generally lasts nine months, and frost is common even in summer. During the winter a great deal of snow falls. In the interior, where protected by the mountains, the climate is milder; the larch tree, and rye, barley, buckwheat, potatoes, white cabbages, turnips, radishes, and cucumbers are grown. The number of horses and cattle is on the increase; but the most valuable animal in the peninsula is the dog, which is a kind of half-breed between the mastiff and the wolf, and has the peculiarity of never barking. They are tractable to their masters, but are not so much won by kindness as by restrained authority. They cheerfully work hard, and draw the sledges for days and even weeks together with very little food. The natives formerly lived chiefly on the produce of the chase; but since the number of wild animals has considerably decreased, fishing is more attended to. Fish is very abundant on the coasts. The forests contain many fine timber trees, which are little used, but might be employed in shipbuilding. The mineral wealth is little known: in some places there is iron ore, and sulphur in immense beds is found in the vicinity of the volcanoes.

Two native tribes inhabit the peninsula, the Kamtchadales in the south and the Koriakes in the north. The Kamtchadales are short, but stout, and broad in the shoulders, with large heads, flat and broad faces, prominent cheek-bones, thin lips, lank black hair, and eyes deeply sunk in the head. They evidently belong to the Mongol race. The Koriakes are principally distinguished from them by the smallness of their head. Both nations differ in language and in mode of life. The Kamtchadales are hunters and fishermen; while the Koriakes are a wandering tribe, subsisting on the produce of their numerous herds of reindeer. The population is estimated at 6000.

The export of goods is carried on in sledges, the principal articles of commerce being sable, fox, and other skins (about 30,000 annually), whale oil, fish, and eggs. The trade is chiefly with Okhotsk, and the imports consist mainly of colonial goods.

The principal towns are PETROPAULOVSKI, Nishnei, Kamtchatka, and Bolcheresk; but their population and commerce are very inconsiderable.

Kamtchatka is a Russian province annexed to a government of Eastern Siberia, called the Maritime Region. It was discovered and conquered by the Russians between 1696 and 1706, and is now subdivided into four districts, each under a lieutenant-governor.

KANAGAWA is the name of the principal seaport of Japan, on the island of Nippon, in the bay of, and 15 miles S. from, Jeddo, of which city it is the port. It is a long narrow town stretching for nearly three miles along the bay, and having only one main street. The population is about 8000. The houses are built chiefly of wood, and the shops are large and well supplied. The shores of the bay are very beautiful and covered with villages, while the view inland is bounded by the cone of the large mountain Fusi-yama. Kanagawa was opened to commerce in 1858, and now has a larger foreign

trade than any other Japanese port; the ships mostly owned by British, American, French, and Dutch merchants. The number of vessels which entered in 1867 was 254 (174,030 tons), and the clearances 248 (164,812 tons); 134 of these were British. The value of the exports in the same year was 9,708,907 dollars. The principal articles are raw silk, tea, silk worms' eggs and cocoons, tobacco, galls, seaweed, cuttlefish, mushrooms, medicines, ginseng, rags, and raw cotton. The imports were valued at 13,008,785 dollars, and consisted chiefly of cotton and woollen manufactures, arms, lead, iron, tin, leather, ivory, and sugar. The consuls reside at the native town of *Yokohama*, on the opposite side of the bay, which has 12,000 inhabitants.

KANGAROO (*Macropus*), the name of a genus of marsupial or pouched animals. They are for the most part natives of Australia. The members of this family group (*Macropodidae*) are characterized by the young being born in a very rudimentary state. At birth, they are received into a pouch placed on the belly of the mother. The hind legs of the kangaroo are long and powerful, while the fore legs are very short, causing the animal to pass from place to place by a series of jumps. The anterior parts of the body are small and slender when compared with the posterior. It has a small head, long ears, cleft upper lip, six incisor teeth in the upper jaw, and only two in the lower. The fore feet have five toes, the hind feet only four, and the tail is very long and strong. In addition to the larger kangaroos (*Macropus*), the family contains also the tree kangaroos (*Dendrolegus*), and the kangaroo rats (*Hypsiprymnus*).

KANSAS, one of the United States of North America, admitted into the Federal Union in 1861, extends from 37° to 40° N. lat., and from 94° to 107° W. long. Its length is 400, and its breadth 208 miles, the area being 78,418 square miles. It is separated from Utah by the territory of Colorado and the Rocky mountains, and watered by the Kansas, Missouri, and Arkansas rivers, the first of which rises in the Rocky mountains, flows in an easterly direction 900 miles to the Missouri, and is navigable to Fort Riley. The climate generally throughout the state is very fine. The soil is very fertile, producing all the cereals, with cotton, hemp, tobacco, and fruits. It is one of the finest grazing states in the west, and the farms are well stocked with cattle. The prairies contain an abundance of game, including the buffalo, deer, antelope, wild turkey, wild goose, and prairie hen. Coal, gypsum, quartz, porphyry, limestone, sandstone, and lead are among the minerals.

Kansas is well supplied with religious and educational institutions; has a Senate of twenty-five members, a House of Representatives of seventy-five members, and sends one member to Congress. The population in 1860 was 107,206; in 1867 it had increased to 135,000 whites, 15,000 free coloured, and 8180 Indians; total, 158,180.

The state is divided into forty-five counties; the principal towns are *Topeka*, the capital, on the S. side of the Kansas River, which is handsomely laid out with streets 130 feet wide, and has a population of 2500. *Leavenworth*, the largest city, is situated on the Missouri River, and contains seventeen churches, numerous schools, printing-offices, steam

saw-mills, flour-mills, and breweries. It is the headquarters for supplying stores to the western forts, and also of an immense trade with the territories. Population, 18,000. There is an important military fort in the vicinity. *Atchison*, on the Missouri, is a place of considerable trade, and has 3500 inhabitants. *Lawrence* is a fast rising town, with a population of 3500. It suffered severely during the civil war in 1863. The other towns are *Manhattan*, *Wyandot*, and *Emporia*. Kansas was formed into a territory in 1854, and was the scene of bitter struggles between the advocates and opponents of slavery. The constitution under which it was admitted into the Union prohibited slavery.

KANT, IMMANUEL, was born April 22, 1724, at Königsberg, in Prussia, where he lived all his life. He died there on the 12th of February, 1804. He received his early education at the gymnasium, whence he removed in 1748 to the university, to attend the classes of philosophy, mathematics, and theology. In 1755 he commenced a series of private lectures on logic and metaphysics, physics, and mathematics, which he continued to give for fifteen years, until he was invited, in 1770, to fill the chair of logic and metaphysics, which he held until 1794.

When Kant first entered upon philosophical studies, nothing but superficial eclecticism and uncompromising dogmatism prevailed on the one hand, and on the other an unlimited scepticism, which was cherished by the refined irony of Hume. To put an end to this state of things, which was as dangerous to morality and religion as subversive of the legitimacy of knowledge, was the object of Kant's labours. He accordingly proceeded to an examination of man's cognitive faculty, in order to discover the laws and extent of its operation. This investigation he designated the Criticism of the Pure Reason, and he maintained that the reason, as a pure faculty, must criticise not only itself, but also the subordinate faculties of sense and understanding. Kant understood by *pure* whatever is independent of experience, as opposed to the empirical, which rests upon it. The pure, or whatever in knowledge expresses the universal and necessary, is *à priori*, that is, antecedent to experience; whereas all that is contingent, or only comparatively general, is *à posteriori*. The first requisite in philosophy is a science which may establish a possibility, and determine the principles and extent of such knowledge, which must have its root in the pure reason itself, and cannot be the ground of the contingent and empirical; for the pure reason contains nothing except the formal or necessary principles of all knowledge, whereas the objects to which these principles refer are given to the mind from without. As an instance of these universal and necessary principles, Kant adduces the law of causation. The notion of a cause implies the necessity of its being connected with some effect, and enforces so strongly the universality of this law, that it is inconsistent with the derivation of it from the repeated association of an effect with an antecedent. The next point which Kant notices, in the Introduction to the Analysis of the Pure Reason, is the distinction between analytical and synthetical judgments. The analytical are those in which the predicate is connected with the subject by identity; the synthetical are devoid of all identity of the subject and predicate

Analytical judgments may be also termed explanatory, the synthetical may be called extending judgments; since in the analytical the predicate adds nothing to the notion of the subject, and only resolves the notion which forms the subject into its constituent and subordinate notions, which are contained in it: whereas in the synthetical a new element is added by the predicate to those already contained in the subject, which was not previously understood in it, and therefore would not result from it by any analysis. For instance, the proposition that all bodies are extended is analytical; but the assertion that all bodies are heavy is synthetical. All the conclusions of experience are synthetical. Experience proves the possibility of the synthesis of the predicate 'heavy' with the subject 'body'; for these two notions, although neither is contained in the other, are nevertheless parts of a whole, or of experience, which is itself a synthetical combination of its intuitions, although they only belong to each other contingently.

Transcendental logic is divided into analytic and dialectic, of which the former is the critic ('Der Kritik'), or investigation of the understanding, as the faculty of notions; the latter, of the reason, as the faculty of ideas.

The criticism of the transcendental dialectic gives this result—that the ideas of the reason, as pure speculative ideas, are nothing more than simple conceptions, for which no corresponding object can be scientifically shown to exist. Accordingly, neither the existence of God, nor the immortality of the soul, nor the freedom of the will, can be demonstratively established. Nevertheless the reason is not merely a theoretical, but also a practical faculty, which gives the law of human conduct and action. Now, these laws present themselves with such unconditional necessity (the *categorical imperative*), that no rational man can refuse obedience to them; and on the other hand, without the freedom of the will these laws could not be obeyed; and without God and the soul's immortality there would be no final cause or motive for human conduct, which must be placed in a state of felicity, agreeable to morality, provided by and to be obtained through God, in another and a better life. Consequently every man who is conscious of his moral destination holds these practical ideas to be both true and objectively legitimate, notwithstanding that he is compelled or required to admit them merely by a subjective ground—the testimony of his own consciousness, and of the moral wants resulting from its dictates. This Kant calls the postulate of the practical reason. The acceptance of this postulate as true and legitimate does not constitute a scientific certainty, or knowledge properly, which indeed does not exist for the supersensible; it is merely a belief. This faith or belief, however, is thus distinguished from every other, that it is a moral or practical faith, and consequently possesses for the believer all the certainty requisite for the guidance and conduct of life, and consequently it enjoys a subjective certainty and authority. This faith is the proper foundation of religion, which is nothing else than a conscientious observance of all duties as divine commands, since God, as the moral lawgiver, cannot be worthily honoured otherwise than by obedience to the laws of morality.

VOL. VIII.

The most important of the works of Kant in a philosophical sense are the 'Kritik der reinen Vernunft,' 7 vols., Leipzig, 1828; 'Kritik der praktischen Vernunft,' 6th edit., Leipzig, 1827; and the 'Kritik der Urtheilskraft,' 3rd edit., Berlin, 1827. (Masson's *Recent British Philosophy*.)

KANTURK. [CORK.]

KAOLIN, the Chinese name for *porcelain clay*. It occurs massive and disseminated in disintegrating granite rocks, and is generally supposed to be derived from the decomposition of the felspar which they contain. Its colour is either white, yellowish, or reddish-white. Fracture fine earthy; soft, dull, and opaque; adheres to the tongue; specific gravity 2.216; infusible. Kaolin is found in China, France, Saxony, &c.; and in England a large tract of this substance occurs near St. Austell, in Cornwall, on the south side of the granite range. It contains crystals of felspar, quartz, and mica. From this source the porcelain manufactory of Worcester is supplied. Analysis: Silica, 46.8; alumina, 37.3; potash, 2.5; peroxide of iron, 0.4; water, 13.0.

KARPHOLITE (Gr. *karphe*, 'to shrivel,' and *lithos*, 'a stone'), a mineral of a straw colour, which occurs in minute crystals and silky fibres. It is sufficiently hard to scratch fluor-spar, although it may be scratched by felspar. Its specific gravity is 2.93; and its constituents—silica, 36.15; alumina, 28.70; water, 10.78; oxide of manganese, 19.16; oxide of iron, 2.29; fluoric acid, 1.47; lime, 0.27.

KARS is a city in Asiatic Turkey, the capital of a pashalic, situate 105 miles N.E. of Erzeroum, and containing about 12,000 inhabitants. It is partly walled, and has eight mosques, minarets, Armenian churches and convents. It was taken by the Turks in 1853, and afterwards, in 1854, besieged by the Russians, who only succeeded in recapturing the place after a brave and memorable resistance on the part of the Turks, commanded by an English general named Sir William Williams, and General Knety, a Hungarian. At the treaty of Paris, in 1856, Kars was evacuated by the Russians, and restored to the dominion of the Porte. The town has an active transit trade.

KARSHI, a large town in Bokhara, on the Shebri Sebz river, 90 miles S.E. of Bokhara. It has extensive manufactures of knives, which are exported to all parts of Central Asia, as well as to Persia, Arabia, and even to Turkey. Some of them are of beautiful workmanship, and are quite equal in durability and temper to the best made in Sheffield. Karshi has a population of about 25,000; and it cannot fail to become a very important place when the trade of Central Asia is developed.

KASAN or KAZAN. [CASAN.]

KASHMIR. [CASHMERE.]

KATER, HENRY, an English mathematician of some eminence, was born at Bristol, April 16, 1777. He became a captain in the army, and for several years devoted himself to ascertaining the precise length of the seconds' pendulum—an object of high importance in physical science. He was the first who availed himself of the convertibility of the points of suspension and oscillation for the determination of the exact length of a mathematical pendulum vibrating in the same time as a given pendulum.

But his name will be transmitted to posterity in

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connection chiefly with his invention of the floating collimator, an instrument which has conferred on practical science essential benefits, its object being the determination of the position of the line of collimation in the telescope attached to an astronomical circle. After a life spent in philosophical research, Kater died in London, April 26, 1835.

KATHETOMETER, or **CATHETOMETER**, an instrument for measuring difference of levels, as between two liquid columns in equilibrium. It consists of a small telescope, sliding vertically upon an upright scale, and furnished with cross wires; the point of intersection of the latter is made to coincide with the apex of one of the liquid columns, and the position of the telescope upon the scale is then read off. A similar process is adopted for the second column, and the difference between the two readings exhibits the difference in vertical height.

KATRINE, or **CATERAN**, **LOCH**, a lake in the county of Perth, Scotland, 5 miles E. of Loch Lomond. It is deep, of a serpentine form—10 miles long and 2 broad—and surrounded by lofty mountains, the most striking of which is Benvenue. The surplus waters of the lake are discharged at its E. end through the Pass of the Trosachs and Loch Achray, into the river Teith: and Glasgow is supplied with water from it by magnificent aqueducts opened by Her Majesty in 1859. The distance from Loch Katrine to Glasgow is upwards of 25 miles.

KATTIMUNDOO, sometimes spelt **CUTTIMUNDOO**, is the juice of the plant *Euphorbia nereifolia*, extensively grown in India. This juice is procured by making incisions in the bark, or sometimes it exudes as a natural gum. When solidified it resembles gutta-percha, and is used in India for similar purposes, but it has not yet become an article of export.

KEAN, CHARLES, son of the celebrated tragedian, Edmund Kean (see next article), was born on the 18th of January, 1811, and educated at Eton. Adopting the stage as a profession, he made his appearance at Drury Lane in 1827 as 'Young Norval.' The only occasion upon which he and his father appeared together in London was at Covent Garden, March 28, 1833, in 'Othello;' Miss Ellen Tree—whom the son married, January 29, 1842—performing the part of 'Desdemona.' He afterwards made a tour in America. Returning to London, he appeared as 'Hamlet,' on the 8th of January, 1838. Thenceforward he was known as one of the first tragedians of his time; and he acquired additional celebrity by the elaborate and tasteful production of the masterpieces of Shakspeare, &c., under his management of the Princess' Theatre. On his retirement from this post, he was presented at a banquet with a splendid testimonial, the duke of Newcastle presiding, and Mr. Gladstone taking part in the proceedings. He afterwards undertook a professional tour in Australia. His death, took place on the 23rd of January, 1868.

KEAN, EDMUND, was born about 1787, in London. His father, Edmund Kean, seems to have been a stage-carpenter, and his mother, Miss Ann Carey, was an actress at minor theatres and with strolling players, and in showmen's booths. Little attention seems to have been paid to his instruction by any one, but his theatrical education commenced

early. His mother took him with her in her rambles with strolling players and showmen. Master Carey, as he was then called, was so clever, that once, when Miss Carey was performing at Windsor, he was required to give his recitations before George III. at the Castle, which he did, to his majesty's great delight, and was dismissed with a handsome present.

Kean's first performance of a complete character was that of young Norval, in 'Douglas,' in the booth of Richardson of Bartholomew Fair notoriety; his first engagement with a regular company was in 1804, when he made his appearance at Sheerness on Easter Monday, on which occasion he played George Barnwell and Harlequin in a pantomime. From this time till 1814, when he made his first appearance at Drury Lane Theatre, London, his life was a series of the vicissitudes, struggles, and privations incident to the profession of an actor in country theatres. In November, 1813, while acting at Dorchester, he was seen and appreciated by Mr. Arnold, manager of Drury Lane Theatre, who engaged him for three years, at a salary of eight, nine, and ten pounds per week, respectively. This occasioned a contest with Mr. Elliston, then manager of the Olympic Theatre, who alleged that he had made a previous engagement with him. A delay was caused by the claim, highly distressing to Kean, who was in extreme poverty, but at length Mr. Arnold ventured to complete his bargain, and the play-bills of Drury Lane announced 'The Merchant of Venice,' 'Shylock by Mr. Kean, from the Exeter Theatre.' There had been no previous puffing, and the house was thinly attended, but the applause was tumultuous: he repeated the character; the house was well filled, and his fame was thenceforth established. Mr. Whitbread, on the part of the Drury Lane Committee, cancelled the original agreement and concluded a new engagement, by which he received a weekly salary of 20*l.* per week. Not long afterwards the committee made him a present of 500*l.*, and many valuable gifts from individuals rewarded his surprising talents.

Kean's career of success, including a visit to America in 1820, was uninterrupted till January, 1825, when the action of Cox *v.* Kean was tried, and a verdict of 800*l.* damages was pronounced against him for adultery with the alderman's wife. The public were exasperated against him; he was driven from the stage of Drury Lane, and afterwards from that of Edinburgh, and then availed himself of an invitation to pay a second visit to America.

After an absence of two seasons in the United States, Kean returned to London, having during the time not only acquired but saved a considerable sum. He had, however, now fallen into habits of almost constant intoxication; his constitution was broken up, his memory impaired to such a degree that he could not study a new part, his alacrity of spirit was gone, and his performances were little more than a faint reflection of what they had been. Kean quarrelled with and discarded his son Charles, whom he had sent to Eton College, for wishing to become an actor; but they afterwards became reconciled, and in 1833 it was announced that Kean would play Othello, at Covent Garden Theatre, with his son Charles as Iago. Kean struggled through the part as far as the speech 'Villain, be sure,' when his

head sunk on his son's shoulder; he was borne off the stage, and his acting was at an end. He lingered for a while, but died May 15, 1833.

Kean in his person was small, but well formed; his face was thin, but handsome; his eyes and hair were black; his countenance, in variety and intensity of expression, was wonderful; his voice, in its upper tones, was somewhat harsh, in its lower tones it was soft and melodious; his action was free, graceful, varied, and appropriate; his conception of character was original and true, and evidently the result of observation and deep and careful study. He did not, as some have supposed, trust to the impulse of his feelings. He studied his characters much and anxiously. Frequently, after his family were retired to rest, he would act scene after scene before the pier-glass, endeavouring to produce, by expression of countenance, gesture, emphasis, and modulation of voice, the effect which his conception of the character required. The *Life of Kean*, by F. W. Hawkins, from original sources, was published in 1869.

KEANE, RIGHT. HON. LORD JOHN, G.C.B., was born in 1781. In 1809 he served in the campaign of Martinique, and was present at the siege of Dessaix. In 1812, being then a full colonel, and lieutenant-colonel in the 60th Foot, he was sent to Madrid, where his reputation was such that he was intrusted with the command of a brigade in the third division, and served with it until the end of the war with France, in 1814, in the battles of Vittoria, the Pyrenees, Nivelle, Orthes, Toulouse, &c. In 1814 he attained the rank of major-general, and was rewarded with the Egyptian medal and other decorative honours. In the year 1833 he was appointed commander-in-chief of the army in Bengal; and in 1838 he succeeded Sir Henry Fane in the command of the forces operating in Scinde, and the north-western parts of India. He was now engaged in conducting the operations of a considerable army, with important objects to attain. The difficulties and successes which attended the British troops under his command, and the memorable victory of Ghuznee, are well-known matters of history. [HINDUSTAN; AFGHANISTAN; SCINDE.] In 1839, on the termination of this campaign, he was raised to the peerage, with a pension of 2000*l.* a year for his own life, and that of his two immediate successors. He died in 1844.

KEATS, JOHN, an English poet, was born in Moorfields, London, in the year 1796. He received a classical education at Enfield, under the father of Mr. Cowden Clarke, and was afterwards apprenticed to a surgeon. In 1817 he published a volume containing his juvenile essays at verse, and shortly afterwards his long poem, 'Endymion,' which called forth a virulent attack from the *Quarterly Review*; an attack which, according to the evidence of his friends Byron and Shelley, embittered his existence. Keats, whose health had been impaired by his attentions to a dying brother, resolved, as a last resource, to try the climate of Italy, his friend Severn, the artist, accompanying him. They went first to Naples, then to Rome, where, after some weeks of intense agony, he died, February 24th, 1821, having previously published a third volume of poems, containing 'Lamia,' 'Isabella,' 'The Eve of St. Agnes,' 'Hyperion,' 'Odes to the Nightingale,' and the

'Grecian Urn.' The English pilgrim may see his grave and Shelley's in close proximity. The 'Life and Letters of John Keats,' edited by Lord Houghton, gives a painfully interesting picture of the poet in his latter days, sinking under the effects of consumption and a hopeless attachment which had contributed to undermine his health. Keats' first sonnets were published in the *Examiner*, then edited by Mr. Leigh Hunt; his 'Endymion' was dedicated to the memory of Chatterton.

His poetry is exceedingly rich and graceful, and its imagery, often classic in character, is always beautiful, if sometimes too luxuriant. He died, however, before the promise of his youthful genius could be fulfilled; and what he might have been can only be inferred from the severe simplicity and exquisite polish of his 'Hyperion.'

KEBLE, JOHN, M.A., vicar of Hursley, near Winchester; author of 'The Christian Year,' born about 1800; received his later education at Oxford, where he became a member of Oriel, examiner *in literis humanioribus*, and in 1831 professor of poetry, an office which he retained until 1842. In 1827 he published 'The Christian Year: thoughts in verse for the Sundays and holidays throughout the year,' which has had a very extensive popularity. It was followed by a work which had Christian childhood for its theme, 'Lyra Innocentium: thoughts in verse for Christian children, their ways and their privileges.' In 1844 some of the fruits of Mr. Keble's activity as professor of poetry at Oxford were given to the world in two volumes, entitled 'De Poeticæ vi medicæ: Prelectiones Academicæ Oxoniæ habitæ annis, 1832-41,' published, as they had been delivered, in Latin. To the 'Tracts for the Times,' 1834-36, he contributed his disquisition on 'Primitive Traditions.' With Dr. Pusey and John Henry Newman he edited the 'Library of Fathers of the Holy Catholic Church anterior to the division of the East and West, translated by members of the English Church,' the publication of which was commenced at Oxford in 1838. Mr. Keble died on the 29th of March, 1866. A memoir of him, by his friend Sir J. T. Coleridge, was published in 1868; and the Keble College, specially intended for a 'poor and clerical college,' and the first founded at Oxford since 1714, was erected in 1869 as the best memorial that could be devised for the much-loved author of the 'Christian Year.'

KEEL (Dutch, *Kiel*), is the lowest timber of a ship, upon which the whole fabric is raised. It extends from one end to the other, and for a large ship consists of two or more pieces of wood scarfed together at the extremities, and is usually protected by strong iron binding.

The keelson passes inside the vessel, from stem to stern, as the keel does outside, to which it is united by bolts which go through both, and through the floor timbers. In large ships two additional keelsons about 30 feet long are bolted to the floor timbers, sufficiently near to one another that the foot of the mainmast may rest upon them. They serve to relieve the bottom of the ship from the pressure of that mast, and strengthen it against the upward action of the water. The word seems to have anciently signified a complete *ship*, and we read of the sea-rovers invading England in *caels* or *keels*.

KEELAGE. A charge paid for a ship on coming into port.

KEEPS, in the feudal ages, strong towers in the middle of any fortification, to which the besieged resorted in the last extremity. They were similar to what the classical ancients called the citadel, or inner fort, a term which is still applied to modern fortification. [CASTLE.]

KEIGHLEY. [YORKSHIRE.]

KEITH. [BANFFSHIRE.]

KEITH, GEORGE. The family of Keith is one of the most ancient and historical in Scotland. The office of the king's marischal was attached to the lands of Keith in East Lothian; and in 1305 Sir Robert of Keith, hereditary marischal of Scotland, was justiciary of Scotland from the Forth to the Mouth, and sat in the English council at Westminster as a Scotch representative. He commanded the Scotch cavalry at Bannockburn, and afterwards married a relative of Bruce. Through this alliance the Keiths acquired large estates in Kincardineshire, and, by purchase, the sea-girt rock of Dunnottar, where they built a castle, which they made their chief seat. The family was ennobled about 1458, and the fourth earl nearly doubled his domains by marriage with the heiress of Inverugie, and was reputed the wealthiest peer in Scotland. These vast possessions passed to George, the fifth Earl Marischal, and founder of Marischal College, Aberdeen, who succeeded his grandfather in 1581; his father having died in the previous year.

The subject of our biography was educated at King's College, Aberdeen, where he distinguished himself by his great proficiency in the classics, Hebrew, history, and antiquities; and at Geneva, under the celebrated Beza, who instructed him in theology and eloquence. In 1589 he was sent to Denmark with proposals from King James for the hand of the Princess Anne. In 1609 he was appointed lord high commissioner in the Scottish Parliament. His memory has been perpetuated mainly by his enlightened munificence displayed in the establishment of Marischal College. The charter, dated 2nd April, 1593, provides for the maintenance of a principal, three professors, and six bursars. Since that time several additional chairs and bursaries have been established; and by an Act of Parliament passed in 1858, Marischal College and King's College have been incorporated into one university. The earl died in 1623.

KEITH, GEORGE, tenth Earl Marischal, eldest son of the ninth earl, was born about 1693, and succeeded his father in 1712. He was attainted for his share in the rebellion of 1715, and with his brother escaped to the Continent. After many hardships and long wanderings, he found refuge at the court of Prussia, and was appointed by Frederick the Great ambassador to the court of France, and afterwards to Madrid. While at the latter court he revealed to Mr. Pitt an important secret respecting the family compact of the princes of the house of Bourbon. This procured his pardon in 1759, and he revisited Scotland, but in a few years returned to Prussia, where he died in 1778, in the eighty-sixth year of his age. The title became extinct at his death. His brother James, who had risen to the rank of field-marshal in the Prussian service, closed a brilliant military career at

the battle of Hochkirchen, fought between the Prussians and Austrians on the 14th of October, 1758. King Frederick celebrated the virtues of his friend in a poetical epistle.

KEITH, GEORGE ELPHINSTONE KEITH, VISCOUNT, a distinguished naval officer, was born in 1746, and was the fifth son of Charles, tenth Lord Elphinstone, and Clementina, only child of the sixth earl of Wigton, and niece and heir-of-line to the last Earl Marischal. He served in the American war, in the war with France, and in 1799 succeeded Earl St. Vincent as commander of the Mediterranean fleet. The most brilliant of his exploits was the famous landing at Aboukir, the success of which was due to his promptitude and skill. In 1797 he was created an Irish peer by the title of Baron Keith, of Stonehaven-Marischal; and in 1803 a peer of the United Kingdom, as Lord Keith, of Banheath. He died 10th March, 1823. By his first wife he left a daughter, the Viscountess Keith, and wife of the well-known count de Flahault, formerly French ambassador at the court of London. His second wife was the daughter of Henry Thrale, M.P. for Southwark, and friend of Dr. Johnson.

The present earl of Kintore is also descended from the family of Keith.

KELLS. [MEATH.]

KELLERMANN, FRANÇOIS CHRISTOPHE, DUC DE VALMY, Marshal of France, and one of the most distinguished of Bonaparte's generals, was born at Strasbourg, May 30, 1735. He entered the Conflans legion when seventeen years of age, and in 1788 rose to the rank of quarter-master-general. The French revolution opened a new field for his military career. In 1792 he became general-in-chief of the army of Moselle, and in November of the same year commander-in-chief of the army of the Alps and Italy. He was principally employed at the head of the cavalry, of which he became inspector-general in 1798. In June, 1799, he was sent to command the French troops in the Batavian republic. Returning to France he followed the fortunes of Napoleon, was with the army of reserve in 1804-6, and accompanied Bonaparte to the Rhine and into Germany. He was created a marshal of France upon the occasion of Napoleon's becoming emperor, in May, 1804. Kellermann, after the Restoration, joined the Bourbons, and was created a peer of France, and honoured with the grand cross of St. Louis in August, 1814. He died at Paris, September 12, 1820, and was buried in Père la Chaise.

KELP, the produce of sea-weed when burned, from which carbonate of soda is obtained. It was formerly much used in the manufacture of glass and soap, and large quantities of iodine are now obtained from the residue, after the carbonate of soda is separated. For soap and bottle glass a cheaper and better alkali is now made from common salt. [ASHES; SODIUM.]

KELSO. [ROXBURGHSHIRE.]

KEMBLE, CHARLES, a member of an illustrious family, was born at Brecknock, on the 25th November, 1775. He was educated at the Roman Catholic college of Douay. In 1792 he obtained a situation in the post office; but so strong was his predilection for the stage, that he soon threw up his employment; and after a few appearances at private

theatres, made his debut in public at Sheffield, as Orlando in 'As You Like It.' In 1794 he obtained an engagement at Drury Lane, and in 1797, at the Haymarket.

With the single exception of Garrick, Charles Kemble played successfully, for a lengthened period, the widest range of character of any actor of the age. His Macduff, Aufidius, Cassio, Laertes, Alcibiades, Henry V., Antony, and Orestes, were true personifications of historic character, as represented by a majestic form, an impressive countenance, and a full-toned, commanding voice. But Kemble did not confine himself to mere acting. He engaged in dramatic authorship, and was also the compiler of several adaptations.

For a short period he was the manager of Covent Garden Theatre; and in 1840 he accepted the office of examiner of plays, having closed his career as an actor on the 20th of April of the same year. He died on the 12th November, 1854. He left one son and two daughters, Fanny and Adelaide. His son, Mr. JOHN MITCHELL KEMBLE, was the author of the 'Saxons in England,' and distinguished as one of the chief Anglo-Saxon scholars and historians of the age. For many years he was editor of the *British and Foreign Quarterly Review*, and held the office of examiner of plays, under the lord chamberlain. He died in 1857. ADELAIDE KEMBLE obtained reputation as a singer, and marrying an Italian nobleman, settled in Italy. FANNY KEMBLE (Mrs. Butler) has won distinction as an actress and a Shakspearian reader, while as a dramatist, a poet, and an agreeable writer, her productions have been favourably received by the public.

KEMBLE, JOHN PHILIP, elder brother of Charles, was born February 1, 1757, at Prescott, in Lancashire. His father, Mr. Roger Kemble, was an actor and manager of a provincial theatrical company. He was educated partly at the Roman Catholic seminary of Sedgley Park, in Staffordshire, and afterwards at the English college at Douay, in France, whence at the age of nineteen he returned to England, and made his appearance in the character of Theodosius, in the tragedy of that name, at Wolverhampton, January 8, 1776. Two years afterwards he was a regular member of the York company. On Tuesday, 30th of September, 1783, Mr. Kemble made his first appearance in London at Drury Lane, in Hamlet. In 1790 he became manager of that theatre. In 1803 he purchased for 24,000*l.* a sixth share in Covent Garden Theatre from Mr. Lewis, and became manager of that establishment. In 1808 Covent Garden was destroyed by fire; and on the opening of the new theatre in 1809, under Mr. Kemble's management, an advance in the prices of admission to the pit and boxes gave rise to the well-known O. P. (Old Prices) riots, during which the tragedian was personally and grossly insulted whenever he appeared upon the stage. On June 23, 1817, he took his leave of the London audience, and soon afterwards retired to the south of France, finally taking up his residence at Lausanne, in Switzerland where he died, February 26, 1823, aged sixty-six. Mr. Kemble's talents, both as an actor and a manager, were of a very high order; his fine taste and classical acquirements being perceptible in every effort. In society he was the accomplished gentleman as

well as the convivial companion, and to the last enjoyed the respect and regard of the noblest and wisest in the land.

KEMPIS, THOMAS A, born in 1380 at Kempen, near Cologne, was a regular canon of the monastery of Mount St. Agnes, where he applied himself to transcribing the Bible and other religious books. He afterwards began a collection of pious and ascetic treatises, among which were the four books 'De Imitatione Christi,' which have been erroneously ascribed to him as his own composition, but which he merely transcribed. The authorship of the work is generally attributed to John Gerson, chancellor of the University of Paris, who died in 1429. Thomas à Kempis composed some ascetic treatises, such as 'Dialogus Novitiorum de Contemptu Mundi,' &c., but they are inferior to the book, 'The Imitation of Christ,' which, next to the Bible itself, is supposed to have had the largest number of readers of which sacred literature, ancient or modern, can furnish an example. It has been translated into almost every language, and has gone through hundreds of editions. Dean Milman says, 'In it is gathered and concentrated all that is elevating, passionate, and profoundly pious in all the older mystics.' With the exception of the fourth book, which relates to the real presence in the Eucharist, it has been used indiscriminately by all bodies of Christians. Thomas à Kempis died in 1471, aged ninety-one. A new translation of this noble work under the title of 'Like unto Christ,' has recently been published in England.

KEMPTEN (the ancient *Campodunum*), a town of Bavaria, situated on the river Iller, in the circle of Swabia, 55 miles S.W. of Augsburg. It is built in the old-fashioned style, and consists of two parts—the *Stifts-stadt*, or St.-Hildegard, which stands on a hill; and the ancient free imperial city, which is in the valley. The old town is walled, and nearly encircled by the new. Kempen has a castle, two churches, a public library, a Latin school, a gymnasium, an hospital, and an orphan asylum. There are manufactures of woollen, cotton, and linen goods, and considerable trade in furs, wool, salt, linen, &c. The population in 1861 was 10,370.

KENDAL. [WESTMORELAND.]

KENILWORTH. [WARWICKSHIRE.]

KENNEBECK. [MAINE.]

KENNET, River. [BERKSHIRE.]

KENNICOTT, BENJAMIN, was born of humble parents at Totness in Devonshire, April 4, 1718. In 1744 some friends raised a sum of money to enable him to go to Oxford. He entered at Wadham College, and applied himself with the greatest diligence to the study of divinity and Hebrew. He resided at Oxford till the time of his death, September 18, 1783. He was a canon of Christ Church, and librarian of the Radcliffe Library, to which office he was appointed in 1767.

The most celebrated of Kennicott's works is his edition of the 'Hebrew Bible,' which was published at Oxford in 2 vols. folio, the first volume in 1776, and the second in 1780. In 1753 Dr. Kennicott published a work 'On the State of the Printed Hebrew Text of the Old Testament,' which was succeeded by another volume on the same subject in 1759.

KENSINGTON GARDENS, one of the public ornamental parks of London, lie on the west side of

Hyde Park, to which they form an excellent adjunct, though quite distinct in character. Intended only for the pedestrian, they are conspicuous for presenting one immense and almost continuous mass of shade, beneath the noble avenues and clumps of fine old trees. King William III. bought the gardens, which at that time only occupied 26 acres, adjoining a palace known as Kensington House. Queen Anne enlarged them to 56 acres, and Queen Caroline to their present extent, by taking 300 acres out of Hyde Park, and forming the Serpentine out of a series of ponds.

A magnificent monument, in memory of the late lamented Prince Consort, was erected during the years 1866-68, on the south side of Kensington Gardens. The funds were partly raised by public subscription, and partly voted by the House of Commons. In Kensington Palace, a plain and irregular building of red brick, William III. and his queen, Queen Anne, and George II. breathed their last, and there her majesty Queen Victoria was born.

KENT, a maritime county of England, is bounded N. by the estuary of the river Thames, E. by the German Ocean and the Straits of Dover, S. by Sussex, and W. by Surrey. A detached portion of the parish of Woolwich in Kent, about 400 acres, lies on the north side of the Thames. The greatest length of the county from E. to W. is about 64 miles; the greatest breadth, N. to S., is about 40 miles. The area is 1624 square miles, or 1,039,419 acres, of which above 720,000 are meadow and arable land, and a considerable quantity of the residue is woodland. The total population of the county at the census in 1861 was 733,887—369,129 males, and 364,758 females, being an increase of 118,121, or 19 per cent. on the census of 1851. According to an official estimate of the Registrar-General, it had still further increased to 825,284 in 1868.

Kent is divided into twenty-eight poor law unions and twenty-five county courts. There are two regiments of yeomanry cavalry, and about fifty companies of volunteer rifles and artillery in the county.

Coast-line, Islands, &c.—The northern part of the county, along the estuary of the Thames, is skirted by a line of marshes, which are very extensive near the junction of the Thames and the Medway, forming a portion of the Isle of Grain. Eastward of this island lies the Isle of Sheppey, extending about 10 miles by 5, the surface of which is laid down for the most part in grass, but the upland part on the northern side produces good corn. The marshes terminate east of the Swale, and the coast again rises to some height in clayey cliffs, which extend past Herne Bay and Reculver nearly to the Isle of Thanet. In this isle, which occupies the north-eastern corner of the county, and was formerly separated from it by the Stour, the chalk cliffs commence, and continue along the whole line of coast to Pegwell Bay, which is the boundary of the isle to the south-east. The North Foreland is a projection of the Isle of Thanet, due east of Margate. The chalk cliffs of the so-called island are succeeded by the low shore of Pegwell Bay, which continues to Walmer Castle near Deal. Here the chalk cliffs recommence, and continue round the South Foreland to Sandgate, presenting many lofty heights near Dover. From Sandgate the coast begins to decline until it forms

the extensive tract of Romney Marsh, which ends on the borders of Sussex, at Winchelsea. Opposite Deal lie the GOODWIN SANDS, the channel between which and the Kentish coast forms the well-known roadstead of the Downs.

The Downs, which are about 8 miles in length and 6 in width, and vary in depth from 4 to 12 fathoms, are a safe anchorage in most winds, and are the general rendezvous of shipping leaving the Thames for the Channel, or returning homeward. To the north of the Downs are 'The Small Downs,' a smaller roadstead immediately contiguous to the Downs properly so called. The name is derived from the *dunes*, or sand-heaps of the Goodwins and the shore.

Surface and Geology.—Kent is on the whole a hilly county. The chalk range of the North Downs enters it on the west side from Surrey, and runs nearly east through the county, being cut by the valleys of the Darent, the Medway, and the Stour. Many of its hills rise from 400 to 600 feet in height; and the range terminates on the coast between Folkestone and Walmer, where it forms a mass of white cliff, the 'white walls of Albion.'

The district between the chalk and the estuary of the Thames is, for the most part, occupied by the plastic clay, which immediately overlies the chalk, and is again overlaid by the London clay in the isles of Grain and of Sheppey, in the shore near Reculver, and in other parts of the county, including Shooter's Hill.

South of the North Downs the chalk marl and greensand crop out, and cover a belt of land which skirts the chalk throughout the whole extent of the county from west to east. South of this belt lies another occupied by the Weald clay, about 5 miles in width; and this is bounded on the south by a belt of Hastings sand. The Weald of Kent was anciently an immense forest (the ancient Andredes-weald), inhabited only by deer and hogs. The greater part of it has, however, been gradually cleared and brought into cultivation, though it is still interspersed with numerous oak woods and groves of beech.

Hydrography and Communications.—The northern boundary is formed by the Thames, to the basin of which nearly the whole county belongs. The other principal rivers are the Ravensbourne, the Darent, and the Medway, which flow into the Thames; and the Stour and the Rother, which flow into the sea. The lengths of the rivers are about as follows:—The Ravensbourne, 10 miles; Darent, 20; Cray, 9; Medway, 60; Eden, 16; Teise, 17; Beult, 20; Stour, 45. The Medway is by far the most important of these; it rises near East Grinstead, and flows past Penshurst, Tunbridge, Yalding, Maidstone, Rochester, and Chatham, to the Thames at Sheerness. The tide flows up to Maidstone Bridge. Ships and large vessels cannot ascend above Rochester Bridge. Below Rochester the estuary gradually expands to a considerable width, and forms an important harbour for the British navy. Numerous arms of the river or creeks penetrate the marshes, which spread inland to a considerable extent from the banks of the river. As high as Rochester it is under the conservancy of commissioners. Its upper course embraces a succession of beautiful scenery. The Stour has its rise in the chalk-hills; it flows N.N.E. past Canterbury, where it becomes navigable, and in the lower part of

its course divides into two branches, the Greater and the Lesser Stour. A branch, anciently called the Wantsum, separated the Isle of Thanet from the rest of the county, but has long ceased to have a distinct channel. The waters of the Lesser Stour have been employed for purposes of irrigation, and hence this branch is no longer navigable, but small craft ascend the Greater Stour as high as Canterbury. The former falls into the estuary of the Thames at Reculver, the latter into the English Channel at Pegwell Bay.

The principal canal in Kent is the Royal Military Canal, which was formed rather for the purposes of defence than of commerce, during the alarm of invasion in the war against Napoleon. It has, however, since been converted to commercial use. It runs from Oxney to Hythe. The Thames and Medway Canal is now the property of the South-Eastern Railway Company, who have filled up the section from Higham to Rochester, and which is now used for the transit of trains in a tunnel upwards of 2 miles in length.

Kent has a most abundant steam traffic from Ramsgate, Margate, Sheerness, Gravesend, Greenhithe, Erith, Woolwich, and Greenwich, to London; from Rochester to Sheerness; from Dover to Ostend, Calais, and Boulogne; and from Folkestone to Boulogne.

The South-Eastern, North Kent, and the London, Chatham, and Dover railways, with their branches, traverse the county.

Climate and Agriculture.—The climate of Kent is in general mild and genial. The soil may be divided into the gravel, chalk, and clay, which produce, where they mix in due proportions, an extremely fertile loam. The alluvial soils along the Thames and Medway, and in Romney Marsh, produce some of the richest marsh pastures in the kingdom.

Throughout the whole county the clay may be said to predominate, and the mode of cultivation generally adopted is that which suits the strongest soils. On the hills, however, chalk and gravel are the main ingredients of the surface soil.

The products of Kent are more varied than those of any other British county, and, owing to the drier climate, generally superior in quality. Wheat, barley, and other grains, turnips, clover, &c., are of the finest growth. The county also produces several crops which are peculiar to it, such as canary and radish seed, which grow chiefly in the Isle of Thanet, where there are few hedge-rows to harbour birds. Other seeds are likewise raised for the London seedsmen, such as spinach, cresses, and white mustard. Kidney beans are cultivated to a considerable extent in the neighbourhood of Sandwich, and from ten to twenty bushels per acre are produced. Woad and madder were formerly more commonly cultivated in Kent than they are now; the foreign, being raised at a less expense, has driven the Kentish out of the market.

There is comparatively but a small proportion of grass land in Kent, if we except the sheep downs on the chalk hills and the marshes. The latter produce most of the hay consumed in winter. Romney Marsh, which is well known for the richness of its grass, contains about 44,000 acres; on the borders of the Stour are 27,000; and along the Medway, Thames, and Swale, about 11,500 more, on which a great number of sheep are reared and fattened. The Romney breed is noted for its long wool.

There are very few dairies of any consequence in Kent, and no cheese is made, except for domestic consumption.

Hops are grown to a very great extent in this county, and with the exception of those which are raised at Farnham in Surrey, are the most esteemed of any in England. Nearly 40,000 acres are appropriated to them, supplying almost one-half of the whole crop of England. The finest are cultivated in the parish of East Farleigh, near Maidstone.

In that part of Kent which is nearest to London there are many extensive gardens; and about Deptford hundreds of acres are laid out in asparagus beds. Great quantities of peas are cultivated on the line of road from London to Rochester; and apples, pears, plums, and cherries are grown in extensive orchards for the supply of the London markets. The cultivation of filberts is peculiar to Kent, and carried on with peculiar success in the neighbourhood of Maidstone.

Throughout the county agriculture is in an advanced state. The estates are small, owing to the Saxon custom of gavel-kind, which is still maintained here, and by which the lands of a father dying intestate are divided among all the sons alike.

There are several important paper factories on the Darent and the Medway, as well as corn, oil, silk-printing, and gunpowder mills in the county, and shipbuilding is extensively carried on on the seaboard. There are no less than four royal dockyards in the county, viz., Deptford, Woolwich, Chatham, and Sheerness.

There are still some extensive woods in Kent, but they are diminishing every year; and the produce of bark and timber is much reduced from its ancient amount. The demand for hop poles has caused more attention to be paid to underwood; and some of the coppices which are well managed give a sufficient return to prevent their being grubbed up and converted into arable land.

Divisions, Towns, &c.—Kent is divided into five lathes, sixty-five hundreds, and 423 parishes. Each lathe comprehends several hundreds, and other smaller divisions. The lathes are—*Sutton-at-Hone Lathe, Aylesford Lathe, Scray Lathe, St. Augustine Lathe, and Shepway Lathe.*

There are several parts of the county which have their particular 'liberties,' exempt from the jurisdiction of the county magistrates. They are as follows:—1. The county of the city of Canterbury. 2. The city of Rochester. 3. The borough of Maidstone. 4. The liberty of Romney Marsh, which is under the jurisdiction of its own bailiff and jurors. 5. The liberty of the Cinque Ports, which is partly in Kent and partly in Sussex. [CINQUE PORTS.] For ecclesiastical purposes the whole county is in the diocese of Canterbury, except the city, archdeaconry, and deanery of Rochester. It is in the Home Circuit, except certain parishes near London, which, in criminal matters, are within the jurisdiction of the Central Criminal Court. The assizes are held at Maidstone. For parliamentary purposes the county is divided, by the Reform Act of 1867, into East, West, and Mid Kent, each returning two members to the House of Commons; in addition to which the cities of Canterbury and Rochester, and the boroughs of Dover, Greenwich, Maidstone, and Sandwich each

return two members; and Chatham, Hythe, and the newly-formed borough of Gravesend, one each; total, twenty-one.

There are sixteen polling-places. Canterbury is the place of election for the eastern division, Blackheath for the western, and Maidstone for Mid Kent. The amount assessed to the property tax is 2,555,500*l*.

The following are the principal places, with the population of each in 1861:—

Ashford, a market town, is situated on the west bank of the Stour, 12½ miles S.S.W. from Canterbury, and 67 miles from London. The South-Eastern Railway has a station here, and a large factory for the construction and repair of carriages and engines, by which the trade of the town has been greatly increased. There is a market-house in the centre of the town. The church has a Perpendicular tower, erected in the reign of Edward IV., when the church itself was repaired, if not rebuilt. Population of the town, 5522; of the parish 6950.

Aylesford (*Eghwys-ford*, or 'church-ford'), situated on the east bank of the Medway, 2½ miles N.W. from Maidstone. There is an ancient church with a square west tower. Population of the parish, 2057. Close to the Medway, a short distance west from Aylesford, stood a Carmelite friary, which was suppressed at the Reformation. Many portions of the conventual buildings are incorporated in the present mansion of the earl of Aylesford. On the side of the hill, about 1½ mile E.N.E. from Aylesford, is Kit's Coty House, one of those Druidical monuments called cromlechs. [CROMLECH:] Two stones placed upright, each 8 feet above the ground, 8 feet long, and 2 feet thick, form the sides; another upright stone, 5 feet high, 5 feet broad, and 14 inches thick, closes one end, the other end being left open; a fourth stone, 12 feet long, 9½ feet broad, and 2½ feet thick, forms a flat cover like a roof, sloping towards the closed end. All the stones are very rude and irregular. This cromlech is supposed to mark the burial-place of Catigern, who was killed in battle between the Britons and Saxons in 455.

Broadstairs, a small but fashionable bathing-place on the east coast of the Isle of Thanet, 2 miles north-east of Ramsgate, has a station on the London, Chatham, and Dover Railway. It was formerly called *Bradstowe*, and is included in the parish of St. Peter (Thanet), which has a population of 2855.

Bromley, a market town, is situated above the east bank of the Ravensbourne, 10 miles S.E. from London. It is a flourishing town, with a market-house near the centre, recently rebuilt. There are here two railway stations, some good inns, and a large number of villas and first-class mansions. The church has a low tower at the west end, massy and embattled. The entrance to Bromley church-yard affords a specimen of the ancient *lich-gate*, where the corpse rested before it was borne into the burying-ground. Dr. Hawkesworth, author of the 'Adventurer,' lies buried here. Population of the parish, 5505. It is a polling place for the county, and the head of a poor-law union.

Canterbury. [CANTERBURY.]

Chatham, a market town, parliamentary borough, and arsenal, is situated on the south-east bank of the estuary of the Medway, a short distance east from Rochester, with which it is connected by a continuous line of houses. Chatham is 33 miles E. by S.

from London by railway. It was a comparatively insignificant place till after the commencement, about 1757, of the great naval and military establishments, although it had a dockyard and arsenal founded as early as the reign of Elizabeth. The establishments now consist of the largest dockyard in the kingdom, which has numerous wet docks and building slips for vessels of the largest class; an extensive arsenal; barracks on a large scale for artillery and the royal engineers—the latter of whom have their headquarters here; infantry and marines; a park of artillery; large magazines and store-houses; besides a handsome dock-chapel, and habitations for the civilians who are employed. There is a school for engineers, established in 1812, and near the dock-yard gate is a large naval hospital. Population of the town, 25,183; of the parliamentary borough, 86,177: number of electors in 1869, 4293.

The river Medway widens here, and is flanked on the east and south by heights partly built on, and crowned with several forts and batteries. The principal buildings are six churches, ten chapels, a seamen's hospital, and soldiers' and mechanics' institute. The military and naval arsenals are separated from the town and the country beyond by a line of fortifications. Near the dockyard is a large prison for convicts, who labour in the yard. Fort Pitt is now used as a military hospital, and Fort Clarence as a military prison. The borough has no municipal jurisdiction, but sends one member to the House of Commons. Chatham gave the title of earl to the elder Pitt. The towns of *Brompton* and *New Brompton*, in the parishes of Chatham and Gillingham, with a population of 14,000, are partially inclosed within the line of Chatham fortifications.

Cranbrook, a market town, 48 miles S.E. from London, is irregularly built. The church is a handsome structure in the Perpendicular style, with buttresses and fine windows. Some woollen manufactures are carried on in Cranbrook, which is 7 miles S.S.W. of the Staplehurst station on the South-Eastern Railway, and 13 from Maidstone. Population of the parish 4128.

Crayford is a small place on the Cray, 8 miles E.S.E. of Greenwich, having an area of 2474 acres, and a population of 3103. In its vicinity are bleaching grounds, silk and calico printing establishments, and numerous chalk-pits. Here, in 457, Hengist totally defeated Vortimer in the second great battle between the Saxons and the Britons.

Dartford, a market town, 15 miles E. by S. from London Bridge, is situated in a narrow valley on the river Darent, about 3 miles from its junction with the Thames. There are several corn, paper, oil, and powder-mills in the neighbourhood. This important agricultural town is on the line of the North Kent Railway, and has a workhouse and market-hall, with a steam-engine factory, and an active trade with London by the river. The first paper-mill was built here by Spielman, who died in 1607. Here also are the ruins of a nunnery of the time of Edward III., and many ancient caverns dug in the chalk. Wat Tyler's insurrection broke out at Dartford in 1381. The town is governed by a local board of health. Population of the parish, 6597.

Deal, a market town, municipal and parliamentary borough and port, is situated on the coast, 74 miles

E.S.E. of London. It is annexed to Sandwich as a member of the Cinque Ports, and unites with that place in returning two members to the House of Commons: number of electors (1869) 1849. The town of Lower Deal extends a considerable way along the shore; Upper Deal, the most ancient part, is further inland. There is a pier, opened in 1864, but no harbour. The fine roadstead called the Downs extends in front of Deal between the shore and the Goodwin Sands; and the Deal fishermen, as well as the pilots, whose services were formerly in great requisition, have the highest reputation for skill and intrepidity. At the south end of the town is Deal Castle, erected by Henry VIII., in a good state of repair; and a little more than a mile farther south stands Walmer Castle, the residence of the Lord Warden of the Cinque Ports, with a modern house, and handsome grounds and garden. Here the duke of Wellington, and more recently the late Lord Palmerston, spent a portion of each year during the time they held the office of lord warden. The former died here on 14th September, 1852. The borough of Deal is divided into two wards, and is governed by six aldermen and eighteen councillors. Population of the parish, 7531. The principal industry of Deal is connected with maritime pursuits, but the occupation of its redoubtable boatmen has been much interfered with of late years, in consequence of the employment of steam-tugs to expedite outward and inward bound vessels, and also because the mails from foreign countries are now landed at other places more convenient for transmission to London. The number of vessels which entered the port in 1867, principally coastwise, was 259 (17,293 tons), and the clearances in the same year were 87 (5407 tons). The customs revenue received at the port in 1868 was 3139*l*.

Deptford is a naval port, separated from Greenwich by the Ravensbourne, near its junction with the Thames, and on the London and Greenwich Railway, 3 miles S.E. from London. It includes two parishes, St. Paul and St. Nicholas, adjoins Greenwich, and contributes with that place and Woolwich to return two members to Parliament. The borough was created by the Reform Act of 1832. There are two hospitals for decayed pilots and shipmasters or their widows, belonging to the Trinity House; an extensive victualling yard, where the provisions for the royal navy are manufactured or stored; and a dockyard, established by Henry VIII., and occupying an area of 31 acres, in which the ships of the royal navy were formerly built and repaired; it was closed as a government establishment in 1869. There are several private shipbuilding yards. A small part of Deptford is in Surrey. Evelyn, the author of the 'Sylvia,' lived here, and Peter the Great worked as a shipwright in its dockyard. The total population is 45,973.

Dover, a municipal and parliamentary borough, and Cinque Port, 70 miles E.S.E. from London, and 15 miles S.E. from Canterbury, is situated on the coast, in a narrow valley between two high ranges of chalk hills, which are broken through, and form lofty precipices in front of the sea on each side of the town, and on the south side rise perpendicularly above the houses and close behind them. On the east side, about a mile distant, is Shakspeare Cliff, 400 feet

high; and on the west side near the town is Dover Castle, with its irregular lines of fortification on the brow of the cliff, and its numerous galleries excavated far below in the chalk rock. The Castle Cliff is 325 feet above the sea, but the heights are much loftier. The castle is a collection of formidable works, occupying 35 acres, containing Roman and Saxon towers, a keep forming a bomb-proof magazine, and barracks for 2000 men. The town extends some distance up the valley, and stretches out on each side as far round as the cliffs will allow. The Dour, a small but clear stream, flows through the valley and falls into the harbour. The old town is irregularly built, and without any pretension to architectural effect, either in the streets or public buildings. The tower of St. Mary's church is of early Norman architecture, and another old church has also some Norman features. Of late years the town has been much improved, and become the resort of fashionable visitors. There are, on the north side, handsome crescents, parades, and terraces. It is the chief packet-station for the opposite ports of France, and the prosperity of the place depends in a great measure on the intercourse between England and the Continent. The imports consist mainly of eggs, fruit, and other rural produce from France, and there is also a thriving coasting trade and fishery. The number of vessels registered as belonging to the port in 1868 was 58 (4075 tons). The entries in 1867 were 2092 (282,148 tons), and the clearances 1304 (168,295 tons). The customs duties received at the port in 1868 amounted to 13,580*l*. The harbour consists of three basins, the outer one inclosed between two piers 150 feet apart. The first section of the admiralty pier, thrown out 1200 feet in 1864, renders the harbour always open. Dover is the terminus of the London, Chatham, and Dover Railway, and there is also an extension of the South-Eastern line from Folkestone, entering the town on the west by a tunnel cut in the Shakspeare Cliffs. The port is 21 miles from Cape Gris-nez, on the opposite side of the English Channel, and 26½ N.W. of Calais, with which it communicates by a submarine telegraph. There is also submarine communication with Ostend. The harbour of refuge, when completed, will inclose 574 acres. Fortifications of immense strength have been erected on the heights commanding the town. Shipbuilding, sail, rope, and paper making are the chief branches of industry which occupy the population. Dover is the seat of quarter sessions, has a board for licensing pilots, and a court of the constable of the Cinque Ports is held here. The municipal borough is divided into three wards, and is governed by six aldermen and eighteen councillors. Its limits are coextensive with those of the parliamentary borough, which returns two members. Population, 25,325. The number of registered electors in 1869 was 3233.

Eltham, formerly a market town, 7 miles E.S.E. from London Bridge, is a small place of 3009 inhabitants, which deserves notice on account of its remains of a royal palace, built at a very early period, in which Henry III. held Christmas in 1270. Succeeding kings frequently resided in it till the time of Henry VII., when Greenwich Palace was built, and that of Eltham was suffered to fall into decay. The hall, now occupied as a barn, is 100 feet long

by 56 feet wide, with a carved timber roof, and windows which have been very elegant, but are now mostly bricked up. The area of the palace is surrounded by a wall, and the ditch, which is now dry and planted with shrubs, is crossed by an ancient bridge.

Erith is the name of a parish on the right bank of the Thames, covering an extent of 4585 acres, and having 4143 inhabitants. The North Kent Railway has a station here, and in the neighbourhood are extensive powder mills, which were the scene of a terrible explosion in 1864, the report being distinctly heard in, and causing considerable alarm throughout London, about 15 miles distant. There are some extensive lime and sand pits here, from whence ballast is shipped; and the brick-fields in the vicinity are amongst the largest in the kingdom. It has a fine old church of considerable historic interest, and of late years numerous villas have sprung up in its pleasant environs.

Faversham, a market town, municipal borough, and port, is situated on a stream which runs into the East Swale, just to the left of the road to Dover, 47 miles E.S.E. from London Bridge. It was a place of some note before the time of King Stephen, who built and endowed here an abbey for Cluniac monks, in which himself, his queen Matilda, and his eldest son, Eustace of Boulogne, were buried. The town consists principally of four streets forming an irregular cross, and having the guild-hall and market-place in the centre. The church is a large cruciform structure of flint. The town contains also four dissenting chapels, a theatre, assembly-rooms, union workhouse, and gaol. There is a station of the London, Chatham, and Dover Railway at Faversham. Near the town are the extensive gunpowder works of Messrs. Hall & Co. There is also a valuable oyster fishery here. The number of vessels which entered the port in 1867, nearly all coastwise, was 1642 (124,461 tons, and there cleared thence 857 vessels (38,048 tons). The customs revenue in 1868 amounted to 1057*l*. The council of the borough of Faversham, under the Municipal Reform Act, consists of four aldermen and twelve councillors. The creek or arm of the Swale on which the town stands, is navigable for vessels of more than 200 tons. The parish of Faversham is in the Cinque Port liberty of Dover. Population of the parish, 6383.

Folkestone, a bathing-place, seaport, parliamentary and municipal borough, is situated on the shore of the English Channel, opposite Boulogne, partly in a hollow between two cliffs, and partly on the west cliff. Those on one side of the town are chalk, and on the other sandstone. During the last twenty years Folkestone has been much improved, and become a fashionable resort. Spacious streets and noble terraces have been erected in the place of narrow, steep, and winding lanes. The harbour is not capable of affording anchorage to many vessels, admitting only ships of from 10 to 12 feet draught at high-water, but was considerably improved by the South-Eastern Railway Company, when they extended their line to Dover; steam-packets daily ply between Folkestone and Boulogne, and considerable quantities of wine and other French produce are imported. The number of vessels which entered the port in 1867 was 1178 (188,679 tons), and the clearances

906 (154,004 tons). The customs duty received at the port in 1868 was 14,428*l*. The council, under the Municipal Reform Act, consists of four aldermen and twelve councillors. The town forms part of the parliamentary borough of Hythe. Population of the parish of Folkestone, 9674. The village of Sandgate, which is partly in Folkestone parish, is resorted to as a bathing-place, and has a ship-building trade. There is a castle at Sandgate, built by Henry VIII.

Gravesend, a market town, municipal and parliamentary borough, the boarding station for the officers of the London customs, is situated on the south bank of the Thames, 20 miles from London. It has a free school, alms-houses, a battery on its eastern side, a custom-house, numerous baths, libraries, &c. Steamboats run to London in two hours, and one of the earliest passenger steamers (the *Kent*) plied from hence to the metropolis in 1829. But owing to the competition of railways on either side of the Thames, steamers ply only during the summer season. There is a station on the North Kent Railway which, 4 miles beyond, passes through a remarkable tunnel upwards of 2 miles in length, and connects the town with Strood and Rochester. There is a steam ferry across the Thames to the Tilbury station of the London and Southend Railway. Gravesend is a noted resort for holiday-makers from London, who flock here, and to Rosherville and Springhead, which are both in the neighbourhood. The municipal borough is governed by six aldermen and eighteen councillors. Population, including the parish of Milton, 18,782. The town was created a parliamentary borough by the Reform Act of 1867, and returns one member. The number of voters in 1869 was 2639. *Milton*, which adjoins it, has some good houses, and a fine parish church of great antiquity. Cobham Hall, about 4 miles S.E., the residence of the earl of Darnley, is a noble Tudor mansion in a fine park, with a celebrated collection of pictures.

Greenwich, a market town and parliamentary borough, is situated on the south bank of the Thames, 4 miles E.S.E. from London. Greenwich park, which comprises nearly 200 acres, is diversified with lawns, and well planted with elms and chestnut trees. The park, which was laid out from the designs of the celebrated John Evelyn, spreads between the hospital and Blackheath. It was first inclosed by Duke Humphrey of Gloucester, protector in the reign of Henry VI., and still has numerous herds of deer, and some fine old trees. Upon one of its eminences, 160 feet above the river, is situated the Royal Observatory, the residence of the astronomer-royal, commonly called Flamsteed House, and it is from the meridian of this observatory that the longitudes are computed in all British maps. The south gate of the park opens upon Blackheath, where Wat Tyler and Jack Cade both encamped, and which has been the scene of other memorable assemblages. Greenwich communicates with the metropolis by the South-Eastern and Charing Cross Railway. The chief object of interest is the hospital for aged, wounded, or disabled seamen. [GREENWICH HOSPITAL.] In the parish church of St. Alphege lie the remains of General Wolfe and the celebrated Lavinia Fenton, duchess of Bolton. Among the other public edifices of Greenwich are the Trinity

Hospital, founded by the earl of Northampton in 1613, for twenty pensioners (revenue, 2525*l.*); a union workhouse, market-house, and theatre. Greenwich was a royal residence from the year 1300 to the reign of William and Mary. Henry VIII. was born and baptized here, and here he married Anne of Cleves. It was also the birthplace of Queen Mary and Elizabeth, and Edward VI. died in its old palace. Population of the parish 40,002. The parliamentary borough, which returns two members, includes Deptford and Woolwich, and contains a population of 139,436. The number of voters on the register in the year 1869 was 14,579.

Herne Bay, on the north coast of Kent, about 10 miles W. from Margate, has of late years been much resorted to as a watering-place. It has a pier 3000 feet in length, which is now in such a dilapidated condition as to be unsafe even for foot passengers. There is a station of the London, Chatham, and Dover Railway here. The town is situate in the parish of Herne, which is three miles nearer Canterbury inland, and has 3147 inhabitants. The population of Herne Bay itself is only 1503. Extensive oyster farming was commenced here in 1865.

Hythe, a municipal borough, parliamentary borough, and one of the Cinque Ports, 15 miles S. from Canterbury, is situated at the foot of a steep hill or cliff, about half a mile from the shore, and consists chiefly of one long street, parallel to the sea, with some smaller ones branching from it. There is a rather extensive avenue of trees from the principal street to the waterside. The town-hall and market-place are in the centre of the town. The church, on the slope of the hill above the town, is very ancient. The South-Eastern Railway has a station at Westerhanger, near Hythe. The now well-known school of musketry—whose rules are observed by all the volunteers in Great Britain—was established here in 1855; and on the beach, which is higher than the town, are posted several strong martello towers. Hythe has also a county hall, borough gaol, theatre, and hospital. The corporation of Hythe, under the Municipal Reform Act, consists of four aldermen and twelve councillors. Hythe formerly returned two members to Parliament, but since 1832 it sends only one. The parliamentary borough includes the municipal borough, the liberty of the town of Folkestone, and the parishes of West Hythe, Saltwood, Cheriton, and Folkestone, and part of that of Newington. These limits include the watering-place of Sandgate. Population of the municipal borough, 3001; of the parliamentary borough, 21,367, including Folkestone: electors (1869), 2209.

Lee is now a well-populated suburban parish, inhabited chiefly by wealthy city merchants, on the south side of Blackheath, 6 miles E.S.E. of London. The parish comprises 1273 acres, and has a population of 6162.

Lewisham is 6 miles S.E. of London, of which city it may almost be said to be a suburb. The parish includes the chapelry of Sydenham, and the total population is 22,808, a large number of whom are engaged in business in London, travelling to and fro every day.

Lydd, a market town on the English Channel, was formerly a member of the Cinque Port of New Romney, from which it is distant about 3 miles.

Accumulations of shingle have destroyed the port, and it is now a poor village, one mile inland, with a population of only 1667.

Maidstone, a municipal borough, parliamentary borough, and the assize town of the county, is situated on a declivity on the east bank of the Medway, 8 miles from Rochester, and 36 miles from London, at the meeting of two branches of the South-Eastern Railway. The town is in a pleasant position in the central vale of Kent, has a fine parish church, known as the 'Pilgrim's Chapel,' and many almshouses and charities. There are also a former palace of the archbishops of Canterbury, a town and county hall, gaol, and lunatic asylum, barracks, theatre, library, philosophical society, an excellent museum, &c. The grain market is the largest in Kent. In the vicinity are paper and oil mills, and some of the most productive hop grounds and orchards in England; also valuable quarries of stone, which is exported by the Medway, navigable here for vessels of sixty tons. Trade is thriving, and the town increasing. Maidstone is the chief place of election for Mid Kent; and the borough sends two members to the House of Commons. In 1869 the number of voters on the register was 3250. There was an important city of the early Britons in the neighbourhood of this town. In the reign of Henry VIII. the first English houses were raised here. In 1648 Maidstone was twice stormed by the parliamentary forces. The municipal borough is divided into four wards, and is governed by six aldermen and eighteen councillors: population, 23,016. The parliamentary borough has a population of 23,058.

Margate, a seaport town and municipal borough in the Isle of Thanet, on the north coast of the county, about 3 miles from the North Foreland, and 65 miles E. by S. from London. Margate has been of late years a favourite sea-bathing place. A curved stone pier with a lighthouse was erected at the beginning of the present century, which has very greatly improved the harbour, previously much exposed to winds from the N.E., and there is a noble jetty, at which the steamers land and embark passengers. The modern streets and public structures, including a Gothic and other churches, an esplanade, squares, &c., are well built. Population of the parish, 10,019. Margate is connected with London, Canterbury (15½ miles distant), and Ramsgate (3 miles), by branches of the South-Eastern and Kent Coast railways. It lies in the hollow, and on the declivities of two chalk hills; has a royal bathing infirmary, town-hall, and market-house, assembly rooms, theatre, public library, baths, and several fine hotels. The harbour has 8 to 13 feet at high water, but is dry at low water. Margate was recently made a municipal borough. The population within the municipal limits is 8874; but in the season it often contains from 50,000 to 100,000 persons, who visit it for its excellent sea-bathing.

Milton is a market town situated on a creek of the Swale, 39½ miles from London. The town is on the side of a hill sloping down to the creek, and is ill-built. The business of the place arises from its celebrated oyster fishery, and from its being the port of communication with London for the surrounding agricultural district. In the centre of the town is the ancient court-house for holding the manor courts,

with the town gaol beneath. Much corn is shipped here. The church is chiefly in the decorated English style, and is large and handsome. Population, 2731.

Penshurst, on the South-Eastern Railway, 32 miles from London, is a pleasant village, with an interesting church, and much visited as the ancestral residence of the Sidney family. Sir Philip Sidney was born at Penshurst Place, now the seat of Lord de Lisle and Dudley.

Plumstead is a large manufacturing parish, 10 miles E. from London, with which it is connected by railway, and includes a great part of the royal arsenal. Population, 24,502. It forms part of the borough of Greenwich.

Queenborough, in the Isle of Sheppey, 45½ miles from London, belonged to the Saxon kings, who had a castle here, on the site of which Edward III. commenced a new and more extensive fortress. Edward made the town a free borough, and gave it the name of Queenborough, in honour of his consort Philippa. This castle was demolished in the time of the Commonwealth. Queenborough is now a poor place, and the greater part of the inhabitants are dependent on the oyster, shrimp, and lobster fishery. Queenborough was disfranchised by the Reform Act of 1832, before which it returned two members to Parliament. Population of the parish, 973.

Ramsgate, a market town, port, and favourite sea-bathing place, is situated in the Isle of Thanet, about 4 miles S. from the North Foreland. An excellent harbour has been constructed, which has contributed greatly to the prosperity of the town. It is the largest artificial haven in England, being formed by two piers, constructed of Purbeck stone and granite, which project from 1500 to 2000 feet into the sea, and inclose an inner basin. This harbour is bordered by wet and dry docks; vessels of 300 tons burthen enter it at ordinary tides; a lighthouse stands at its entrance, and it is guarded by batteries. The port has a little coasting trade and fisheries; eggs, fruit, and other provisions from France and Belgium are its chief imports. The entries in 1867 were 296 (27,364 tons), the clearances 30 (2707 tons). The customs revenue in 1868 amounted to 3616*l*. The old part of the town is in a hollow between two chalk ridges, on which the modern portion is built. There are terraces, crescents, bathing-rooms, assembly-rooms, a handsome modern Gothic church, several places of worship for dissenters, custom-house, bank, barracks, and market-house. Ramsgate is 15 miles E.N.E. of Canterbury, with which, and with London, Margate, &c., it is connected by two railways. Steamboats also ply to and from London, except during winter. It is a member of the Cinque Port of Sandwich. Population of the parish, 11,865.

Rochester. [ROCHESTER.]

Romney is called *New Romney*, to distinguish it from *Old Romney*, which is a little farther inland, and had been deserted by the sea before the time of Edward the Confessor, when the harbour of New Romney was formed. New Romney is situated on the east coast, about 4 miles N. from Dungeness. It is one of the Cinque Ports. The town stands in Romney Marsh, an exceedingly fertile, level tract, which is used as pasture land, chiefly for sheep, and which is defended from the encroachment of the sea by a high and broad embankment called Dymchurch Wall,

which extends northwards about 4 miles to the village of Dymchurch. This embankment is under the management of a corporation. The *Marsh* is 24,000 acres in extent. The town consists chiefly of one wide well-paved street, with a market-house and a hall. There is a weekly market. The church is a very ancient and handsome building. Romney is 22 miles S.S.W. of Canterbury, and is the head of a poor-law union, a prescriptive but decayed municipal borough, and a polling-place for the eastern division of the county. Its harbour was destroyed by an irruption of the sea. Population of the Cinque Port and parish, 1062.

Old Romney, 2 miles west of the new town, now has only 151 inhabitants.

Sandwich, a municipal and parliamentary borough, and Cinque Port, is situated 12 miles E. from Canterbury, near the east coast, and on the south side of the Stour, at its entrance into Pegwell Bay. It is a very ancient town, and had once a fine harbour, but the sand had begun to fill it up before the reign of Elizabeth, and in the reign of Edward VI. it was almost entirely destroyed. Only vessels of small draught can now get up to Sandwich. The streets are irregular, and the houses antique. There are two ancient churches, both of which have been injured by tasteless modern alterations. Sandwich is 4 miles N. of Deal, with a station on the South-Eastern Railway. It was formerly of importance as the seaport of London, and is nearly inclosed by the remains of fortifications; has a third parish church, a guild-hall, gaol, two hospitals, and several dissenting chapels. At spring tides the Stour at this point is about 11 feet in depth, and 150 feet across. At present the trade of the port is very little, the chief exports being agricultural produce, wool, malt, bark, and ashes. Coal is the chief article imported. Near Sandwich is Richborough, the ancient *Rutupium*, on whose decline this town arose in the sixth century. The municipal borough is governed by four aldermen and twelve councillors. Population of the town and port, 2944. Population of the parliamentary borough, which includes Deal and Walmer, and returns two members, 13,750. The number of registered electors in 1869 was 1849.

Sevenoaks, a market town, is pleasantly situated on the northern slope of the North Downs, near the upper course of the Darent, 24 miles S.E. from London. The town is well built, and contains many good houses. The church is of perpendicular architecture, spacious and elegant; and there is a well-endowed grammar-school. The surrounding district is very fertile. In the neighbourhood is Knole House, the seat of Earl Delawarr, a splendid manorial mansion in the Tudor style. It contains a good picture gallery, and some choice relics of antiquity. The park is of great extent, and includes some beautiful scenery. Knole was anciently the residence of the Sackville family. Population of the parish, 4695.

Sheerness, a seaport town and naval arsenal, is situated on the north-western part of the Isle of Sheppey, on the eastern side of the Medway, at its junction with the Thames, 51½ miles E. from London by the London, Chatham, and Dover Railway. The town consists of four parts; Blue-town, which is inclosed by an outer line of fortifications; Mile-town, which is an outer uninclined suburb; Marine-town;

and Banks-town. The fortress occupies the extreme point of the island, and the principal batteries front the Thames. The dockyard is surrounded by a brick wall, and is sufficiently capacious to receive ships of war of the largest size. It occupies nearly 60 acres; contains a wet dock of $3\frac{1}{2}$ acres, in which ships are fitted, several dry docks, large storehouses, a mast-house, rigging-house, sail-loft, &c., with residences for the port-admiral, commissioner, and other officers. Outside of the yard is Garrison Point, with telegraph and coast-guard stations, and large barracks. Opposite the river and sea is a long wharf, and a break-water has been constructed for the protection of the harbour. The town, latterly much improved, has a pier, bathing establishment, a district church belonging to the Establishment, dissenting chapels, Jews' synagogue, and numerous schools. Corn, seeds, and oysters are exported to London; but the trade lies chiefly in the supply of the government establishments. There is constant communication by steamers and railway with London and Chatham. Sheerness was attacked by the Dutch under De Ruyter in 1667. The mutiny of the *Nore* broke out in this port in 1798. Population of the parish of Minster-in-Sheppey, which includes the village of Minster, as well as Sheerness and its suburbs, 15,964. Sheerness itself contains 12,015 inhabitants within the limits of the ecclesiastical district and the local board of health.

Sittingbourne is 40 miles E. by S. from London, and 10 from Rochester. The town, which is increasing, has both an ancient and modern church, some handsome dissenting chapels, a corn-exchange, and a station on the London, Chatham, and Dover Railway. There is also communication with London by barges. Population of the parish, 4301.

Staplehurst is a small place, with a station on the South-Eastern Railway, $4\frac{1}{2}$ miles N.N.E. of Cranbrook. Population, 1695. A terrible railway accident occurred here in the summer of 1865, by which several persons lost their lives.

Strood is a continuation, on the other side of the Medway, of the city of ROCHESTER, to which it is joined by a bridge, and within the limits of which this town is comprised. Population, 4057. Here are stations of the South-Eastern, and London, Chatham, and Dover railways, the latter crossing the river by a tubular iron bridge.

Sydenham is a chapelry in the parish of Lewisham, with a station on the London and Croydon Railway, 8 miles S.S.E. of London Bridge, having a population of 10,595. On the 10th of June, 1854, the Crystal Palace was opened here by the queen. [CRYSTAL PALACE.] It covers nearly three-quarters of a mile of ground, and the cost of its erection was about 1,000,000*l*. Numerous elegant villas cover the surrounding country.

Tenterden, a market town and municipal borough, is 55 miles S.E. from London. It consists chiefly of one main street along the Romney road, and contains some good houses. The church is of perpendicular architecture, with a lofty tower at the west end. The municipal borough is governed by four aldermen and twelve councillors. Population of the parish, 3656, chiefly agricultural. The town stands on an eminence, environed by hop-grounds, and near it are the Romney Marshes. The population of the municipal borough is 3762.

Tunbridge, or *Tonbridge*, a market town, is on the north bank of the Medway, 27 miles S.E. from London. The town consists chiefly of one street, broad, partially paved, and being on a declivity is remarkably clean. There are five stone bridges over the Medway, which is here divided into five arms, one of which is called the Tun. Near the principal bridge is a wharf, and the Medway is made navigable to Maidstone by means of locks. The church is a large and handsome fabric, in various styles of architecture. The ruins of the castle and the ruins of a priory partly remain. The South-Eastern Railway passes by Tunbridge, which is one of its principal stations, and there is a branch from Tunbridge to Hastings, through Tunbridge Wells. Population of the town proper, 5919. The parish of Tunbridge comprises 15,235 acres (including part of the town of Tunbridge Wells), with 21,004 inhabitants. Tunbridge is a quiet old town, and has been long noted for a manufacture of toys and turned wares, having also some exports of timber. The principal buildings are a new school in the Gothic style; the grammar-school, which is most liberally endowed, having sixteen exhibitions of 100*l*. each at the universities, twelve minor exhibitions, a scholarship and a fellowship at Oxford, and 700*l*. in salaries to masters; the town-hall, union workhouse, market-house, chapels, &c.

Tunbridge Wells, a market town and a place of fashionable resort, is five miles S. from Tunbridge, on the border of Kent and Sussex, part of it being in each county. The chalybeate spring, to which the town owes its origin, is nearly equal in strength to that of Spa, in Germany. When Henrietta, queen of Charles I., visited the Wells, she and her suite remained under tents. After the Restoration the place rapidly increased. The springs are in the centre of the town, and the pump-room and baths, public parade, ball-rooms, libraries, theatre, and market-house, are in a small valley inclosed by sloping hills—Mounts Ephraim, Pleasant, and Sion. The site of Tunbridge Wells was once supposed to resemble that of Jerusalem, which led to the application of these sacred names. There are also a church and elegant chapel, numerous dissenting places of worship, an infirmary, dispensary, and many schools and literary institutions. The population within the limits of the jurisdiction of the local board—including portions of the three parishes of Tunbridge, Speldhurst, and Frant (in Sussex)—is 13,807.

Walmer is a parish on the east coast, 1 mile S.S.W. of Deal, in which municipal borough it is included. Population, 3275. It is also comprised in the parliamentary borough of Sandwich. The village of Upper Walmer adjoins Deal, and separated from it on the S.E. is Lower Walmer, on rising ground near the shore, containing the church, and resorted to for sea-bathing. Facing the sea, opposite the Downs, is Walmer Castle, the official residence of the Lord Warden of the Cinque Ports.

Westerham is 21 miles S.S.E. from London, near the source of the Darent. It is a market town. Population of the parish, 2196, chiefly agricultural. In the church is a monument to General Wolfe, who was born here, and whose victory at Quebec is commemorated by a pillar in this parish. His remains lie at Greenwich.

Whitstable is about 6 miles E. from Canterbury,

with which city it communicates by a railroad. It is the port of Canterbury, being situate at the entrance of the Swale into the estuary of the Thames, opposite the Isle of Sheppey. Population of the parish, 3675; of the town (including part of the parish of Seasalter), 4183; mostly engaged in the oyster fisheries. Whitstable, formerly only an insignificant fishing place, is rapidly rising into importance. The extensive oyster grounds here are dredged by an incorporated company of working fishermen, whose gross returns are sometimes 40,000*l.* per annum. The town is protected by substantial embankments from landfloods and incursions of the sea. It has two churches, one forming an important landmark. This place was the principal scene of the exploits of the religious impostor Thorn, or Sir William Courtenay, as he loved to style himself, who was shot in 1838; and here was first brought into operation the diving apparatus invented by Charles Deane. It has a large coal trade, and stations on the South-Eastern and London, Chatham, and Dover railways.

Woolwich, an arsenal and naval port, is on the south bank of the Thames, 9 miles E. from London, with which it is connected by railway. The population is chiefly dependent on the government establishments. The town, about a mile in length, is on an elevated site, separated from the Thames by the dockyard; it has an old church, a new church, and several chapels; a Scotch church, dissenting chapels, numerous schools, and a theatre. The dockyard, upwards of a mile long, is the most ancient in the kingdom, and has some fine new docks. Ships were first built here in Henry VII.'s reign. From the comparative shallowness of the water, this yard was chiefly employed for the construction of steamers, but it has not been used as a government establishment since 1869. The arsenal is the largest in Great Britain, covering more than 100 acres, and containing nearly 24,000 pieces of ordnance, besides other warlike materials for the army and navy, a royal laboratory, &c. It is the headquarters of the royal horse and foot artillery, for whom, and other corps, there are extensive barracks, with a frontage of over 400 yards; and on a fine parade ground south of the town are a repository for military models and an observatory. Woolwich is also the seat of a royal and military academy for engineering and artillery. Admission to the royal arsenal can only be obtained by an order from the War office, or from one of the heads of the departments. The number of inhabitants within the limits of the parliamentary borough—which, with Deptford and Greenwich, returns two members to the House of Commons—is 40,975.

History and Antiquities.—The name of this county is supposed to be Celtic, and Dr. Guest identifies it with *Caint*, or the 'open country.' No portion of England played a more important part than Kent in the Roman times; it was the scene of Caesar's first attack; and in most of the subsequent invasions it lay, from its proximity to the Continent, in the track of the invaders. There were Roman stations at Reculver, Richborough, Dover, and Hythe; and roads from Canterbury to these places and to London by the road called Watling Street. Richborough Castle, near Sandwich, is the *Rutupie* of the Romans. The walls form a parallelogram, but that on the eastern side has

disappeared, and probably fallen into the Stour. The area within the walls is five acres. A quarter of a mile from the south-west angle of the castle lie the remains of a Roman circular amphitheatre of about seventy yards' diameter. Many portions of the Brito-Roman Watling Street coincide with the present high road from London to Canterbury.

In the Saxon invasion Kent was the scene of certain interesting events. The brothers Hengist and Horsa landed in Pegwell Bay, probably about 446 or 449, though Kemble and Lappenberg impugn the authenticity of this historical incident. Having received a grant of the Isle of Thanet, then insulated by a channel of some width, they received accessions of strength from their countrymen at home, and were soon involved in hostilities with the Britons. Many irruptions of the Jutes followed, and many battles between them and the Britons. In 752 Kent was subject to Mercia, being the first established kingdom of the Saxon Heptarchy. In 823, after the successes of Egbert, it became a subordinate part of the West Saxon empire, commonly forming the appanage of the eldest son, or heir-apparent, of the king of Wessex; and when the heir succeeded to the paramount sovereignty, he usually resigned the Kentish crown to his heir. During the reign of Ethelwulf in Wessex, and of his sons in Kent, the latter kingdom was repeatedly attacked by the Danes, and down to the time of the Norman Conquest this county was seldom free, for any considerable period, from their hostile incursions.

At the great battle of Hastings the men of Kent formed the vanguard of the Anglo-Saxon army. At the outbreak of the war of the Roses in 1451, Richard, duke of York, encamped near Dartford, where he fortified himself. Henry VI. made Blackheath his headquarters. In the civil war of Charles I. and the Parliament, a severe battle was fought at Maidstone in 1648, in which the Parliamentarians, under Fairfax, obtained a complete victory. In 1667 a detachment from the Dutch fleet under De Ruyter sailed up the Medway, and in defiance of the forts on its banks, succeeded in burning many vessels and a considerable quantity of stores.

Of ancient castellated edifices, the most remarkable are the castles of Rochester, Dover, Leeds, Chilham, Tunbridge, and Westerhanger, to which may be added the manorial mansions of Penshurst, Knole, Hever, Allington, and Cobham. Leeds Castle, partly modernized, is surrounded by a broad moat: the entrance is by a stone bridge of two pointed arches, and through a deep gateway in good preservation. Another gateway, which defended the entrance of the bridge, is in ruins. Hever Castle, the seat of the Boleyns, is surrounded by a moat: the entrance gateway is flanked by round towers; the inner buildings form a quadrangle inclosing a court. Chilham Castle was a Norman structure, of which the keep is the only part now remaining. Of Westerhanger the principal relics are the outer walls, with the towers of the N. and E. sides. Penshurst Place is one of those castellated dwellings that immediately succeeded the baronial castles of a more troubled period. The principal buildings form a quadrangle inclosing a spacious court, and comprehending a hall, chapel, and other apartments. Knole is another extensive and magnificent mansion: the

principal buildings form a capacious quadrangle, and are in the castellated style. The greater part is of the fifteenth century, but some portions are yet older.

Of monastic remains, the principal are St. Augustine's Abbey, at Canterbury, Aylesford Priory, St. Radigund's Abbey, near Dover, the abbey of Faversham and Malling, the priories of Tunbridge and Folkestone, and Boxley Abbey, near Maidstone. Besides the cathedrals at Canterbury and Rochester, the most interesting ancient church, perhaps, is that of Barfreston, between Canterbury and Dover.

KENT, HOLY MAID OF. [BARTON, ELIZABETH.]

KENT, WILLIAM, was born in Yorkshire, in 1684, and was apprenticed to a coach-painter. In 1716, while in Italy, he became acquainted with the earl of Burlington, who became his patron, and under whose roof he resided till his death, April 12, 1748. Kent soon discovered greater capacity for architecture than for painting and sculpture; and if it be true that the designs for Holkham, the seat of the earl of Leicester, in Norfolk, emanated principally if not entirely from him, that single edifice alone proves him to have possessed superior talent. In landscape gardening he attained great excellence, and may justly be considered as the father of the English style.

KENTISH FIRE, a term applied to the cheers and vehement applause with which the rabble greeted the no-popery orators at the public meetings held in Kent to prevent the passing of the Roman Catholic Relief Bill, 1828-29.

KENTISH RAG (Geology), a provincial term for one of the beds of the lower greensand. It occurs at Hythe and near Maidstone in Kent, is of a gray appearance, and consists of chert or arenaceous limestone, sometimes about 70 feet thick. The stone is highly fossiliferous, and is much used as a building material where durability is required.

KENTUCKY, one of the United States of North America, is situated between $36^{\circ} 20'$ and 39° N. lat., and between 82° and $89^{\circ} 20'$ W. long. It is bounded N. by Ohio, Indiana, and Illinois, from which it is separated by the river Ohio; E. by Virginia; S. by Tennessee; and W. by the Mississippi, which separates it from Missouri. Its greatest length is about 400 miles, and its greatest breadth about 170 miles. The area is 37,680 square miles. The population in 1860 was 1,155,684, of whom 10,684 were free coloured, and 225,483 slaves; it is now estimated at 1,320,000, all free.

Surface.—The south-eastern and eastern parts of Kentucky are covered with mountain ridges and high hills. None of the summits of these mountains appear to attain the height of 3000 feet above the sea. The highest range is that of the Cumberland mountains, in the S.E. To the west of the hilly region lies an upland region, which extends to about 86° W. long. The surface is undulating, but it is intersected by numerous river beds, which are from 100 to 300 feet below the surface of the plain. The soil is of the first quality. It rests extensively on a formation of limestone, apertures in which greatly diminish the rivers in dry seasons. The most western portion of the state is divided between the Barrens and a country which is partially hilly. The Barrens are in the S.W., between Green River and Cumberland River.

In their natural state they are generally destitute of trees, and resemble the prairies or savannahs which occur north of the Ohio. Though this tract does not deserve the name which it bears, it is of inferior fertility when compared with the upland region.

Hydrography.—Along the northern boundary runs the Ohio, which receives all the larger rivers that drain Kentucky. The most eastern is the Sandy River, which separates this state from a part of Virginia. It flows in a northern direction, and has a course of about 250 miles. The branches of the river Kentucky rise in the eastern part of the state, and form by their union a considerable stream, which first flows N.W., then W., and at last nearly due N. Its course is about 280 miles, and though very rapid, has been made navigable for steamers throughout 260 miles. Green River rises in the western districts of the upland region, and flows W., N.W., and N. to the Ohio. Its course is 280 miles. Cumberland River rises in the eastern part of the state, and flows W. and S. into Tennessee, where it makes a large bend, then re-enters Kentucky, and flows N.W. to the Ohio. It is above 500 miles long. Licking River and Salt River are also of considerable size. The river Tennessee flows only about 70 miles through Kentucky.

Climate, Products, &c.—The mean annual temperature of Kentucky seems to be about 55° , or 5° higher than that of London, but the differences in the extremes of heat and cold are much greater. The climate is considered healthy, except near the Mississippi; the winters are generally mild and humid. Wheat, tobacco, and hemp are the staple products; but Indian corn, rye, oats, barley, buckwheat, flax, and potatoes are also cultivated. Horses, cattle, bacon, beef, pork, and dairy produce are largely exported. The breed of horses is greatly valued throughout the Union. The forests support millions of swine, and there is abundant pasturage for almost endless herds of cattle. Iron, lead, marble, coal, salt, and lime are obtained. The greater part of the products of the state pass down the Ohio and Mississippi to New Orleans.

At the last census there were in this state 3450 manufacturing establishments, employing 21,258 persons, principally saw and flour mills, tanneries, distilleries, breweries; and tobacco, cordage, leather, woollen, and clothing factories. There are twenty colleges, 4507 public schools, 223 academies, 196 libraries, and 2179 churches and chapels.

There are 590 miles of railway in the state, and 766 miles of water navigation. The rapids of the Ohio are avoided by a canal.

Divisions, Chief Towns, &c.—Kentucky is divided into 110 counties. Frankfort, the capital, is situated on the banks of the Kentucky, 60 miles above its junction with the Ohio, in $38^{\circ} 14'$ N. lat., $84^{\circ} 40'$ W. long. Steamboats of 300 tons burthen come up to the town. The State-house is a handsome edifice of marble quarried in the vicinity, with a portico supported by six Ionic columns. Population, 8702. Lexington is situated on a branch of the Elkhorn River, 24 miles E.S.E. from Frankfort. It is the oldest town in the state, and was formerly the capital. It is well built, and contains several places of public worship, a state lunatic asylum, the halls of the Transylvania University, and 9521 inhabitants.

Louisville is the largest town in the state, and is situated on the south bank of the Ohio, in $38^{\circ} 8' N.$ lat., $85^{\circ} 26' W.$ long., about 50 miles *W.* by *N.* from Frankfort. It has increased with extraordinary rapidity. In 1800 the population was 600; in 1860 it was 68,033. The Ohio is more than a mile wide opposite the town, and there is a very large traffic on it by steamboats and river craft. *Maysville*, on the south bank of the Ohio, 81 miles *N.E.* from Frankfort, has a population of 8000. It is the *entrepôt* for the north-west section of the state, and a great hemp mart. The other towns are *Covington*, *Newport*, *Danville*, and *Paducah*.

History.—The first Europeans arrived here in 1767, and the first settlement was formed in 1775. It was originally a part of Virginia, but the population having increased rapidly, Virginia consented to a separation. The first constitution was formed in 1790, and its present constitution in 1799. The legislative body consists of thirty-eight senators, who, with the governor of the state, are elected for four years, and one hundred representatives, who are elected for one year. It sends two senators and ten representatives to Congress.

In the American civil war, 1861–65, Kentucky was the scene of many conflicts, and its inhabitants were divided as to which cause they espoused. The name of the state is of Indian origin, and signifies ‘the dark and bloody ground,’ in consequence of the sanguinary contests which took place on its soil in the displacement of the old and warlike Indian tribes.

KENYON, LLOYD, LORD, the second son of Lloyd Kenyon, was born at Greddington in Flintshire in 1733. His education was, owing to the straitened means of his father, very defective. At the age of fourteen he was articled to Mr. Tomlinson, an attorney at Nantwich in Cheshire, with whom he remained for seven years, during which time his diligence and shrewdness procured him his master’s favour. In 1754 he took chambers in the Temple, London, and became a member of Lincoln’s Inn. While a student, he devoted himself with great earnestness to the law. Mr. Kenyon was called to the bar in Hilary Term, 1761, but many years elapsed before he obtained business. His legal attainments appear to have been not only considerable but exact, and he acquired by degrees the reputation of being a sound lawyer. In 1773 he married Mary, third daughter of George Kenyon, of Peele in Lancashire. He now began to rise into notice. In 1779 he was retained as one of the counsel for Lord Pigot in the state prosecution of Shelton and others for depriving him of his government; and afterwards in the same year as leading counsel for Lord George Gordon. In April, 1782, on the accession of the Fox and Rockingham administration, he was appointed attorney-general, but went out with the Shelburne administration in the spring of the year following. In December he was reappointed attorney-general. To the character of an orator he had no pretension, being a man of little imagination, and expressing himself not only without elegance, but occasionally with vulgarity. He was no scholar, and yet he would insert Latin words and phrases without point or taste in his discourse.

In 1784 he was raised to the office of master of the rolls, and created a baronet; and in May, 1788,

he was gazetted Lord Kenyon, Baron Greddington, and succeeded Lord Mansfield as chief-justice of the King’s Bench. His appointment to this important situation was at the time unpopular with the profession generally. The opinion of his brother judges he received not only with neglect, but almost with contempt; and to the barristers he was equally ungracious.

Lord Kenyon struck sternly at those offenders who are the peculiar objects of popular dislike. But while doing so he frequently gave too easy credit to accusation, and allowed himself to punish often with a severity not sufficiently tempered. The vices of the wealthy met with no favour from him. He exerted himself to the utmost to put an end to duelling, and declared that whoever was convicted of having murdered his fellow-creature in a duel should suffer the course of the law; and he on more than one occasion directed the jury to that conclusion, but without success. Flagitious libels against individuals he punished with merited severity. But of all writings, it was against those partaking of the character of political libels that he directed, with the most unflinching perseverance, all the terrors of the law. He died, 2nd April, 1802, after having accumulated a fortune of 300,000*l.* Lord Kenyon was temperate, frugal even to parsimony, and an early riser. For his happiness he looked to his home. He entirely disregarded outward appearance: his dress was shabby, his equipage mean, and he wholly neglected the exercise of hospitality.

KEPLER, JOHN, a celebrated astronomer, was born at Weil, a small town of Württemberg, on the 21st December, 1571. His parents, Henry Kepler and Catherine Guldenmann, though of noble descent were in indigent circumstances. Their son being a seven months’ child was very sickly during his early life; and when he was only five years of age he was placed under the charge of his grandfather at Leonberg, near Stuttgart, in consequence of his father and mother having joined the army in the Netherlands. In 1586 he was admitted into the school at the monastery of Maulbronn, where he was educated at the expense of the duke of Württemberg. At the University of Tübingen he took his degree of master in 1591, holding the second place in the examination. It does not appear how Kepler was occupied, and how he supported himself for two or three years after he graduated at Tübingen. While he was attending the lectures of the celebrated Moestlin, who had distinguished himself by an oration in favour of Copernicus, Kepler became a convert to the opinions of his master, and wrote an essay on the primary motion (the apparent daily motion of the heavenly bodies), in order to prove that it was produced by the diurnal rotation of the earth upon its axis. He succeeded George Stadt as professor of astronomy at Grätz in 1593 or 1594. In this situation he continued to lecture on astronomy, of which he had very little knowledge; but in 1595, ‘when he had some intermission of his lectures, he brooded with the whole energy of his mind on the subject, inquiring pertinaciously why the number, the size, and the motion of the planetary orbits were not other than they are.’ His ‘*Prodromus Dissertationum Cosmographicorum*’ appeared at Tübingen in 1596, and was commended by Galileo and Tycho; but the latter

judiciously advised him 'to obtain a solid foundation for his views from actual observations, and then by ascending from these to strive to reach the causes of things.' In 1592 Kepler paid his addresses to Barbara Muller von Muleckh, a young lady of nineteen, but the marriage was not agreeable to her parents; and when it was again proposed in 1596, they refused their consent till Kepler produced a proof of his nobility. In 1597 the marriage took place, the lady having been a widow for the second time. Kepler's salary being very small, and his wife's fortune less than was expected, he was involved in pecuniary difficulties and disputes with her relations. In 1600 he paid a visit to Tycho Brahe, then living at Benach, near Prague, an exile from his country; and during his residence there he had agreed to become assistant to Tycho for two years, with a salary of one hundred florins, provided he could retain the salary of his chair at Grätz. In 1601 Kepler was introduced by Tycho to the Emperor Rodolph, who conferred upon him the title of imperial mathematician on the condition of his assisting Tycho; and the two astronomers agreed to combine their talents in the computation of new astronomical tables, to be called the Rudolphine Tables, from the generosity of the emperor who had promised to defray the expense of them. The death of Tycho in October, 1601, put a stop to this important arrangement; but Kepler was appointed principal mathematician to the emperor, with an ample salary to be paid in March, 1601. This promise, however, was not fulfilled; and from the non-payment of his salary he was obliged to postpone the Rudolphine Tables, to devote his time to the completion of other works, and even to cast nativities; though it appears from other parts of his writings that he held astrology in contempt. In 1602 he published at Prague his work, '*De Fundamentis Astrologiæ*;' and in 1604, at Frankfort, his '*Paralipomena ad Vitellionem*'—a work containing much new and interesting information on dioptrics and vision. In 1605 he published his '*Epistola de Solis Deliquio*,' and in 1606 his treatise '*De Stella nova*,' the new star which appeared in 1604 in Serpentarius, and which, like that of 1572, rivalled even Venus in lustre. In 1609 Kepler published at Prague his greatest work, entitled '*Astronomia Nova, seu physica cælestis tradita commentariis de motibus stellæ Martis*.' In 1601, when residing with Tycho, he had begun the researches contained in this volume. He had failed in every attempt to represent the observations on Mars by a uniform motion in a circular orbit, and by the aid of the cycles and epicycles, as employed by Copernicus in explaining the planetary inequalities; and having, after many abortive speculations, conjectured that the orbit of the planet might be of an oval form, he was led to the conclusion that Mars moved in an elliptical orbit, with the sun placed in one of its foci. His knowledge of the conic sections enabled him to determine the major and minor axis of the ellipse; and by comparing the times in which the planet describes any portion of its orbit with the time of a whole revolution, or the time of describing any other portion of it, he found that these numbers were always to one another as the areas contained by lines drawn from the sun's centre, or focus of the ellipse, to the extremities of the respective portions or arches of the orbit; or,

more precisely, that the radius vector or line joining the sun's centre and Mars describes equal areas in equal times. Kepler's third law, that the squares of the periodic times are proportional to the cubes of the mean distances of the planets from the sun, was not discovered till nine years after he had discovered the other two laws. It was published in 1619 at Linz, in his '*Harmonia Mundi*,' which was dedicated to James I. of England. In 1611 he published at Frankfort his '*Dioptrica*,' with an appendix on the use of optics in philosophy. In this excellent work, which was reprinted in London in 1653, he explained the principle of the telescope, and described the astronomical telescope with two convex lenses, which was his own invention, and which was greatly superior to that of Galileo, from its admitting in front of the eye-glass micrometer wires for measuring distances in the heavens. He proved that spherical surfaces cannot converge rays to a single focus; and he conjectured what Descartes afterwards proved, that this property might be possessed by surfaces having the figures of some of the conic sections. Kepler's wife was seized in 1610 with fever, epilepsy, and phrenitis, and three of his children were attacked with the small-pox. His favourite son died of the complaint; and while Kepler was in the midst of poverty and domestic affliction, Prague was oppressed with Austrian troops, who had introduced the plague into the city. Disappointed in obtaining the arrears of his salary, Kepler went to Linz in the hope of being appointed to the mathematical chair. The Emperor Mathias permitted Kepler to accept the professorship at Linz, and continued him in the office of imperial mathematician. Soon after this his wife died. He had now a son and a daughter, both of tender age, who required a mother's care; and he married a girl of humble station, whose person, manners, and excellent education he considered better than a good dowry. The marriage seems to have taken place in 1614, as he mentions it in his book entitled '*Nova Stereometria*,' which appeared at Linz in 1615. In the year 1617 Kepler published at Linz his '*Ephemerides*' for 1617–20, the Ephemeris for 1620 having been dedicated to Baron Napier of Merchiston; and in 1624 he published his '*Chilias Logarithmorum*,' an imperfect table of logarithms. In 1618 Kepler published at Linz the three first books of his '*Epitome Astronomiæ Copernicanæ*.' The fourth book was published at the same place in 1622; and in the same year the fifth, sixth, and seventh books appeared at Frankfort. This work, which contains a summary of his astronomical discoveries, was prohibited both at Rome and Florence, to the great annoyance of its author.

When Ferdinand succeeded to the imperial throne, he ordered the arrears of Kepler's salary to be paid, and supplied the means of publishing the Rudolphine Tables, which appeared at Ulm in one volume folio in 1628. Honours and appointments were now showered down upon the astronomer. The grand-duke of Tuscany sent him a gold chain in approbation of his services to science; and the duke of Friedland induced him, by the munificence of his offers, to settle at Sagan in Silesia in 1629. By the duke's influence he was appointed to a professorship in the University of Rostock. During his residence

at this place he published his last work, entitled 'Terrentii epistolum cum commentationculâ,' which appeared at Sagan in 1630.

The arrears of his salary had again been allowed to accumulate, and now amounted to eight thousand crowns. In the hope of obtaining it he went to Ratisbon; but having failed in his mission, the fatigue of his journey, combined with mental anxiety, threw him into a fever, accompanied with an imposthume in his brain, which carried him off on the 5th of November, 1630, in the sixtieth year of his age, leaving behind him a wife, three daughters, and four sons, all of whom died young excepting Louis, who died a physician at Königsberg in 1663. The remains of Kepler were interred in St. Peter's churchyard at Ratisbon. An admirable life of him will be found in the 'Library of Useful Knowledge,' by the late Mr. Drinkwater Bethune, and one of a more popular character in Sir David Brewster's 'Martyrs of Science.'

KEPLER'S LAWS. We have referred to these in the preceding article, but for the convenience of the reader, shall here recapitulate them. They form the foundation of the whole theory of gravitation and physical astronomy: 1. That the planets describe elliptical orbits, each of which has one of its foci in the same point, namely, the sun's centre. 2. That the area described by the revolution of the line drawn from the planet to the sun (its radius vector) is proportional to the time occupied in its description. And 3. That the squares of the times of the revolutions of the planets are proportional to the cubes of their mean distances from the sun. This latter was discovered by Kepler in 1618.

KEPPEL, AUGUSTUS, VISCOUNT, a gallant and able English admiral, was the second son of the earl of Albemarle, and born in 1725. He accompanied Lord Anson in his celebrated circumnavigation of the world. Family interest and professional ability procured him rapid promotion, and in 1758 he commanded the expedition which captured the island of Goree. Three years later he assisted at the brilliant attack upon Belleisle, and largely contributed to its success. In 1778 Admiral Keppel was placed in command of the Channel Fleet, and on the 27th of July fell in off Ushant with a French armada of superior force, under Count D'Orvilliers. An indecisive action immediately took place, and during the night the French contrived to escape into Brest. So dubious a result excited general dissatisfaction, and Sir Hugh Palliser, Keppel's second in command, charged him with misconduct and neglect of duty. A court-martial, however, after thirty-two days' sitting, unanimously pronounced the accusation malicious and unfounded; a decision which was approved and confirmed by public opinion. Keppel, however, was deeply hurt by the treatment he had received from the government, and resigned his command. In 1782 he was raised to the peerage, and made first lord of the admiralty, an office which he filled with advantage to the service. He died, unmarried, in 1786. It may be mentioned as a proof of his popularity that the 'Keppel's Head' is still a favourite sign with many of our town hostleries and wayside inns. Burke pronounced him 'one of the greatest and best men of his age,' and he was no less distinguished for honour and generosity than for professional ability.

KERASINE (Gr. *keras*, 'a horn'), a mineral of a light yellowish-gray colour, and found in a crystallized rectangular four-sided prism. Its specific gravity is 6; and its constituents are oxide of lead, muriatic acid, and carbonic acid.

KERGUELEN'S LAND CABBAGE, the name given by Captain Cook to a remarkable plant belonging to the natural order *Cruciferae*, or cruciferous family. It is the *Pringlea antiscorbutica* of botanists. It has a great resemblance to the common cabbage, but is much larger, and has a strong perennial root stock. It is confined to Kerguelen's Land Island, and is much prized by seamen as an antiscorbutic.

KERMES (Arabic, little worm'), an insect found in the south of Europe and many districts of Asia. It is the *Coccus ilicis* of Linnæus, and was originally esteemed for affording a red and scarlet dye, to which the ancient tapestries of Flanders owe their brilliant beauty.

KERMES MINERAL, a peculiar sulphuret of antimony, formerly much used in medicine. It is obtained in the form of a brownish red powder, and is a sudorific in small doses, and an emetic in large ones.

KE'RODON, a genus of rodent Quadrupeds peculiar to South America, remarkable for the form of the molars, which all resemble each other, and are composed of two equal parts, each of a triangular or rather heart-form shape, united on the external side of the tooth, and separated on its internal side. These triangles or 'hearts' are each surrounded by their enamel, and filled with bony matter, and their separation produces an angular notch partly filled with cortical substance.

When M. F. Cuvier wrote, only one species, *Kerodon Moco*, was known, and this was discovered by Prince Maximilian of Neuwied, and noticed by him under the name of *Cavia rupestris*. The fur is ash-gray mixed with reddish yellow, and blackish above and whitish below. Size smaller than that of the guinea-pig. This species was found in the rocky places of the interior of Brazil, near Rio San Francisco.

KERRY, a maritime county of the province of Munster, in Ireland, is bounded E. by Limerick and Cork, S. by Cork and the estuary of the Kenmare, W. by the Atlantic Ocean, and N. by the estuary of the Shannon. It lies between 51° 41' and 52° 33' N. lat., and between 9° 7' and 10° 30' W. long. The greatest length from N. to S. is 54 miles, and from E. to W. 58 miles. The area is 1,186,126 acres, of which 414,614 are arable, 11,169 in plantations, 807 in towns, 32,761 under water, and 726,775 uncultivated. In 1851 the inhabitants numbered 238,239; but in 1861 they had decreased to 201,800, of whom 195,159 were Roman Catholics, and 6200 belonged to the Established Church. A large proportion of the population speak only the Irish language.

Surface.—Kerry forms the south-western extremity of Ireland. The coast, which is bordered by the Atlantic, is deeply indented by the estuary of the Kenmare River, the Bay of Dingle, and the Bay of Tralee. Many islands fringe the coast, the principal of which are the Blasquet group, Valentia, and the pinnacled Skelligs. The peninsulas between the bays form the western extremities of that mountain system, which, commencing in Waterford,

extends with little interruption across the entire south of Ireland. Beyond the range of mountains which crosses the centre of the county extends a rich and generally level country, which rises into rough land in only one direction, towards Kerry Head on the Shannon. The peninsula between the Kenmare estuary and Dingle Bay is cut by minor ranges of mountains into three principal valleys. It contains the rivers Roughty, Fartagh, Inny, Sneem, Little Blackwater, and others of smaller size. The mountain-knot called Macgillicuddy's Reeks, which extends about 10 miles in a direction S.W. to N.E., subsiding into the plain at the head of Dingle Bay, contains Carran Tual, 3410 feet above the sea-level, and the highest summit in Ireland.

Hydrography.—In a deep hollow between the south-eastern flank of this range and the group of Mangerton lies the Upper Lake of Killarney. This beautiful sheet of water, which is three miles in length by three-quarters of a mile in breadth, is inclosed on all sides by mountains from 2000 to 3000 feet in height, except at one point, towards its eastern extremity, where it discharges its waters by a tortuous course of three miles between the southern declivities of Glenna and the precipitous side of Turk Mountain. A channel leading from the Upper to the Lower Lake passes through a thickly wooded defile. About midway between the extremities of the channel a remarkable detached rock, called the Eagle's Nest, rises over the left bank to a height of 1100 feet. Emerging from this defile, the river expands into the Lower Lake of Killarney, five miles in length by three in breadth, skirting the eastern declivities of the mountain range of Tomies and Glenna. These mountains, descending abruptly to the western verge of the lake, are still the resort of red deer, and are clothed with the richest natural woods of oak, ash, pine, alder, and beech, intermixed with hazel, whitethorn, yew, holly, and arbutus, from a height of several hundred feet down to the water's edge, through a continuous distance of six miles. O'Sullivan's River, descending by a thickly wooded ravine on this side, forms a cascade 70 feet high, close to the shore of the lake. On the opposite side the low alluvial banks are everywhere broken into promontories and islands, on which the arbutus (commonly considered an exotic) grows in unusual luxuriance. The town of Killarney is situated on the plain about a mile from the eastern shore, and half a mile south of Killarney runs the Flesk, the chief feeder of the lake. Several other cascades and richly wooded promontories ornament the borders of the lake. The waters of the Lakes of Killarney discharge themselves at the northern extremity of the Lower Lake through the river Laune, which runs by a course of twelve miles into the head of Dingle Bay.

Mountain ridges, bounding valleys of greater or less width, form the distinguishing features over the greater part of Kerry. The most extensive tract of open country is near the Limerick boundary; it is drained by the rivers Feale, Gale, and Brick, which, uniting within five miles of the sea, receive the common name of the Cashen River; the united length of their courses is about 50 miles. A rough district extends from the mouth of the Cashen to Beal Point, where the estuary of the Shannon first assumes the

character of a river. The whole coast line, from the Shannon to the Kenmare, contains many good harbours, of which that of Valentia is the most westerly in the British Islands. The termini of the Atlantic submarine telegraphs are at this place.

Climate.—The climate is very moist, from the vicinity of the Atlantic, and the south-western district is much exposed to storms. In the inland parts, however, especially in the neighbourhood of Killarney, the air is mild and genial, and vegetation extremely luxuriant.

Geology.—The geological structure of the chief mountain-chains is similar to that of the mountains in the west of Cork, the main component being a red or gray conglomerate and sandstone supporting flanks of silicious flags, and overlaid in the low districts by fields of floetz limestone. The mountains of Glanbehy abound with iron ore, which was formerly smelted in considerable quantities at Blackstones, in works erected by Sir William Petty; but the supply of timber having failed, these works were given up about the year 1750. Iron has been worked in other parts, and copper and lead also exist in the county. The slate quarry in Valentia produces flags and slates to a large amount. The flagging, which is of a very superior description, is transported to London.

The soil of the south-western district, where not encumbered with bogs, is an adhesive loam, fit for the reception of corn crops. The soil of the middle district is a rich loam, producing excellent crops of grain, and when laid down in pasture, yields butter of prime quality. The northern district has a stiffer soil, more retentive of wet, and inclined to run to rushes. Cider is made in considerable quantity. The native breed of cattle is very small, but well formed, good milkers, and easily fattened. A breed of small ponies is peculiar to Kerry; they are too light for farming purposes, but answer for the saddle very well. Numerous goats and Irish cattle are pastured in the mountains, and a larger English cross-breed in the vales. The chief crops are potatoes, wheat, oats, and barley, the former of which is alone consumed by the producers, who are in general poor. The fisheries employ about 3000 men and boys.

The chief trade of the county consists in exports of agricultural produce, chiefly oats and butter. The manufacture of linen is carried on, but the quantity is insignificant. There is also a general manufacture of coarse woollens throughout the county for home consumption. Fishing is pursued extensively on the coasts.

Divisions and Chief Towns.—Kerry is divided into eight baronies and eighty-seven parishes. It is in the diocese of Limerick, Ardferit, and Aghadoe, and in the Munster Circuit. The assizes are held at Tralee. The county returns two members to Parliament, and one is returned for the borough of Tralee. The number of voters on the county register for 1869 was 5506. The following are the principal towns, with the population of each in 1861:—*Ardferit*, though now a small village, was formerly a place of importance, and the see of a bishop. A part of the ancient cathedral has been fitted up as the parish church. The village is about 6 miles N.W. from Tralee; population, 367; of the parish, 3234. *Cahiriveen*, a village situated on the southern shore of the small sea-bay called Valentia River, has a little quay and

harbour, which were constructed in 1822; population, 1802. *Castle-Island*, about 11 miles E. from Tralee, is a small but improving town. It contains a church and a Roman Catholic chapel; population, 1702. *Dingle* is on the north shore of Dingle Bay, at the bottom of a capacious and well-sheltered harbour. The town is of considerable size, situated on the slopes of the mountains which rise directly from the shores, but has a wretched appearance. It was formerly a borough, but has been disfranchised; it is still a seaport and market town. *Dingle Bay* is much exposed to the swell of the Atlantic, but the harbour is safe; population, 2260. *Kenmare*, situated at the head of Kenmare Bay, consists of one large street of neat and well-built houses. It is a market town, lying in an isolated district, has a suspension bridge across the estuary of the Roughy, and a convenient harbour pier approached by vessels of large burden. It is an extensive parish of over 22,000 acres, the total population being 3848; within the limits of the town proper only 1200. *Killarney* is situated a mile and a half from the Lower Lake of Killarney. The town consists mainly of two good streets, from which branch several poor lanes and alleys. In summer, from the influx of visitors to the lakes, the town presents an animated appearance, but in winter is very dull. Here is a venerable old parish church, a Roman Catholic cathedral for the diocese of Kerry, a nunnery with female school attached, a court-house, market-house, and assembly-room; union workhouse, hospital, and many fine hotels and reading-rooms for tourists. Killarney is 46 miles W.N.W. of Cork, and the terminus of the Cork and Killarney Junction Railway. The population of the parish, which includes a part of the lake scenery (being altogether 34,789 acres in extent), is 9570; of the town only 5204. The new cathedral (Roman Catholic) from designs by Pugin, at the west end of the town, is an imposing structure. There is also a magnificent hotel, erected by the Railway Company. *Listowel* is situated on the north bank of the Feale, about 17 miles N.N.E. from Tralee; it is an improving town, and a place of considerable thoroughfare. A new bridge has been made across the Feale; population 2273. *Tarbert* is situated on an inlet of the estuary of the Shannon, called Tarbert Bay, which affords good anchorage; population, 857. *Tralee*, the chief town and port of the county, where the assizes are held, is situated on a flat tract of land which extends along the shores at the head of Tralee Bay. It is about a mile from the sea, but is connected with it by a ship canal. Tralee is one of the most thriving towns of the south of Ireland. Its exports, imports, and general trade have much increased of late years. It is well built and contains a handsome court-house, a county prison adjoining, a church, two large Roman Catholic chapels, meeting-houses for Presbyterians, Independents, and Methodists, a county infirmary, fever-hospital, and infantry-barracks. It has also two nunneries, a county court-house, lunatic asylum, and custom-house. The port has a good trade in grain and flour. Vessels of 300 tons can discharge their cargoes by means of the ship canal mentioned above. The number of entries in 1867 was 204 (52,255 tons), and the clearances 52 (6802 tons). The customs revenue in 1868 amounted to 13,376*l*. In the vicinity is a

spa, resorted to by invalids. *Tralee* is a parliamentary borough, and had 263 electors in 1869. The corporation is now extinct, and its property vested in the lighting and cleansing commissioners; population, 10,191. *Valentia*, an island and parish separated from the mainland by a strait $1\frac{1}{2}$ miles in breadth, is the most westerly point in Ireland, and has become widely known as the place where the homeward-bound American mail packets first touch, and also as the *termini* of the Atlantic telegraphs; population, 2920.

History.—Kerry originally formed part of the kingdom of Desmond, or South Munster, of which the Mac Carthies were sovereigns. About 1177, part of the county came into the hands of Maurice Raymond, from whom the Fitzmaurices, lords of Kerry, draw their pedigree, and the barony of Clanmaurice takes its name. It was made a shire by King John in 1210. Soon afterwards the Fitzgeralds established themselves in the south of the county, and, as earls of Desmond, exercised powerful influence until the time of Elizabeth, when their authority was put an end to, and their estates confiscated. From 1641 till 1691 there was almost a constant series of insurrections and confiscations.

Kerry contains several monuments of a very remote antiquity, of which the most remarkable are the Cyclopean stone fortresses of Cahirconree, Staigue, and Cahir Donnell; and the sepulchral stones with Celtic inscriptions in the neighbourhood of Dingle. There is a round tower at Rattoo, one in an island in Loch Currane, and part of another at Aghadoe. There are also the remains of thirteen religious houses and thirty feudal castles.

KERSEYMERE. [WOOLLEN AND WORSTED MANUFACTURES.]

KERTCH, a seaport town of Russia, situated on the south-east of the Crimea, about eight miles west of Yenikale, and celebrated as the place against which an Anglo-French expedition was sent during the siege of Sebastopol in 1854–55. The squadron sailed on the 24th of May, 1855. It was garrisoned by the Russians; but on the approach of the enemy they blew up the magazines, destroyed the stores, and vacated the town. After this the expedition captured Yenikale, and entered the Sea of Azoff, when Arabat, Genitch, and other places were attacked, and immense supplies of stores, as well as numerous vessels laden with grain, were destroyed. Kertch was once the residence of Mithridates, and is the site of the ancient Panticapeum, the seat of the Bosporean kings. Before the Russian war it was the most important port of the Crimea, and its trade is still considerable. The exports in 1866 were valued at 70,890*l*., consisting principally of corn, salt, petroleum, and hides. The imports amounted to 12,363*l*. More than one-half of the foreign commerce is with Great Britain. The population in 1867 was 19,682.

KESTREL (*Falco tinnunculus* of Linné), the name of a well-known bird of prey belonging to the family *Falconidae*. It is also named the *Windhover* from the manner of its flight. In the male the head, hind-neck, and tail are a dull grayish blue colour. The tail is marked by a broad subterminal black bar. The wings, when closed, are about two inches shorter than the tail. The feathers of this

back and the wing-coverts are a pale red with triangular black spots. The feathers of the breast and belly are yellowish red, with longitudinal linear and round spots. In the female all the upper parts are light red, with transverse spots of dark brown. The lower parts are paler, with oblong dark blotches. The kestrel is a harmless bird. Its chief food is field mice and large beetles. The female lays from three to five eggs, which are roundish, pale orange-red, irregularly patched. The young when they leave the egg are of a dirty white colour, which in a day or two becomes a bright white.

KESWICK. [CUMBERLAND.]

KETCHUP, a sauce made principally of mushrooms, but also of walnuts and tomatoes.

KETTERING. [NORTHAMPTONSHIRE.]

KETTLEDRAW, an instrument used principally by cavalry and artillery bands, its shape rendering it more convenient than the ordinary cylindrical drum for use on horseback. It is made by stretching vellum over the circular edge of a hemispherical vessel of brass or copper.

KEUPER, in Geology, the German term for the upper portion of the new red sandstone formation, one of the members of the Triassic system of rocks. It takes its name keuper, or copper, from the variegated copper-bearing marls, sandstones, &c., of which it is composed. It is from 700 to 100 feet thick. In this country it is represented by the saliferous and gypseous shales and sandstones of Cheshire, and contains rock-salt and gypsum.

KEW. [SURREY.]

KEY, in Music, is the particular diatonic scale, whether major or minor, in which a composition begins and ends, and which more or less prevails in a given piece of music.

The diatonic scale may commence on any note, and that chosen, called the *Key Note*, governs the progression of the other notes. [SCALE.] If a composition begins and ends in a scale in which neither sharps nor flats are used, it is in the key of c, the distinctive term *natural* being understood. When three flats are placed at the clef, and the last and lowest note in the piece is $\epsilon \flat$, the key is $\epsilon \flat$; and so in other cases.

As any note in the diatonic and chromatic scales may be taken as a key note, it follows that there are twelve keys in the major mode and twelve in the minor; for each scale may have either a major or a minor 3rd. Hence arise twenty-four keys. But as three major and three minor keys have two designations each (as for example, $\alpha \flat$ and $\epsilon \sharp$, which are merely two different names for the same key or note), there are in name thirty different keys, and as many signatures are in actual use.

KEY or KI ISLANDS are a group of considerable extent in the Indian Archipelago, situated between $5^{\circ} 20'$ and $6^{\circ} 30'$ S. lat., and between $132^{\circ} 30'$ and $138^{\circ} 40'$ E. long. Three islands are rather large, and called Great Key, Little Key, and Key Watela. The number of the smaller ones is not known, as they are rarely visited by Europeans. The population is from 8000 to 10,000, many of whom are Mohammedans. The Great Key is about 45 miles in length. The three larger islands rise to a moderate elevation above the sea, and all the heights are overgrown with forest trees, which constitute one of

the principal sources of wealth to the inhabitants, who are engaged in shipbuilding to a considerable extent.

KHAIBAR, a town of Arabia, 100 miles N.N.E. of Medina, is the capital of an independent Jewish territory. It was captured in 628 by Mohammed, who here received from a Jewess the poisoned egg which ultimately cost him his life.

KHAMSIN, the name of a hot south wind or blast, which begins to blow in Egypt soon after the vernal equinox. It continues at intervals for a period of about fifty days, as the term implies, and is somewhat similar in its destructive effects to the simoom, or sirocco, so prevalent in the desert regions of the East.

KHAN, a word of Mongol or Turkish extraction, said to mean 'great and powerful lord,' was employed by the nations of central Asia to express the full extent of royal power. It was assumed by Gengis when he became supreme ruler of the Mongols and Tartars, and was adopted by all his successors. The earlier monarchs of the Ottoman empire were also distinguished by this title. The word is used in Persia in a more restricted sense, being applied to the governors of provinces.

KHARKOV. [SLOBODE-UKRAINE.]

KHARTOUM. [SENNAR.]

KHAYA, a genus of plants of the natural family of *Cedrelaceae*, which is often made a tribe of the *Meliaceae*. Khaya contains only a single species, *K. Senegalensis*. It forms one of the largest and handsomest of the trees which are found along the banks of the Gambia and in the valleys near Cape Verde. It is valuable for its wood, and medicinally for its bark.

KHERSON, or CHERSON, a government of European Russia, lying between $46^{\circ} 12'$ and $49^{\circ} 4'$ N. lat., $29^{\circ} 10'$ and $34^{\circ} 5'$ E. long., is bounded N. by Podolia, Kieff, and Pultawa, E. by Ekaterinoslaf, S. by Taurida and the Black Sea, and W. by Bessarabia. Its area is 27,713 square miles, and its population 1,027,459. Its length from E. to W. is 240 miles, and its average breadth from N. to S. is about 140. The province, which consists of an immense plain, lies between the Dnieper and the Dniester, which respectively bound it on the east and west. The central parts are drained by the Bog [BOG], the Ingul, the Inguletz (a feeder of the Dnieper), and by several smaller streams. The north of the country is diversified by some hills, which are covered with forests. The rest is a treeless steppe overgrown with tall grass, which the great heat of summer withers; vegetation does not revive till the autumn. In the interior the soil is a gray clay mixed with sand, which produces rich pasture. Here and there are heaths, and in the lower parts swamps: on the coast there is a red ferruginous earth, which produces little besides saline plants. There is a great scarcity of spring water in the steppes. The climate is very variable; in summer the heat is from 85° to 90° of Fahr. A dark yellow sky, a wind which raises the dust in clouds, and an immense torrent of rain, are the usual precursors of a thunder-storm, which is awful beyond conception. The nights are always cool. The winter is cold: most of the rivers freeze over, though but for a short time. Agriculture is in a backward state; the breeding of cattle and sheep is the chief

occupation of the population. Corn, hemp, flax, tobacco, liquorice, saffron, and mustard are grown. The vine is cultivated, and much attention is paid to horticulture. Oxen and buffaloes are numerous, and used for draught; the horses (of which many are wild) are slight, but very spirited and swift-footed; the breed of sheep has been much improved by crossing the common stock with merinos. Wolves, wild cats, bustards, gray partridges, ortolans, snipes, &c., abound; the country is infested by locusts, large rats, snakes, scolopendræ, lizards, and swarms of gnats. The fisheries on the sea coast and in the rivers are important. The minerals are—fine potter's clay, freestone, slate, chalk, talc, saltpetre, agates, and garnets. The province is well situated for trade. The foreign commerce of the country is very important and rapidly increasing. Manufactures of cloths, tallow, leather, butter, cheese, and caviare, are carried on, partly by Swedish, German, and other colonists, the population consisting of a great intermixture of races.

The chief towns are Kherson, Elizabethgrad, Nicolaiev, and ODESSA.

Kherson, a large, well-built, fortified town, with 40,402 inhabitants, is situated on the right bank and near the mouth of the Dnieper, which forms a good harbour. It is the seat of the governor of the province, and was formerly important on account of its great naval dockyards, arsenal, and foreign trade. But unhealthiness of site, and the difficulty experienced by large vessels in crossing the bar at the entrance of the harbour, have greatly contributed to its decline in favour of Odessa, although a good trade is still carried on in linseed, wheat, ropes, tallow, and wool, the exports amounting to about 1,000,000*l.* annually. Three miles distant are the tomb and cenotaph of Howard the philanthropist, who died here in 1790.

Elizabethgrad, situated in the interior on the Ingul, has strong fortifications, military magazines, a large hospital, and about 15,000 inhabitants. It was established with great pretensions by Catherine II., but has never prospered.

Nicolaiev, a well-built town, situated at the confluence of the Ingul and the Bog, contains 33,504 inhabitants. It is the seat of the admiralty that directs all the Russian naval operations on the Black Sea. The town is strongly fortified, and has several fine buildings, among which are remarked the principal Greek church, the town-house, the custom-house, the admiralty buildings, and the shipbuilding yards. It is a place of considerable trade, and has numerous schools and other institutions for the education and improvement of persons devoted to naval and military pursuits. It was founded in 1790, and since the fall of Sebastopol has been the chief naval station of Russia in the Black Sea.

KHIVA or **KHYVA**, a country of Independent Turkistan, on the east of the Caspian Sea, extends from lat. 37° 45' to 44° 30' N., and from long. 50° 30' to 63° E. The population consists mostly of wandering tribes, and is estimated to number 200,000. The surface is almost entirely a sandy desert, but along the banks of the Oxus (which flows through the eastern side), and the canals connected with it, there are many fertile tracts. In these places the vine is cultivated, and wheat, millet, barley, fruits, linseed, cotton, flax, and some rice, are grown. The

breed of horses is good, and sheep and goats abound. Camels are the ordinary beasts of burden. About 2000 of them go annually to Orenburg, Astrakhan, and Cabool with agricultural produce, silk and cotton fabrics, and yarn, to be exchanged for the products of Russia and the West, which are brought in boats across the Caspian Sea. Some shawls are made by the females and exported; but agriculture is the principal occupation of the settled inhabitants, and is in a very advanced state. The population is very mixed, the dominant race being the Uzbeks, as in Bokhara. *Khiva*, the capital, is situated in 41° 30' N. lat., 60° 18' E. long., in an irrigated plain near the Oxus, surrounded by numerous gardens. It is the chief seat of trade, though the only stone buildings are three mosques and a caravanserai. The population is given as about 12,000.

KHOKAN, a khanat of Central Persia, in Independent Turkistan, between lat. 40° and 45° N., long. 67° and 75° E., bounded by Chinese Turkistan, South Bokhara, &c. The surface is mountainous, pasturage plentiful, live stock numerous, and wool is an important article of export. The products comprise corn, cotton, silk, and fine fruits, including the apricot, apple, pear, almond, and melon, with coal, copper, iron, &c. The chief articles of manufacture are embroidered silks, cotton stuffs, cochineal, and sandalwood. Shawls are imported from Cashmere and Balkh, the rest of the trade being chiefly with Budakshan and Russia. The khan maintains an army of about 10,000 men. Russia, which is steadily pursuing her advance towards India, has, by arrangement with the king of Bokhara, obtained 700 villages and towns in the khanat, and it is probable that at no distant period Khokan will be united to Russia. The principal towns are Khokan, Khojend, and Tashkend. Population estimated at 150,000 to 180,000. *Khokan*, the capital, is reported to be about half the size of Bokhara, with a population of from 30,000 to 50,000. Its vicinity is fertile and cultivated. The chief buildings of the town are the khan's residence, bazaars, mosques, and public schools.

KHORASAN. [PERSIA.]

KHOSRU I., called Chosroes by the Greek writers, but more commonly known in the East by the name of Nushirwan, 'noble soul,' succeeded his father Kobad in the kingdom of Persia in 531. He divided the empire into the four great provinces of Assyria, Media, Persia, and Bactriana, and established a vizier over each. In the course of a few years he extended his dominions as far as the Indus. He died in 579, after a reign of forty-eight years, and was succeeded by his son Hormisdas IV.

The virtues, and more particularly the justice, of this monarch, form to the present day a favourite topic of Eastern panegyric. His reign forms an important epoch in the history of science and literature: he founded colleges and libraries in the principal towns of his dominions, and encouraged the translation of the most celebrated Greek and Sanscrit works into the Persian language.

KHOSRU II., the grandson of Khosru I., was elevated to the throne of Persia in 590, on the deposition of his father Hormisdas. In the first year of his reign, Khosru, to escape from the treachery of Bahram, who seized upon the royal power, took

refuge in the dominions of Maurice, the emperor of Constantinople, who assisted him to defeat his rival and obtain repossession of the sovereignty; the assistance was, however, purchased by the surrender of some important towns of Mesopotamia and the payment of a large sum of money. During the life of Maurice peace was preserved between the two nations; but on his assassination by Phocas in 602, Khosru took up arms to revenge his death, as he pretended, and in the space of fourteen years subdued almost all the provinces of the Greek empire. Khosru at length, in 621, dictated the terms of an ignominious peace to the Emperor Heraclius, who had hitherto made very few efforts for the defence of his dominions, but who rejected these terms, and in a series of brilliant campaigns (622-27) recovered all the provinces he had lost, and repeatedly defeated the Persian monarch. Khosru was murdered in 628 by his son Siros.

KHYBER PASS. [AFGHANISTAN.]

KIACHTA, a town in the Russian government of Irkutsk, in Siberia, is situated in 50° 20' N. lat., 106° 40' E. long., in a sterile country, 2480 feet above the level of the sea, on a small stream also called the Kiachta. It consists of two separate parts—the fortress, called Troitsko-Sawsk (population about 5000), where the custom-house, the imperial offices, and the military government are established; and the lower town, or Kiachta, which is nearly two miles farther south, and where the Russian merchants live; the population is only 285. The commerce of this place with *Maimaitchin*, the Chinese emporium, which is less than a mile from the lower town, has risen to great importance in modern times. The Russians bring to Kiachta furs of the sable, black fox, and ermine; hides, leather, woollen cloth, and other coarse woollen fabrics; glass, looking-glasses, cattle, and large quantities of bullion. They receive in return from the Chinese, manufactured silks and cottons, musk, rhubarb, tobacco, china, furniture, and several kinds of toys; but the principal commodity taken in exchange is tea. At the Kiachta December fair about 60,000 chests, or 4,200,000 lbs., of fine Pekoe are annually purchased by the Russians, in addition to a still larger quantity of an inferior kind, much of which is consumed by the Siberians and nomadic Tartars. There is here an academy for the Chinese language.

KIDDERMINSTER. [WORCESTERSHIRE.]

KIDNAPPING is defined to be the stealing or conveying away of a man, woman, or child, and is an offence at common law, punishable by fine and imprisonment, and until the abolition of that mode of punishment by 1 Vict., c. 23, by pillory. The 24 & 25 Vict., c. 100, provides for the offence of child-stealing as felony. In Scotland this crime is known by the name of *plagium*, and was in former times punishable by death as treason—the detention of the king's lieges being regarded as an encroachment upon the royal prerogative. The forcible abduction of women, and of voters at elections, are crimes at common law, and punishable with an arbitrary pain.

KIDNEY-BEAN. [BEAN.]

KIDNEYS are two glands lying in the lumbar region, on each side of the spinal column. They are composed of numberless and delicate tubular ramifications, on whose walls there is a fine net-work of

capillary arteries and veins, and which are all collected into one mass of a firm fleshy consistence, inclosed in a fibrous capsule.

The ureter, through which the urine secreted by the kidney is conveyed to the bladder, dilates at its extremity into a wide pouch, the pelvis of the kidney, which is divided into several portions, called calyces. Into each calyx a nipple-like process, or papilla, projects, at whose extremity there are several minute orifices, each opening into a very fine canal, which, as it is continued into the substance of the kidney, ramifies and becomes tortuous. On all these canals, or tubuli uriniferi, minute blood-vessels ramify, which with a number of rounded bodies called the corpuscles of Malpighi, secrete the urine, which is conveyed from the tubuli into the calyces, and from them through the pelvis and the ureter into the bladder.

Diseases of the Kidneys.—The principal disease to which the kidneys are liable is that which gives rise to the formation of calculi. [*Calculus, Renal.*] Sometimes the stone is retained in the pelvis of the kidney, where, by continued depositions, it may increase till it completely fills the pelvis and calyces; but more frequently it passes through the ureters into the bladder, producing in its passage violent spasmodic pain in the loins, sickness and nausea, hæmorrhage, &c. This affection is the most common cause of inflammation of the kidneys (nephritis), from which abscess and other morbid alterations may result. Chronic inflammation seems to be the most frequent cause of a peculiar alteration in the structure of the kidneys, particularly described by Dr. Bright, of which the chief characters are, the interstitial deposition of a pale yellowish and firm substance, and a granular or tuberculated form of the surface of the kidney, with a great decrease of its vascularity. This condition comes on in hard drinkers, and after the scarlet fever; it usually produces dropsy, and is indicated by a dull heavy pain in the loins, a bloated expression of the countenance, a hard pulse, and the secretion of so large a quantity of albumen with the urine that it coagulates on being heated, or on the addition of a little nitric acid. Suppression of urine may be the ultimate result of obstruction from calculi in the ureters, or it may occur as an idiopathic disease. It is a condition of great danger. The kidneys are also subject, in common with other organs, to the deposition of various morbid substances, as cancer, fungus, hæmatodes, melanosis, tubercle, &c. But the diagnosis of all the chronic affections of this organ is extremely obscure, the principal indications of each being the same, viz., the dull heavy pain in the loins, dropsy, and sometimes hæmaturia.

KIEL, a seaport and the chief town of Holstein, is beautifully situated on a bay of the Baltic, which forms an excellent harbour, in 54° 10' N. lat., 10° 8' E. long. It is 53 miles by railway from Altona and Hamburg, and has 17,543 inhabitants. The town, which is surrounded with walls pierced by five gates, is pretty regularly built, with straight, well-paved streets. It has a university, founded in 1665, connected with which there is a library of 80,000 volumes, an observatory, and botanic garden. The manufactures consist of iron goods and machinery, linen, hats, tobacco, refined sugar, &c.; shipbuilding is carried on. The trade in corn, dried herrings, and dried sprats, is considerable, and has much increased

since the completion of the Kieler Canal, which joins the Baltic and the German Ocean, and enters the harbour of Kiel. Steamboats ply regularly to Copenhagen, Aalborg, &c. The chief public buildings are the cathedral church of St. Nicholas, of the thirteenth century, a handsome palace, the public baths, and grammar-school. The castle has a sculpture gallery, with copies of the best works of art. The charming environs attract inland visitors in summer, intent on recreation and sea-bathing. Kiel became part of Prussia, with Holstein, after the Danish war in 1864.

KIEV, or KIEFF, a government of Russia in Europe, lying between $48^{\circ} 30'$ and $51^{\circ} 30'$ N. lat., $28^{\circ} 40'$ and $33^{\circ} 25'$ E. long., is bounded W. by Podolia and Volhynia, N. and N.E. by Minsk and Tchernigof, E. by Pultawa, and S. by Kherson. It has an area of 19,656 square miles, and a population of 1,944,334. The surface is in general flat, with a few undulations which follow the course of the rivers. The land in the north of the government of Kiev is extremely rich and fertile; in the south the soil is poorer; but still there are here also tracts of luxuriant corn fields and good pastures. The whole government belongs to the basin of the Dnieper, which forms the north-eastern boundary for nearly 250 miles. [DNEPER.] The interior is drained by the numerous feeders of the Dnieper from the left bank, the principal of which are the Pripetz, the Teterer, the Irpen, and the Ros, the latter of which rises in the west of the province, and dividing into two arms, forms with the Dnieper a large island. The climate is mild and dry, and adapted to all the productions of the temperate zone, though no vines are cultivated. The rivers usually freeze in December, and thaw in February; the north wind is always severely felt in winter. The heat is great in summer, during which season rain seldom falls. Locusts often do great injury to the growing crops.

Agriculture is the chief employment of the inhabitants, and wheat is extensively exported to Odessa. The soil produces all kinds of corn, pulse, millet, hemp, fruits, flax, hops, and tobacco. Cattle are numerous and of good breed; horses are small; swine are kept in great numbers; sheep are scarce. The forests produce excellent timber, and large quantities are annually floated down the Dnieper to the ports of the Black Sea. Among the wild animals are foxes, wolves, bears, deer, &c. The minerals are clay, lime, chalk, millstone, and bog iron. There are numerous distilleries, and beet-root sugar, tobacco, cloth, china, and delft are manufactured. The trade consists in the exportation of the produce of the province, and the importation of salt, metal, wine, manufactured goods, and colonial produce.

KIEV, the capital of the government, is built on a hill on the right bank of the Dnieper, in $50^{\circ} 27'$ N. lat., $30^{\circ} 27'$ E. long., and has more than 60,000 inhabitants. The town consists of four distinct parts—the old convent and fortress of Petchersk, in which are the celebrated catacombs, containing the bodies of 118 saints; Old Kiev, which contains the fine cathedral of Santa Sophia, and is the residence of the Russian archbishop; Podol, containing most of the private houses, numerous churches, an imperial palace and town-hall; and Vladimirstadt, which was built by Catherine II. Kiev is the seat of the governor-general of Little Russia, capital of a

Greek eparchy, and has a civil and criminal court. It is 670 miles S. of St. Petersburg, and 490 S.W. of Moscow: is fortified, and has an arsenal. Besides its cathedral, churches, convents, and a Greek ecclesiastical academy, Kiev has a university, founded in 1834, called St. Vladimir's University, which is frequented by students from the governments of Kiev, Podolia, and Volhynia. Kiev contains the oldest Greek ecclesiastical academy in Russia, which was founded in 1588. The university has cabinets of medals, mineralogy, zoology, and botany, and most of the collections transferred from the old University of Vilna. There is also a Russian theological seminary, with a large library, two gymnasiae, and an establishment for the education of the daughters of nobles.

Kiev is one of the oldest towns in Russia, and was its capital for three centuries. In 980 the Grand Duke Vladimir here embraced Christianity and cast Perune, the thunder god (who occupied a place in the Slavonic mythology analogous to that of Zeus among the Greeks, and Jupiter among the Romans), into the sea, after the image had been soundly cudgelled by twelve stout men. The great point of attraction in Kiev is the catacombs, previously alluded to. They consist of two caverns, excavated in the precipitous cliff which faces the river. They were once occupied by living, and have since accommodated the remains of departed, monks and saints. The bodies are arranged along the sides in open coffins, but enveloped, like Egyptian mummies, in wrappers, so that no part is left visible. But the stiffened hands are so arranged as to receive the kisses of devotees, and on the breasts are written the names of the deceased, with occasionally a brief record of their lives. Kiev is thus the Jerusalem and Mecca of Russia, and is annually visited by multitudes from all parts who seek an interest in the intercession of the defunct. They perform the whole journey on foot, seldom sleep under a roof, and depend upon precarious charity for subsistence.

Kiev is not an industrial but a commercial centre, and its fairs are amongst the largest in the Russian empire. The Dnieper is here crossed by a remarkable suspension bridge, the work of an English engineer (Mr. Vignolles). Nearly 3000 tons of iron were employed in its construction, all of which, as well as the requisite machinery, were wrought in England. Fifteen vessels conveyed this material to Odessa, and it was then transported in bullock waggons over the steppes.

KILDA, ST., the most western of the Hebrides, is situated in $45^{\circ} 49'$ N. lat., $8^{\circ} 32'$ W. long., and consists of an uneven mountain-ridge, the most elevated point of which rises 1380 feet above the sea-level. The greatest width of the island is about 2 miles, and the length 3 miles. The population in 1861 was 78, who inhabit a village in the S.E., and live in a great measure on the eggs of sea-birds, which are exceedingly abundant. They are also occupied in rearing cattle and sheep, and in fishing.

KILDARE, an inland county of the province of Leinster, in Ireland, is bounded N. by Meath, E. by Dublin and Wicklow, S. by Carlow, and W. by Queen's County and King's County. It is situated between $52^{\circ} 50'$ and $53^{\circ} 25'$ N. lat., and between $6^{\circ} 27'$ and $7^{\circ} 10'$ W. long. Its greatest length from

N. to S. is about 40 miles, and its greatest breadth E. to W. 27 miles. The area is 418,436 acres, of which 356,787 are arable, 51,854 uncultivated, 8288 in plantations, 490 in towns, and 1017 under water. The population in 1851 was 95,724; in 1861 it had decreased to 90,946, of whom 79,121 were Roman Catholics, and 11,817 Protestants.

Surface and Soil.—The surface is more level than that of any other county of Ireland. The only considerable elevations are the hills of Rathcoole, which form the western extremity of the range of the Dublin mountains, and a detached group which occupies part of the southern margin of the Bog of Allen, in the central northern division of the county.

An open table-land divides the middle and southern parts of Kildare into two districts, of which the one slopes gradually towards the river Liffey on the east, and the other towards the river Barrow on the west. The west district is divided into three open vales by low ranges of undulating ground extending in parallel directions from the central table-land towards the south-west. The most northern of these vales contains the rivers Feagile and Little Barrow; but the chief rivers of the county are the Barrow and the Liffey. That part of the valley of the Liffey which is included within this county is formed by the western slope of the Dublin mountains on the one side, and by the subsidence of the table-land of Kildare on the other. The country in this neighbourhood is in a high state of cultivation, and much of it in demesne. The western bank of the river particularly, from the point where it enters the county to Leixlip on the Dublin boundary, is almost wholly occupied by a succession of demesne lands, including numerous residences of the best class. The river Boyne rises in the north of the county.

The common called the *Curragh of Kildare*, a tract 4858 acres in extent, is the property of the Crown, and is scarcely to be matched for the excellence of its turf and the richness of its verdure. Here is a large permanent military camp, where the prince of Wales went through the usual routine of camp life for some months in the year 1861. Most of the Curragh is used as common pasture ground; but it also contains a well-known race-course—the Newmarket of Ireland—and a part of the Bog of Allen.

The north-western part of the county, extending from the Bog of Allen to the Boyne, is open and chiefly in pasture. Besides the Royal Canal, the Grand Canal, and their branches, which connect it with Dublin, Waterford, and the Shannon, the county is intersected by the Great Southern and Western railways, which pass through or near the towns of Naas, Newbridge, Kildare, Monasterevan, and Athy. Large quantities of turf are sent to Dublin by the canal.

Climate.—The climate, from the quantity of boggy surface exposed (about 50,000 acres in all), is more moist than that of the neighbouring counties on the north and south. In the central district the air is pure and keen, and milder and more salubrious in the valleys of the Liffey.

Geology.—The clay-slate, which flanks the granite axis of the Dublin and Wicklow mountains, occupies about one-fourth part of the surface of Kildare. The granite tract of Carlow extends into the south-

eastern extremity of this county. The remainder of the county is occupied with the floetz limestone of the great central plain, broken only by the group of Dunmurry and the Hill of Allen. The latter is composed of a mass of granular compact greenstone and greenstone-porphry protruded through the floetz limestone.

The soil is generally a rich loam, resting on limestone or clay-slate. There are rich fattening lands in the baronies of Carberry, Clane, and North and South Salt, which occupy the north-western and north-eastern portions of the county. An improved system of agriculture has been introduced by the resident proprietors, and is practised to some extent by the smaller farmers. The general crops are wheat, oats, and barley. The best English breeds of cattle have been introduced. The minerals of the county are unimportant.

The only manufactures carried on are of paper, cotton, and woollen, but only to a very limited extent.

Divisions and Chief Towns.—Kildare is divided into 14 baronies and 116 parishes. It is in the Home Circuit. The assizes are held at Naas. Kildare is in the united diocese of Dublin, Kildare, and Glandelagh, and contains the Roman Catholic College of Maynooth. Until 1869 the latter was aided by an annual parliamentary grant of 28,500*l.* Of the population, only 10,439 belong to the Established Church. The number of electors on the county register in 1869 was 2999.

Kildare is within the Dublin, or Northern Military District; and there are barracks at Athy, Naas, Newbridge, and the Curragh. The latter is the headquarters of the district, and can accommodate 10,000 men. The county returns two members to Parliament. There are no parliamentary boroughs. The following are the principal towns, with the population of each in 1861:—*Athy*. [ATHY.] *Celbridge*, situated on the northern bank of the Liffey, here crossed by a bridge, 13 miles W. from Dublin, contains a church and Roman Catholic chapel, a workhouse, county hospital, and woollen factory, and is the head of a poor-law union. Population, 1592. *Kildare*, 32 miles S.W. from Dublin, is a small and poor town, which contains a Roman Catholic chapel, nunnery, and friary. Population, 1399. The bishopric of Kildare is attached to the archbishopric of Dublin. It has a station on the Great South-Western Railway, and the celebrated Curragh races take place in April, June, September, and October. The town suffers greatly from want of water. The Protestant cathedral, which is partly ruined, contains the burial vault of the earls of Kildare. Kildare is also the see of a Roman Catholic bishop, and has, besides, a county infirmary, market-house, and jockey club. Kildare was once of great importance; and notwithstanding its present decayed appearance, is exceedingly interesting for its antiquities. *Leixlip*, a small town beautifully situated on the Liffey, 11 miles W. from Dublin. Population, 788. The Midland Great-Western Railway Company have a station here. *Maynooth*, 15 miles W. from Dublin, is a small town, consisting of a single street, and having a population of 1497. Maynooth is chiefly distinguished for the Royal College of St. Patrick, founded in 1795 for the education of the Roman Catholic priesthood. The present building, erected in 1849, after the designs of

Pugin, is a striking Gothic edifice. The grounds occupy 80 acres. The college accommodates about 500 students, 250 of whom are maintained free. The academical year embraces ten out of the twelve months, and the students usually remain eight years. There is also a convent at Maynooth. *Naas*, which is the assize town for the county of Kildare, is 20 miles S.W. from Dublin. A branch of the Grand Canal passes it, and it is a place of considerable traffic. There are a county court-house and a new gaol, infantry barracks, a modern church in the pointed style, a large modern Roman Catholic chapel, a convent, diocesan and national schools, a dispensary, county fever hospital, and union workhouse. Population of the parish, 4124; of the town, 2966. Next to Athy, it is the largest place in the county. The principal street is about half a mile in length. The Great South-Western Railway passes near here.

History.—In the ancient division of Ireland the present county of Kildare was divided among many families. The Fitzgeralds became the ruling family in Kildare about the close of the thirteenth century, and maintained their authority, with many fluctuations, to the sixteenth. This county was the theatre of various military operations during the wars which succeeded the rebellion of 1641. The Kildare family were active in bringing about the Restoration, and espoused the Protestant cause in the subsequent wars of the Revolution of 1688.

Many earthen works, partly military and partly sepulchral, remain in this county. Numerous sepulchral mounds may be seen on the Curragh, and pillar-stones of large dimensions in other places. Round towers exist at Kildare, Taghadoe, Kilcullen, and Castledermot. There are also ruins of numerous religious houses in this county. At Castledermot, Moone, and Old Kilcullen are stone crosses ornamented with curious sculptures. Seventeen ancient castles are still standing, of which those of Kilkea, Donadea, and Leixlip are still inhabited.

KILFENORA, formerly a bishop's see in the archiepiscopal province of Cashel, in Ireland, is now in the archbishopric of Dublin and Cashel, and is included in the united bishopric of Killaloe, Kilfenora, Clonfert, and Kilmacduagh.

KILKENNY, an inland county of the province of Leinster in Ireland, is bounded N. by Queen's County, E. by Carlow and Wexford, S. by Waterford, and W. by Tipperary. It lies between $52^{\circ} 13'$ and $52^{\circ} 53'$ N. lat., and between $6^{\circ} 55'$ and $7^{\circ} 38'$ W. long. Its greatest length N. to S. is about 45 miles; its average breadth is about 24 miles. The area is 796 square miles, or 509,732 acres; of which 470,102 were arable, 21,126 uncultivated, 13,899 in plantations, 3056 under water, and 1549 in towns and villages, in 1865. The population in 1861 was 124,515; of whom 118,125 were Roman Catholics, and 5992 Protestants of the Establishment. The inhabitants in 1851 numbered 158,748. There were 5159 voters on the county register in 1869.

Hydrography and Surface.—The navigable rivers Barrow and Suir form the greater part of the eastern and the whole of the southern boundary of Kilkenny, and the partly navigable Nore traverses its entire length from N. to S.E. The northern part of the district between the rivers Nore and Barrow is occupied by a mass of high lands, spreading into

numerous lateral groups, whose general direction is from N.N.E. to S.S.W. These valleys are watered by the rivers before named, and by the minor rivers Dian, Dineen, Dubhglass, Owenree, Munster River, and Clodagh. The ranges of hills have various designations in different parts of the county; such as Castlecomer hills, Slievenamon range, Brandon Mountain, 1696 feet high, Coppinach range, Walsh mountains, and King's Mountain. Several of the summits rise to an elevation of 1000 feet. The county contains a considerable number of small towns and villages; and in the most picturesque spots are many beautiful mansions and parks. Five miles south-east of Ballyragget is the remarkable cave of Dunmore. The entrance is by a picturesque hollow clothed with brushwood, at whose extremity the cavern opens by a natural arch 50 feet high. There are several chambers within, incrustated with stalactites and traversed by a subterranean stream. Beyond the central district nearly all the southern part of the county is occupied with hilly tracts, connected on the east with the granite group of Carlow, and on the west with the range of Slievenamon. A tongue of alluvial land called the Roer, extending above 2 miles in length, occupies the south-eastern extremity of the district at the point of junction of the Nore and Barrow. With the exception of this spot the western bank of the Barrow from Graigue to the Nore is precipitous, and in some places clothed with natural wood. The space between the southern declivities of the Walsh mountains and other groups ranging towards Tipperary and the Suir is occupied to a breadth of from 2 to 5 miles by a level tract of rich land. The river Suir is navigable for vessels of 120 tons up to the bridge of Carrick. At the bridge of Waterford it is in some places 8 fathoms deep at low water. The Barrow is navigable to a considerable distance from its mouth. The general slope of the surface is to the S.E., which is the best aspect both for sun and shelter. Surface waters run off rapidly, and there is very little bog; the air is consequently dry and healthy.

Geology.—Except the mountain groups of the S., the entire surface of Kilkenny is occupied by the limestone of the central plain, overlaid in the hilly districts N. of Kilkenny city by shale and sandstone. The coal formations are nearly co-extensive with the hilly districts; the limestone, where it forms the surface-rock, spreads into undulating plains sweeping round the high grounds, and occupying the intermediate valleys. These anthracite coal-beds would be of great commercial value, if the natural resources of Ireland were better developed. The general colour of the limestone is a bluish gray. Near Kilkenny it passes into a fine black marble, containing a great variety of shelly impressions. These beds are extensively quarried, and the blocks dressed on the spot by a saw-mill driven by the Nore. The marble, which is sometimes procured of a jet-black, is manufactured into chimney-pieces, tombstones, &c.: it bears a very high polish, and can be raised in large blocks. Marl is found in large deposits in various parts of the county. The mountain tract occupying the S. of Kilkenny, with the exception of the primitive group of Brandon, consists of a nucleus of clay-slate surrounded by sandstone. There are many chalybeate springs in the county.

Produce and Manufactures.—Only a small portion of Kilkenny is unfit for tillage. The hills of the northern districts are round-backed and accessible; and the Walsh mountains are mostly pasturable. The group of Brandon is the only considerable extent of rough land in this county. In the coal-tract the soil is a moory turf lying over a stiff whitish clay, which is the poorest district out of the mountain region. Many districts have deep rich soils. The soil of the hilly country on the S. is dry and kind, but it is badly inclosed and destitute of shelter. Some of the best wheat and meadow lands in the S. of Ireland are situated in the level tract along the Suir. There are two districts almost wholly occupied by dairy farmers, the Walsh mountains and the southern part of the Castlecomer tract.

The manufacture of carpets, diapers, and tapestry was introduced into the county by the Countess of Ormond in 1359. James, duke of Ormond, about the middle of the seventeenth century, established and encouraged, at a great expense, both linen and woollen manufactures; and about the close of the same century the Bessborough family introduced the manufacture of linen into the southern parts of the county. These manufactures, which long flourished throughout the county, as well as that of blankets, introduced about a century ago, have now materially declined. A coarse frieze for home consumption is made among the peasantry. There are many flour-mills in the county, and the principal export is grain. There is also some trade in beer, whisky, and leather; but agriculture is the pursuit of the great body of the inhabitants. The chief crops are wheat, barley, bere, rye, oats, and potatoes, which ripen earlier than in most of the other Irish counties. Dairy and sheep farms are numerous; and the breeds of stock are chiefly native.

Two crossing lines of railway intersect this county, and the navigable rivers and the Grand Canal furnish facilities for transport to all parts of Ireland.

Divisions and Chief Towns.—The county contains ten baronies and 140 parishes, and is in the united diocese of Ossory, Ferns, and Leighlin. It is in the Leinster Circuit, and the assizes are held in the city of Kilkenny. It returns three members to Parliament, namely, two for the county and one for the city. It is in the Western Military District, and there are barrack stations at Kilkenny city and Castlecomer. The following are the principal towns, with the population of each in 1861:—*Ballyragget* is on the east bank of the Nore, about 10 miles N. by W. from Kilkenny. The ruins of the castle built here by the Butlers in the fifteenth century are extensive and interesting. Population, 985. *Callan* is on the N.E. bank of King's River, an affluent of the Nore, about 10 miles S.W. from Kilkenny. It is an ancient place, was formerly walled, and there are ruins of fortified castles and an abbey. Population of parish, 3986; of town, 2331. There are manufactures of flannels and shoes. This town is said to have been the ancient inheritance of the O'Callans. The modern parish church occupies a part of the old Augustinian minster. There are also a Roman Catholic chapel, a national school, a court-house, union workhouse, and a small barrack. *Castlecomer*, about 10 miles N.E. by N. from Kilkenny, is a well-built and clean little town, with a court-house, church, a Roman Catholic chapel,

schools, market-house, and fever hospital. About 2½ miles distant are extensive collieries. Population, 1435. *Freshford*, 8 miles N.W. by N. from Kilkenny, is a small town in a fertile tract of land, which extends from the Nore westward to the Bog of Allen at Urlingford. Population, 956. *Graig*, or *Graig-na-managh*, is beautifully situated on the west bank of the Barrow, about 15 miles S.E. from Kilkenny. There are some interesting ruins of an abbey, part of which have been converted into a Roman Catholic chapel. *Kilkenny* is the capital of the county. [KILKENNY.] *Thomastown* is situated on both banks of the Nore, 8½ miles S. by E. from Kilkenny, the larger portion occupying the left side. A handsome stone bridge crosses the river. The situation is beautiful, and well suited for trade, but it is, notwithstanding, a poor place. Population of the town, 1426; of the parish, 1932. It is a dis-franchised parliamentary borough; has several flour mills; and is a station on the Waterford and Kilkenny Railway.

History and Antiquities.—Kilkenny, as part of Leinster, belonged to the earl of Pembroke in the early part of the thirteenth century; but on the death of the earl in 1247 Kilkenny passed into the hands of various proprietors. Its early history is chiefly occupied with the feuds of the family of Ormond against the houses of Desmond or Kildare. The Graces also during this period were engaged in perpetual hostilities with the Fitzpatricks, Kavanaghs, and other Irish families. During the civil war against Charles I., Kilkenny was mostly held by opponents of the Crown.

Circular stone inclosures of the pagan era remain on the summits of the hills of Cloghmanta near Freshford, and Tory Hill, or Slieve Grian, near Kilmacow. The latter appears to have been a sepulchral cairn, inclosing a kistvaen, or stone chamber. The covering stone of the cromlech at Kilmogue is 45 feet in circumference, and is elevated at one end 15 feet from the ground. Another cromlech at Ballyheniberry has a covering stone 16 feet long, 10 feet broad, and 3 feet thick. There are numerous similar monuments of smaller dimensions throughout the county. The remains of raths and earthen tumuli are also of frequent occurrence. There are five round towers, one adjoining the cathedral church of St. Canice in Kilkenny, the others at Kilree, Tullocherrin, Fertagh, and Aghaviller. Of the monastic ruins, the most extensive and interesting are those of Jerpoint Abbey, on the Nore, 2 miles from Thomastown. The ruins occupy 3 acres, and are a fine specimen of the mixed Anglo-Norman and early English architecture. There are also monastic ruins at Graig and other places. The castles are very numerous, the chief one being Grandison Castle in Iverk, an ancient seat of the Butlers. It has three round towers towards the Suir, and two court-yards.

KILKENNY, a city and county of a city, the capital of the county of Kilkenny, 61 miles S. of Dublin, is finely situated on both sides of the Nore, the older and principal part occupying the western bank. It takes its name from the cathedral church (of St. Kenny or Canice) of the diocese of Ossory, founded here about the end of the twelfth century. The place was selected by the early Anglo-Norman invaders for the site of a castle. The present castle, built in 1195,

occupies a commanding site on the west bank of the Nore, and is the residence of the marquis of Ormond. The cathedral is seated on a gentle eminence on the same side of the river, at the opposite extremity of the city. The small river Bregah running into the Nore about midway between these points divides the city of Kilkenny Proper from Irishtown, or St. Canice, the former having originally been a dependency on the castle, the latter on the cathedral. The large suburb on the opposite side of the river, called Englishtown, is connected with Kilkenny Proper and Irishtown by two handsome bridges. Englishtown still retains its name, but Irishtown has merged into the city of Kilkenny.

The chief object of antiquity is the cathedral church of St. Canice. It is a cruciform building, surmounted by a low tower: extends from E. to W. 226 feet, and from N. to S. 123 feet. The chapel of St. Mary in the north transept serves as the parish church. The oldest parts of the edifice appear to be of the architecture of the early part of the thirteenth century. Of the original castle there remain three massive towers worked into large additions in the French taste of the seventeenth century, made by James, duke of Ormond, in 1682. The building occupies three sides of a quadrangle, having a garden and fountain in front and a lofty terrace towards the Nore. The abbey church of St. John's has been converted into a parish church. Black Abbey has been partly restored, and converted into a church for Roman Catholics. The body and tower of the Franciscan friary are still standing.

The town is well built, and has a busy and cheerful appearance, particularly that portion of it constituting Kilkenny Proper. It is the largest town in Ireland wholly inland. The building material is usually stone whitened or dashed with rough-cast. Kilkenny contains a county court-house, county prison, city prison, barracks, infirmary, fever hospital, union workhouse, cathedral, bishop's palace, chapter-house, deanery, a round tower, two parish churches, seven Roman Catholic chapels, one of which (the cathedral) has been recently built, two monasteries, a convent, Presbyterian and Methodist meeting-houses, an endowed grammar-school called the College of Kilkenny, a Roman Catholic college, national schools, a lunatic asylum, almshouses, &c. At the college Swift, Congreve, and Bishop Berkeley were educated.

The coarse linen and woollen manufacture, although much decayed, is still carried on. But the corn, provision, and general retail trade now form the principal business.

There are several distilleries, breweries, tanneries, and flour mills in the town and its vicinity. Coal and marble are raised in the neighbourhood; the former is sulphureous, and burns without smoke or flame; the latter, which is black, is much used for chimney-pieces and ornamental purposes. The streets of the town are also paved with it.

The city of Kilkenny returns one member to Parliament. The county of the city comprises an area of 26½ square miles, or 17,012 acres. The population in 1851 was 15,808; in 1861, 14,174, including 12,769 Roman Catholics. The number of voters in the city in 1869 was 739.

There were formerly two municipal corporations; one for the English, and the other for the Irish town,

but by the provisions of the Municipal Reform Act they are amalgamated, and divided into two wards, each having three aldermen and nine councillors. The assizes for the county are held in the new court-house, and quarter, as well as petty sessions, are held in the town. The mayor presides over a weekly Court of Conscience, in which debts amounting to 2*l*. (Irish currency) may be recovered.

Kilkenny is connected by railway with Dublin and Waterford.

KILLALA, an Irish bishopric in the archiepiscopal province of Armagh, is now united with Tuam and Achonry, thus forming the united bishopric of Tuam, Killala, and Achonry. The town of Killala is a small seaport in the county of Mayo, on an extensive inlet of the Atlantic bearing the same name. The population is 942. The place has a small cathedral, a round tower, and a harbour. In 1798, a French force landed at Killala Bay, and took the town.

KILLALOE. [CLARE.]

KILLARNEY. [KERRY.]

KILLARNEY, Lakes of. [KERRY.]

KILLENITE, a mineral of a green-brownish colour, so called from occurring in the granite veins of Killeny, near Dublin. It occurs both massive and crystallized; but the crystals are not perfect. Its specific gravity is 2·69; and its constituents, according to Dr. Thompson, are—silica, 49·08; alumina, 30·60; potash, 6·72; oxide of iron, 2·27; water, 10·0.

KILLIECRANKIE, BATTLE OF, was fought July 27, 1689, by the troops of William and Mary, against the forces which were held together in Scotland by Viscount Dundee, in the interest of James II. The two armies confronted each other at the Pass of Killiecrankie, in Perthshire. The royal army, commanded by General Mackay, numbered 4000; that of Dundee only 2500 foot, with a small troop of horse. The contest was decided in a few minutes; the Highlanders rushed on with their swords, and instantly scattered the enemy. Mackay lost 2000 men; Dundee, 900. The latter fell by the shot of a bullet in the moment of victory; and shortly afterwards Scotland peacefully submitted to the Revolution Settlement. Professor Aytoun has made this battle the subject of a fine historical poem, entitled 'Killiecrankie,' and its incidents are described with characteristic eloquence by Macaulay in his History.

KILMARNOCK. [AYRSHIRE.]

KILOGRAMME, a French measure of weight of 1000 grammes, equal to 2·2046 lbs. avoirdupois; 100 kilogrammes being equal to 1·9684 cwt. To convert pounds avoirdupois into kilogrammes, or the reverse, divide or multiply by 2·20464. The kilogramme is equal to 15432·48 grains Troy. [GRAMME.]

KILOMETRE, the French itinerary measure, or mille, being the tenth part of the new league, containing 1000 metres, or 1093·6389 yards.

KILKENNY. [FIFESHIRE.]

KILRUSH. [CLARE.]

KILT, a loose dress falling from the waist to the knee in the guise of a short petticoat. It is worn in the Scottish Highlands by men, but the fashion is said to have been introduced by an English tailor.

The tunic is undoubtedly Celtic. After having been considered for many years a national dress, it is now rapidly hastening into disuse, though retained by a few Highland regiments.

KILWINNING. [AYRSHIRE.]

KIMBOLTON. [HUNTINGDONSHIRE.]

KIMERIDGE CLAY, in Geology, one of the strata of the Upper Oolitic group. It is named from Kimeridge, Dorsetshire, where it is typically developed. It occurs also in the vale of Aylesbury, Buckinghamshire, where it is highly fossiliferous. Kimeridge coal is a remarkably bituminous shale found in the Kimeridge clay beds, of little use.

KIN. [CONSANGUINITY; DESCENT.]

KINCARDINESHIRE, or the *Mearns*, as it is commonly called, is a maritime county of Scotland, situated between $56^{\circ} 43'$ and $57^{\circ} 5' N.$ lat., and between $1^{\circ} 47'$ and $2^{\circ} 30' W.$ long. It is bounded N. and N.W. by Aberdeenshire, S. and S.W. by Forfarshire, and E. by the North Sea. Its greatest length N. to S. is 35 miles; its greatest breadth E. to W. is 24 miles. The area is 394 square miles, or 252,250 acres. In 1861 the population was 34,466—16,744 males, and 17,722 females. There were 6697 inhabited houses, 254 uninhabited, and 45 building. In 1861 the inhabitants numbered 34,598. The registered county constituency in 1869 was 1680, who return one member to the House of Commons; while Bervie contributes to Montrose.

The Grampian hills occupy the western and central parts of Kincardineshire. Mount Battock, the highest summit, rises 2611 feet above the sea; Clach-na-Bayne is 1906 feet. This elevated and sterile region comprises about one-third of the county. The rest, to the extent of more than 100,000 acres, is well cultivated, and the soil fertile throughout. In the S. and E. lies the rich, low, arable tract called the How of the Mearns, comprising about 50,000 acres, on a basis of old red sandstone. The climate is mild. The estates in the county are generally large; the farms of all sizes, some from 400 to 500 acres, and the best generally let on lease for about nineteen years. Great improvements have been made recently in agriculture. The chief crops are oats, grain, barley, turnips, potatoes, flax, and wheat.

Cattle, chiefly of the short-horned breed, are fed on most farms; and the mountains yield extensive pasture for sheep. The shores of Kincardineshire abound in fish, and are one of the principal resorts of the herring, many thousand barrels of which are cured annually, but the nature of the coast, and the want of harbours sufficiently capacious prevent the full development of this trade.

The mineralogy of this county is not of great importance. In many places there are limestone quarries; and as the stone is of excellent quality, a more abundant supply of fuel is all that is wanted to render them of great value. There are also granite sandstone quarries.

The principal rivers are the Dee on the N., and the North Esk on the S. [ABERDEENSHIRE; FORFARSHIRE.] The other streams, the Dye, Cowie, Carron, Bervie, and Luther are small, but some of them contain good salmon fisheries. The weaving of dowlais, household and coarse linen, &c., is the chief manufacture. A large number of wooden snuff-boxes are also made.

The county does not contain any towns of importance. The following are the principal places, with the population of each in 1861:—

Bervie, or *Inverbervie*, is situated on the coast, about 9 miles S. by W. from Stonehaven, 13 from Montrose by road, and 8 from the Laurencekirk station of the Scottish North-Eastern Railway. The Water of Bervie, a small river, falls into the sea a little below the town, and forms a harbour for fishing boats at the village of Gourdon. A handsome bridge crosses the river. There is a church and a townhouse. Population of the parish, 1561; of the parliamentary and royal burgh, 952, mostly engaged in fishing. There are also some linen manufactures and a trade in corn. The charter of royal burgh was granted by David II., in 1362; and it is now governed by a provost, two bailies, and fifteen councillors. The parliamentary and municipal electors number only 32. Bervie is included in the Montrose parliamentary district, which returns one member.

Johnshaven is a village on the coast, with a small harbour, about 4 miles S. by W. from Bervie. Population, 1088.

Laurencekirk, a village about 6 miles W. from Bervie, contains a parish church and an Episcopalian chapel. A little linen-weaving is carried on, and a great many wooden snuff-boxes of peculiar workmanship are made here. Population, 2110.

Stonehaven, a borough of barony, consists of a new and an old town, connected by a bridge across the Carron. In summer it is visited for sea bathing. The harbour admits only small vessels. There are haddock and herring fisheries, manufactures of cottons and linens, a distillery and a brewery, and some mills for spinning woollen yarn; and the town is also the seat of sheriff courts. The place is included in the parishes of Dunnottar and Fetteresso, and adjacent to it are the two parish churches, and the fishing village of Cowie. About 2 miles south, on a rock projecting into the sea, are the remains of Dunnottar Castle, the former residence of the Earls Marischal, feudal superiors of Stonehaven. The population of the town in 1861 was 3009. It is connected by railway with Aberdeen (15 miles N.E.).

Kincardineshire includes nineteen parishes, and parts of three others; and two presbyteries in the synods of Aberdeen and Angus and Mearns. This county was part of the Roman province of *Vespasiana*; and Roman stations are traced at Raedykes and Fordoun. There are also old castles at Dunnottar, Kame of Mathers, and Fordoun.

KING, a person in whom are vested the highest executive functions in a sovereign state, with a share, more or less limited, of the sovereign power.

It is immaterial whether the power of such a person is limited only by his own will, or immemorial usage and written laws, or in any other way; still such a person is a king. Nor does it signify whether he succeed to the kingly power by descent and inheritance on the death of his predecessor, or is elected by some council or limited body of persons, or by the suffrages of the nation. The kings of Poland were elected; the king of England succeeds by hereditary right.

The distinction between a king and an emperor is not one of power, but it has an historical meaning. [EMPEROR.]

The origin of the word *king* is disputed. It seems derived from, or connected with, the Latin *gens* and the Greek *genos*, and is identical in meaning with the Greek *basileus* and the Latin *rex*. It comes to us from the old Teutonic *kon-ung*, or *cyn-ing*; that is, the cunning, or able man, the man able to rule.

There are other words employed to designate the person who is invested with the chief power of particular states, in using which we adopt the word which the people of those states use, instead of the word *king*. Thus there is the *Shah* of Persia, the grand *Sultan*, and formerly there was the *Dey* of Algiers. In the United States of America certain powers are given by the federal constitution to one person, who is elected to enjoy them for four years with the title of *President*. A *Regent* is a person appointed to exercise the kingly office during the minority or the mental incapacity of the real king: this definition at least is true of a regent of the British empire. Nothing can be more various than the constitutional checks in different states on the kingly power, or, as it is more usually called in England, the royal *prerogative*.

The English kingly power is traced to the establishment of Egbert, at the close of the eighth century, as king of the English. The accession of William, duke of Normandy, after the battle of Hastings, in 1066, is generally regarded as a new beginning of the race of English kings, for William was but remotely allied to the Saxon kings. In his descendants the kingly office has ever since continued; but though the English throne is now hereditary, there has not always been regular hereditary succession; it has been often disturbed. The last disturbance was the succession of William III., after the abdication of James II., when an act was passed excluding the male issue of James, the issue of his sister the duchess of Orleans, and the issue of his aunt the queen of Bohemia, with the exception of her youngest daughter the Princess Sophia, and her issue, who were Protestants. On the death of Queen Anne this law of succession took effect in favour of King George I., son of the Princess Sophia.

The heir now succeeds to the throne immediately on the decease of his predecessor. The course of descent is to the sons and their issue, according to seniority; and if there is failure of male issue, the crown descends to a female. The person who succeeds by descent to the crown of England succeeds also to the kingly office in Scotland and Ireland, and in all the possessions of the British empire.

At his coronation the king makes oath to three things:—that he will govern according to law; that he will cause justice to be administered; and that he will maintain the Protestant Church. [CORONATION.]

His person is sacred; and he is not personally responsible for any of his acts. His concurrence is necessary to every legislative enactment. He sends embassies, makes treaties, and enters into wars, without any previous consultation with Parliament. He nominates the judges and the other high officers of state, the officers of the army and navy, the governors of colonies and dependencies, the bishops, deans, and some other dignitaries of the Church. He calls Parliament together, and can at his pleasure prorogue or dissolve it. All hereditary titles are

derived from his grant. He can also grant privileges of an inferior kind, such as markets and fairs.

But the exercise of any or all of these powers is practically limited. The king cannot act politically without agents, and these agents may be brought to account for his acts if he transgress the law. The agents by whom the king acts are his ministers, whom he selects and dismisses at his pleasure; but practically he cannot keep a ministry which does not command a majority in the House of Commons; and, virtually, all the powers of the Crown are exercised by the chief minister, or prime minister for the time. [CABINET.] The king now does not even attend the cabinet councils; and the power which in theory belongs to his kingly office, and in fact in earlier periods was exercised by him, is almost formal. But though the king of England has lost his real power, he has perfect security for his person, and for the transmission to his descendants of all the honour and respect due to the head of the most extensive empire on the globe. He also possesses considerable personal influence, and retains a direct control over the military force.

KING-AT-ARMS, an officer of great antiquity, who presides over the chapters and directs the proceedings of heralds. At present his chief duty is to regulate the armorial bearings of gentlemen and the order of state ceremonials. In England there are three kings-at-arms—Garter, principal; Clarenceux, and Norroy, provincial; so called because their duties are limited to the provinces. The name *Clarenceux* is derived from the duke of Clarence, Henry V.'s brother, first king-at-arms for the south of England; that of *Norroy* is Norman-French for *northern king*. There are also a Lyon king-at-arms for Scotland, and an Ulster king-at-arms for Ireland. [HERALD.]

KING, PETER, LORD, was born in 1669, at Exeter, where his father was a tradesman. His mother was a sister of John Locke, by whose advice it is said Peter was sent to study at the University of Leyden. In 1691 he published the first part of his 'Inquiry into the Constitution, Discipline, Unity, and Worship of the Primitive Church,' which displayed considerable learning, attracted much attention, and caused some controversy. Meanwhile King had entered himself at the Inner Temple, and was in due course called to the bar. In July, 1708, he was chosen recorder of London, and was soon after knighted. In 1709 he was appointed by the House of Commons one of the managers in the impeachment of Dr. Sacheverell; and in 1712 he gave his services, without a fee, as one of the counsel for Mr. Whiston, on his trial for heresy before the Court of Delegates. In November, 1714, a few months after the accession of George I., Sir Peter King was made Chief Justice of the Common Pleas, and in June, 1725, was appointed Lord Chancellor, and raised to the peerage as Baron King, of Ockham in Surrey. He resigned the seals on November 26, 1733, and died at his seat near Ockham in Surrey, on July 22, 1734.

KINGFISHERS (*Halcyonidae*), a family of the *syndactyle* group of *Passeræaux*, according to Cuvier; and according to Mr. Vigors, of the *Fissirostral* tribe of his order *Insesores*. [INSESORES.] For other modes of arrangement see Linnæus, Latham, Lacépède, Duméril, Meyer, Illiger, Vieillot, De Blainville, &c. Consult also Mr. Vigors 'On the Natural

Affinities that connect the Orders and Families of Birds; the Prince of Musignano, in his 'Tabella Analitica de'Generi' ('Specchio Comparativo,' 1827); and Eyton's 'History of the Rarer Species of British Birds;' also Selby, Gould, Yarrell, &c. Swainson's 'Classification of Birds' may be referred to with advantage; and Rymer Jones' 'Structure of the Animal Kingdom.'

The *Halcyonidae* are universally distributed, being found alike in the Old and New World, in Australia, and the islands of the Southern Ocean. The genera included under this family title are very numerous, and the species differ considerably from each other in habits. Most are piscivorous, darting upon their finny prey when it approaches near the surface of the water. Others, however, as the puff-birds (*Tamatia*), are insectivorous; and others, as the Gigantic or Great Brown Kingfisher of New Holland (*Dacelo gigantea*), or Laughing Jackass, feed upon large insects, reptiles, and even small quadrupeds, being unfitted, from the character of their plumage, for plunging into water.

When we say that the Kingfishers are *syndactyle*, we mean that the external toe before is united for



Gigantic Kingfisher (*Dacelo gigantea*).

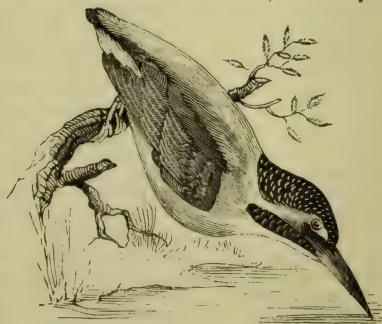
the greater part of its length to the middle toe, as in the Bee-eaters (*Merops*) and others.

Mr. Swainson, in his 'Classification of Birds,' when treating of the *syndactyle* foot, allows the term to be good, if limited to such feet, with united toes, as are of a different formation to all others, and would not, even if the toes were free, come under any of the definitions which he had previously given. Such a form of foot, he says, will be found in the genera *Merops* and *Alcedo*, containing the Bee-eaters and Kingfishers, to whose feet he especially limits the term *syndactyle*. 'The habits of these two groups,' continues Mr. Swainson, 'as far as concerns the use of their feet, are nearly the same, for in neither are these members ever employed but to rest the body. The Kingfisher watches patiently from a fixed station, generally a naked twig overhanging the water, for such fish as come within its reach, and then, after

a time, flies to another station, where it alights and remains. The feet, from not being used for walking or standing, are consequently very small, and the toes imperfectly developed; there are three toes in front and one behind, but two of the former might be almost reckoned as only one, since they are united together even to the commencement of their respective claws, and the inner toe is not half the length of the others, and seems to be rudimentary: it has a claw, and is rather more detached at its tip than the other two; in some, as in the Three-toed Kingfishers, this inner toe disappears. The hinder toe is very short, and scarcely longer than the inner one. The scales of the whole foot are so thin and transparent that they can scarcely be seen in the small species by the naked eye. Those who have seen so much of the true Kingfishers, know that they never perch upon any other than small or slender branches; and this we may infer from the shape of the foot. The two outer anterior toes are very long, so that they would completely clasp two-thirds of the circumference of a small branch, the other third being embraced by the hinder toe. This fact is further confirmed by the unusual flatness of the soles of all, and by the acuteness of the claws, which, from being but slightly curved, would not upon a small branch come into contact with the wood. The union of the three anterior toes, by producing considerable breadth of sole, gives an unusual degree of steadiness to the bird, highly conducive to its remaining very long in one position.'

The following characters are assigned the *Halcyonidae*:—Wings rounded, not formed for rapid flight; feet very feeble; toes in pairs.

The whole of the genera are sedentary, watching for their food from a fixed station, which they only



Common Kingfisher (*Alcedo ispida*).

quit as soon as their prey approaches sufficiently near to come within the sweep of their wings; if unsuccessful in their first attack, they do not pursue their game, but return again to their post, and patiently wait for another luckless straggler; if their first attack is successful, they return with their victim to the same station, and then proceed to swallow it. Of the *Halcyonidae* one species only is British, viz., the Common Kingfisher (*Alcedo ispida*), so remarkable for the brilliancy of its plumage. This is the *Martin Pêcheur* of the French; *Uccello della Madonna*, *Uccello Santa Maria*, *Piombino*, and *Alcione*, of the Italians; and *Gemeine Eisvogel*, of the Ger-

mans. The habits of this species are described by Pennant, Montagu, Selby, Gould, Yarrell, and others.

KINGHORN. [FIFESHIRE.]

KINGROAD, at the mouth of the river Avon, in the Bristol Channel, is between the counties of Gloucester and Somerset. Vessels too large to proceed up the Avon to Bristol lie at anchor here.

KING-WOOD, a beautiful violet-tinted wood of Brazil, imported into this country in trimmed logs, from two to seven inches in diameter. It is principally used in turning and cabinet work.

KINGS, the *Books of*, the name of two books of the Old Testament. They originally formed only one book in the Hebrew text. In the Septuagint they are divided into two books, and are entitled 'the third and fourth books of reigns' or kingdoms, since the first and second books of Samuel are called in this translation the first and second books of Kings. These books, in common with the books of Chronicles, and many others of the Old Testament, are generally ascribed to Ezra.

KING'S BENCH. [COURTS.]

KINGSBRIDGE. [DEVONSHIRE.]

KINGSCLERE. [HAMPSHIRE.]

KING'S COLLEGE, CAMBRIDGE, was founded by King Henry VI. in 1443, in conjunction with Eton College, whence all the scholars were formerly supplied by a regular succession. Under the new statutes, which came into operation in 1861, the foundation will in future consist of a provost, at least forty-six fellows, and at least forty-eight scholars. The fellows will be elected from among all members of the college who are of sufficient standing.

Twenty-four scholarships will be appropriated to the scholars of Eton College, and the remaining twenty-four will be open. They will all be tenable till the holder is of M.A. standing, or fellow of this or any other college. The number of twenty-four Eton scholarships must be completed before any open scholarships are established.

The society of Eton consists of a provost, seven fellows, and seventy scholars. The election to the Eton scholarships is held at Eton about the end of July or beginning of August, at which time a general examination as to proficiency in divinity, classics, and mathematics takes place before the provost of each college, the vice-provost and head master of Eton, and two *posers* or examiners nominated by King's. Only such a number of candidates will be elected upon each occasion as will fill the actual number of scholarships then vacant.

Some peculiar privileges appertain to King's. The provost has absolute authority within the precincts; and by special composition between this society and the university, its undergraduates are exempt from the power of the proctors and other university officers within the limits of the college.

The original buildings of King's College consisted of the present chapel and a quadrangular court to the north of it. The buildings which constituted this court having become much decayed, it was determined that a large quadrangle should be erected to the south of the chapel. Gibbs was appointed the architect. The building was commenced in 1724, and he erected on the west side of the quadrangle the Fellows' building, or Grecian building, as it is commonly called. Nothing more was done till 1824,

when the new buildings were recommenced by Wilkins, and completed in 1828.

The quadrangle is 280 feet in length by 270 feet in breadth, and consists of the hall, library, chapel, and apartments for the fellows and scholars. The Grecian building, hall, and library, are handsome structures; but the architectural boast of King's College is the chapel, the only part of the original buildings which now remains. The first stone was laid in September, 1447. In 1508 Henry VII. gave 5000*l.* towards the completion of the building, and his executors, in 1513, under a power conferred by his will, gave a further sum of 5000*l.* for the same purpose. In July, 1515, the exterior, including the roofs, was completed. In 1526 an agreement was made for the painted windows. The screen and stalls were not finished till about 1534.

The interior of this magnificent chapel is 291 feet long, 45½ feet wide, and 78 feet high. Its exterior appearance, with its towers and buttresses, lofty windows, pinnacles, and pierced battlements, is as beautiful as it is grand and imposing. In the interior the vast stone roof, unsupported by pillars, is one of the wonders of architectural skill. Eleven principal ribs spring from the buttresses on each side, forming an arch somewhat flattened at the centre, whence ponderous stones, each of which is said to weigh a ton, hang as pendants. The principal ribs are connected with each other by diagonal ribs, and the whole roof is formed into one great whole of the lightest and most richly carved fan-tracery. The great east window and twenty-four side windows, each nearly 50 feet high, are filled with painted glass, and form a series of scriptural pictures of exceeding beauty. The great west window alone is of plain glass, probably for the sake of additional light. (*Cambridge University Calendar*, 1869.)

KING'S COLLEGE, LONDON, occupies the east wing of Somerset House. It was founded in 1828 on the fundamental principle, 'that instruction in the Christian religion ought to form an indispensable part of every system of general education for the youth of a Christian community.' The college is only intended for Church of England students. The studies embrace theology, literature, science, and medicine. A limited number of matriculated students reside within the walls. There are also evening classes and a school for young men in connection with the college. The museum contains George III.'s collection of mechanical models and philosophical instruments, presented by the queen; and also the calculating machine invented by Mr. Babbage.

KING'S COUNTY, an inland county of the province of Leinster, in Ireland, is bounded N. by West Meath, E. by Kildare, S. by Queen's County and the county of Tipperary, and W. by the river Shannon, which separates it from Galway and Roscommon. The greatest length E. to W. is 45 miles; the greatest breadth N. to S. is 39 miles. The area is 772 square miles, or 493,985 acres, of which 337,256 are arable, 145,836 uncultivated, 8258 in plantations, 902 in towns, and 1733 under water. The population in 1851 was 112,080; in 1861, 90,043, of whom 79,955 were Roman Catholics, and 9109 belonged to the Established Church.

Surface.—A series of low limestone hills, running in a north-easterly direction, divides the northern por-

tion of the county into two districts of unequal area, of which the one discharges its waters eastward to the Barrow; and the other, which is of about double the extent of the former, westward into the Shannon. This range of eminences terminates in the north-eastern part of the county in the conical hill of Croghan, from which the Yellow River flows northward into the Boyne. The northernmost part of the county is well cultivated; but this is succeeded on the south by peat bog, forming a portion of the great Bog of Allen. This tract, extending about 12 miles every way, is divided into two principal valleys by the Philipstown and Cushina rivers, which flow into the Barrow. The highest part of the bog is 286 feet above the level of the sea. There are numerous other bogs in this county. The valley of the Barrow, which consists on the King's County side of an arable margin interposed between it and the Bog of Portarlinton, is highly cultivated, and to a considerable extent occupied by the demesnes of the resident gentry. The district westward of the range of hills is watered by several small tributaries of the Shannon, among which are the Brosna, Clodagh, Frankford, and Blackwater. In this district, as in the eastern, the bogs are very numerous. The bogs on the western side of Tullamore, lying along the southern side of the Grand Canal, occupy an area of 11,588 acres. They are disposed in three principal tracts, separated from one another by low hills of limestone gravel, and bounded on the south by the hill of Cloghan, which separates the bogs immediately bordering on the canal from the more extensive tract lying between its southern declivity and the range of Slieve Bloom. This latter tract, consisting of five principal fields, extends over 23,986 acres. The valley of the Brosna is the best cultivated portion of the north-western division of the county. The river winds between undulating banks, which form a margin of considerable breadth on each side, free from bog, and towards West Meath spread into a well-cultivated open country. The district included between the Brosna and the county of West Meath, with the exception of the arable margin of the river, is almost wholly occupied by bogs. One of the bogs of this district is that of Kilmaleady, now generally known as the 'moving bog,' which in the year 1821 burst its bounds and overflowed nearly a mile and a half down an adjoining valley.

The remaining portion of the county, included between the Slieve Bloom mountains, Tipperary, and the Shannon, has a general slope towards the Little Brosna, which forms the boundary between King's County and Tipperary. The portion which descends immediately to the Shannon is bleak moorland, comprising a considerable part of the bogs lying south of Cloghan Hill; but the banks of the Shannon are richly clothed with meadows, though liable to frequent floods. The valley of the Little Brosna is an undulating district, containing extensive tracts of pasture, and towards the mountains abounding with varied and pleasing scenery. The highest elevation of the Slieve Bloom mountains is 1689 feet. They extend 15 miles in a line from north-east to south-west. The navigation of the Shannon is aided by three lateral cuts or canals, at Meelick, Banagher, and Shannon Bridge. Many steamboats ply on this part of the Shannon.

Climate.—Notwithstanding the great extent of wet ground on the surface of King's County, the climate is neither damp nor unwholesome; it is, indeed, drier than in most Irish counties. This is partly accounted for by the antiseptic quality of the peat bog, and partly by the fact of the county lying comparatively high and open.

Geology.—The floetz limestone of the central plain spreads over the entire area of the county, with the exception of the portions occupied by the protruded masses of the Slieve Bloom chain and the hill of Croghan. The range of Slieve Bloom consists of a nucleus of clay-slate, supporting flanks of sandstone. Croghan Hill consists of a protruded mass of trap conglomerate, rising about 500 feet above the level of the surrounding country, with steep declivities towards the south. The hill is almost all under cultivation, and yields the most abundant white and green crops without any manure whatever. Massy strata of greenstone appear also between Croghan Hill and Philipstown. Granular limestone occurs at the Seven Churches in the north-west of the county, and has been quarried to the extent of 3000 cubic feet of good gray marble. Banks of rolled limestone gravel, called eskers, occur frequently throughout the floetz limestone district. The bogs, which occupy so large a portion of the county, generally repose on limestone gravel.

Products, &c.—The soil in general is of average fertility, and can be made to yield very good crops in the arable districts by manuring with the lime and bog-stuff which abound throughout the county. The banks of the Shannon, where they are occasionally overflowed, afford considerable tracts of fine pasture. The chief grazing districts in the county lie on the borders of West Meath, where the land is considered very favourable to wool-growing. The principal crops are wheat, barley, oats, and potatoes.

The linen manufacture is carried on to a small extent; and there is a little weaving of friezes, stuffs, and serges. Distilling, brewing, and corn-grinding occupy a few hands. The occupations of the inhabitants, however, are chiefly agricultural; the manufactures being only for home consumption.

Communications.—The Grand Canal traverses the county from Edenderry in the east, to Shannon Harbour in the west. The Athlone extension of the Great Southern and Western Railway runs through it from north-west to south-east, passing through Portarlinton, Tullamore, and Clara; and in the south there is a branch of the same railway from Roscrea to Parsonstown.

King's County is divided into twelve baronies and fifty-one parishes. It is chiefly in the dioceses of Meath, Killaloe, and Kildare, but portions are in Ossory and Clonfert. It is in the Home Circuit, and the assizes are held at Tullamore. It returns two members to Parliament. The number of voters on the county register in 1869 was 3435. There are no parliamentary boroughs. The county is within the Dublin or Northern Military District; and there are barrack stations at Parsonstown, Banagher, Philipstown, Shannonbridge, and Tullamore. The principal towns, with the population of each in 1861, are the following:—*Banagher* is 82 miles W. by S. from Dublin, on the east bank of the Shannon, at one of the guarded bridges across the Shannon to

Connaught. The town consists principally of one very long street, occupying elevated ground. It has a considerable trade in the export of corn and other provisions. There is a spacious church and a Roman Catholic chapel. Population, 1426. *Edenderry* is 32½ miles W. from Dublin. The Grand Canal passes within a mile of the town, to which a branch has been extended. It contains a town-hall and a church, and is a neat and clean place. Population, 1661. *Parsonstown*, formerly and still generally called *Birr*, is 69 miles W.S.W. from Dublin. The town is situated on a gentle acclivity on the north bank of the Little Brosna. The modern parts are laid out in good streets and squares, and respectably inhabited. The church and the Roman Catholic chapel are handsome edifices. The surrounding country is fertile and flourishing, and the town has an extensive retail trade. Population, in the town, 5401; in the parish, 9292. At *Birr Castle*, which has been rebuilt, is the earl of Rosse's very powerful telescope, which has so largely aided the researches of modern astronomers. *Portarlinton* is situated on both sides of the Barrow, the largest portion being in Queen's County. [*QUEEN'S COUNTY.*] *Tullamore*, the assize town of the county, is situated near the centre of that vast mass of peat-moss called the Bog of Allen, 50 miles W. by S. from Dublin. The Grand Canal passes it on the north side, and the stream called the Tullamore River flows through it. Regularly built, and with wide streets, it is a respectable-looking town. The court-house, gaol, church, Roman Catholic chapel, and public schools, are conspicuous and rather handsome buildings. There is daily communication with Dublin, by means of swift iron boats, and the canal boats to and from Ballinasloe and Limerick all call here. Tullamore, has risen since 1790 from a small village, and is now the principal shipping station on the Grand Canal, by means of which great quantities of corn and other provisions are forwarded to Dublin. There is a large distillery and brewery, together with several other branches of trade, connected with the supply of a large town and populous district. There are barracks, market-house, union workhouse, meeting-houses for Dissenters, &c. The environs are well cultivated, and contain several neat cottages and villas. Population, 4797.

History.—Although not reduced to shire-ground as one county until the time of Mary, King's County was partially included in other shires at a very early period. In 1557 the Act was passed which erected the whole into one county under its present name. Before that period it was generally designated Western Glenmalery, to distinguish it from Eastern Glenmalery, the present Queen's County. The native chieftains for a length of time struggled against the new settlement, until 1600, when the Lord Deputy Mountjoy and Sir Oliver Lambert succeeded, after a deplorable destruction of life and property, in finally reducing them. King's County, like others, was involved in the rebellion of 1641; and extensive confiscations followed.

The ruins of the seven churches of Clonmacnoise, in the north-western part of this county, form one of the most interesting groups of ecclesiastical remains to be met with in Ireland. The buildings are of various dates, from, probably, the seventh century

to the twelfth. Surrounding the Abbey of St. Kieran of Clonard is the ancient burying-ground, containing about two Irish acres, and occupied with the sites and ruins of various religious houses. The whole is inclosed with a wall, at two of whose angles ancient round towers are placed. The buildings within the precincts are chiefly chapels, erected over family burying-places by the various Irish kings and chieftains. There are the remains of several other religious houses in the immediate vicinity. The entire group occupies a gently swelling bank rising from the Shannon about midway between Shannon harbour and Athlone. Many other religious houses are enumerated, besides numerous remains of feudal castles, chiefly of the Elizabethan era, of which those of Cloghan, Leap, and Birr are still inhabited.

KINGSCOURT. [*CAVAN.*]

KING'S EVIL, a scrofular affection of the glands. It was long believed by the superstitious that the touch of the sovereign was an immediate cure for this disease, but no sovereign has 'touched' for the 'evil' since Queen Anne.

KING'S LETTER. [*BRIEF.*]

KING'S LYNN. [*NORFOLK.*]

KINGSTON, a city of Western Canada, on the site of Fort Frontenac, in the north-east extremity of Lake Ontario, at the mouth of the Cataract, and at the terminus of a branch of the Grand Trunk Railway, 165 miles E.N.E. of Toronto. Its population in 1861 was 13,743. It was the seat of government in Canada from 1840 to 1845; and next to Quebec and Halifax it is the most important military station in British America.

The city covers a large surface, and has many elegant buildings, large shipbuilding yards, iron foundries, and manufactures of steam engines and agricultural implements. It is the chief seat of the trade between Upper and Lower Canada, and the harbour—which is sheltered by Wolfe and Garden Islands—has a long row of wharves, with machinery capable of unloading 3000 bushels of grain per hour; there is also an extensive trade with steamers on the Lake, the St. Lawrence, and the Rideau Canal.

In 1862 Kingston became the seat of the new colonial bishopric of Ontario. In the city are the Queen's University and College, incorporated in 1841, which has faculties of theology, law, and medicine, seventeen professors and lecturers, and an average of about 150 students; Regiopolis college, a Roman Catholic institution; a county grammar-school, and many private educational establishments, and the provincial penitentiary.

KINGSTON. [*JAMAICA.*]

KINGSTON-ON-HULL. [*HULL.*]

KINGSTON-ON-THAMES. [*SURREY.*]

KINGSTOWN. [*DUBLIN.*]

KING'S TRADESMEN, in Scotland, are tradesmen holding commissions under the Privy Seal, in right of which they are not liable for assessment for the poor or other burghal prestations. The right of the sovereign to appoint such persons is limited to one of each craft or occupation.

KING-TE-CHING, a town of China, in the province of Kiang-si, 110 miles N.E. of Nan-tchang. It is the principal seat of the manufacture of porcelain in China, for which it is said 500 furnaces are employed. The population is estimated at 1,000,000.

KINGTON. [HEREFORDSHIRE.]

KINIC ACID, sometimes called Cinchonic Acid, is obtained from cinchona bark. It has a very sour taste; it reddens litmus paper strongly, is unalterable in the air, dissolves in $2\frac{1}{2}$ times its weight of water at 48° , and is also soluble in alcohol. The crystals contain one equivalent of water. The acid is composed of oxygen⁹, hydrogen⁹, and carbon¹⁵.

Kinic acid combines with other substances to form *Kinates*. Among them the following are the most important:—*Kinate of Quinia* is very bitter, readily soluble in water, and but slightly in alcohol of sp. gr. 0.837. It is decomposable by heat, without residue. By evaporation the solution is reduced to a viscid paste, which when moistened and exposed to the air exhibits rudiments of crystallization. It is composed of kinic acid¹, quina². *Kinate of Cinchona*, composed of kinic acid¹, cinchona², is bitter, very soluble in water, and slightly in alcohol. *Kinate of Lime* (kinic acid¹, lime¹, water¹⁰), crystallizes in rhomboids and hexagonal plates; it has little taste; it is soluble in water.

Kinic acid may be artificially combined with most of the metals, and thus forms *Kinate of Potash*, *Kinate of Soda*, *Kinate of Zinc*, *Perkinate of Iron*, *Kinate of Lead*, *Kinate of Copper*, *Perkinate of Mercury*, *Kinate of Silver*.

KINKAJOU (*Cercoleptes caudivolvulus*), a plantigrade animal which is usually classed with the true bears (*Ursidae*), though it differs considerably from them in its general characters. It has short and blunt canine teeth, behind which are two small pointed pre-molars, and behind these three tuberculated molars. The plantigrade feet have five toes, which are more widely separated than in the bears, and can be used more freely. The kinkajou is about the size of a domestic cat, and is covered with yellowish woolly fur. It feeds on different kinds of fruit and honey, is a native of the tropical countries of America, and is of an extremely gentle and playful disposition in captivity. It is therefore much esteemed as a domestic pet. Its agility is remarkable, and it speeds from tree to tree like the flying monkey. (Bates, *The Naturalist on the River Amazons*.)

KINO, an astringent substance, the concrete juice of several plants. The different extracts differ in their chemical habitudes with re-agents, but all agree in possessing a strong astringent power. Kino most commonly occurs in grains of a shining aspect and rich ruby red colour; they are easily reduced to powder. It is nearly entirely soluble in water and in alcohol. Vauquelin analyzed that sort which is termed African, and found it to consist of 75 per cent. of tannin, 24 of red mucilage, and 1 of woody fibre. Indian kino is said to be the produce of *Pterocarpus Morupium*; and African kino that of *Pterocarpus erinaceus*.

KINROSS. [KINROSS-SHIRE.]

KINROSS-SHIRE, a small inland county of Scotland, bounded E. and S. by Fifeshire, and W. and N. by Perthshire. It lies between $56^{\circ} 9'$ and $56^{\circ} 18'$ N. lat., and between $3^{\circ} 14'$ and $3^{\circ} 35'$ W. long. Its greatest length E. to W. is 12 miles, and its greatest breadth N. to S. is 10 miles. The area is 78 square miles, or 50,560 acres, of which about 30,000 are arable, 3000 wood, and 3327 water—

the latter consisting principally of Loch Leven. In 1861 the population was 7977—3779 males and 4198 females—in 1851, 8924. At the time of the census there were in the county 1644 inhabited houses, 100 uninhabited, and eight building.

The borders of the county are hilly, but the interior, comprising about one-half of the whole, forms a natural hollow round Loch Leven; based on coal and limestone rocks. The soil is various, chiefly inclining to sand and gravel. Some portions consist of a clayey loam, and are tolerably fertile, but in the more elevated parts the surface consists of moorland, and forms excellent pastures. Throughout the county the land is well cultivated; but the soil is least fertile where it rises towards West Lomond Hill, which is on the Fifeshire side, 1727 feet high. The better lands are inclosed; and oats, barley, and turnips are the chief crops. The climate, though cold, owing to the general elevation of the land, has been rendered much drier by an extensive system of drainage.

There is some coal in the south, where the county borders on Fifeshire. There are also freestone quarries of good quality in that quarter. To the north of Kinross red freestone is the geological formation of the district. The higher hills are whinstone or basalt. Some cotton and woollen goods are made; but the manufactures are unimportant.

This county contains several fresh-water lakes, some of which are well stocked with pike, and the rest with perch, eel, and other fish. Of these lakes the principal is *Loch Leven*, which although inferior in magnitude and picturesque beauty to Loch Lomond, is still a noble piece of water, covering a surface of nearly 3300 acres. Its height above the level of the sea is about 360 feet. Its greatest depth is from 80 to 90 feet, and its circumference about 11 miles, a partial drainage having reduced it 3 miles. It contains several islands, on one of which, in its midst, called Castle Island, Mary Queen of Scots was imprisoned in 1567–68, and signed her abdication on July 4, 1567, and from which, on May 2, 1568, she made her escape, shortly before the battle of Langside. The lake abounds in fish, among which the excellent gray trout is highly prized.

The chief streams are the Garry, the South Queich, and North Queich, all of which fall into Loch Leven. The waters flowing from the loch form the river Leven, which, after a course of about 14 miles, passing through a part of Fifeshire, falls into the Frith of Forth at Largo Bay.

Kinross was included in Fifeshire down to 1426. It is the smallest but one of the Scottish counties. There is a ruined castle at Burleigh. The county is divided into four whole parishes, and portions of three others; one presbytery in the synod of Fife; and has one small debt court. It joins with Clackmannanshire and four neighbouring parishes in Perthshire, in returning one member to Parliament. Electors on the county register in 1869, 550. The only towns in the county are the following:—

Kinross, the county town, is situated on the western shore of Loch Leven, 19 miles N.N.W. from Edinburgh. The lower part of the town is mean, but it rises towards the north, where there are many handsome houses. There is a modern parish church,

a county hall and gaol, town-hall, &c. Some manufactures of cotton, tartan shawls, plaids, and damasks, are carried on. The town communicates by railway with Dunfermline, Stirling, and the North British line. The population of the entire parish of Kinross at the census of 1861 was 2649; within the limits of the town only 2083.

Milnathort, 2 miles N. from Kinross, has a market on Wednesdays, though it is only considered a village. Population 1476, included in the parish of Orwell.

KINSALE. [CORK.]

KINTORE. [ABERDEENSHIRE.]

KIOSK, a Turkish word for an open pavilion or summer-house, supported by pillars, which is now becoming a favourite ornament of European gardens.

KIPPIS, ANDREW, D.D., F.R.S., born 1725, died 1795, was educated in a dissenting academy at Northampton. After a few years spent in the exercise of his ministry at Boston in Lincolnshire, and at Dorking in Surrey, he settled in London, in 1753, as pastor of a congregation of Presbyterian dissenters in Westminster. In 1763 he became tutor in an academy for the education of dissenting ministers in London. In 1771 he was elected a fellow of the Society of Antiquaries, and in the next year a fellow of the Royal Society.

Dr. Kippis was a principal contributor to the *Monthly Review* and the *New Annual Register*. But the work with which his name is most honourably connected is the republication of the 'Biographia Britannica,' with a large addition of new lives, and a more extended account of many persons whose lives were included in the former edition.

KIRKALDY. [FIFESHIRE.]

KIRKBY LONSDALE. [WESTMORELAND.]

KIRKCUDBRIGHT, THE STEWARTRY OF, is a maritime county in Scotland, bounded N. and N.W. by Ayrshire, E. and N.E. by Dumfriesshire, from which it is in part separated by the river Nith, S.W. by Wigtonshire and Wigton Bay, and S. and S.E. by the Solway Frith. It lies between 54° 43' and 55° 19' N. lat., and between 3° 33' and 4° 34' W. long. Its length E. to W. is about 48 miles; its breadth varies from 17 to 30 miles. The area is 954 square miles, or 533,760 acres, of which nearly one-third is arable, and 8000 under water. In 1861 the inhabitants numbered 42,495—19,789 males, and 22,706 females—who were living in 7326 houses. There were 233 uninhabited houses, and 66 building in the county; in 1851 the population was 43,121.

The coast, except in the upper part of Wigton Bay, is generally bold and precipitous. The surface of the county is rugged and barren, more particularly towards the sea coast. About two-thirds of the surface are mountainous. The chief elevations are Blacklurg in the north, which rises to the height of 2890 feet above the sea; Cairnsmuir in the west, 2892 feet; and Criffel, a detached granite mountain on the shore of the Solway Frith, 1831 feet.

The soil is thin, but improved by shell marl, &c., on the coast and along the rivers, where the best land is found. When well manured, the ground is often very productive. Abundance of good marl is furnished by upwards of thirty lakes which dot this county. The largest is Loch Ken, of great length, but extremely narrow. The climate is moist, and, except in the uplands, very mild.

The farms throughout the country are of moderate size, with improved buildings, and generally let on nineteen years' lease. Large numbers of cattle (the polled Galloway breed) and hogs are bred and fattened for the Liverpool, London, and other markets. The pastures are excellent. The sheep kept in the moors are mostly black-faced; Southdowns, Cheviots, and Leicesters are numerous in the mountains, and common in the lowlands. The small native hardy Galloway nags have been superseded by draught horses of a larger size, though some remains of the pure and valued breed of Galloway horses still exist. The parish of Borgue is noted for its superior horse.

Oats are the grain chiefly cultivated. The potato crops are considerable, and constitute a principal article of export to England, after supplying the inhabitants and feeding a great number of swine. Turnips, wheat, and barley are also grown.

Granite, porphyry, and grauwacke are the prevalent rocks. From the excellent granite quarried at Cree-town the new docks at Liverpool were constructed. A little iron and lead has been found; slate, limestone, sandstone, and millstone exist in various parts. Besides the numerous lakes, there are two principal streams, the Dee and the Urr. The former has its source near the north-western boundary of the shire, and falls into the Bay of Kirkcudbright. The salmon fisheries on this river are valuable. The Urr rises in a lake of the same name on the borders of Dumfriesshire, and discharges itself into the Solway Frith. The county does not possess any manufacture of importance.

There are some useful mineral springs. Good roads, and stone inclosures, called Galloway dykes, are common. Some fragments of an ancient stone dyke, or boundary, which was 8 feet broad and 50 miles long, yet remain in the uplands.

The county is now traversed by the Portpatrick branch of the Glasgow and South-Western Railway.

Kirkcudbright (pronounced 'Kirkewbree') was the seat of the Selgova and Novantes in the Roman province of *Valentia*. A Roman way can still be traced across the northern extremity. Drumore, near Kirkcudbright, is supposed to be the site of *Caerbantorium*.

In the eighth century the present country became part of Galloway, so called from the Irish Scots of Gaelic extraction, who settled here. There are many remains of British, Roman and Pictish camps, and stations, cairns, &c., with a Logan stone in the Kells range; Druid stones at Mennigaff; besides the ruins of New Abbey, Dundrennane Priory, Anworth and Lincluden churches, Kennure, Threave, Cardonness, and several other castles.

The condition of the rural population and the state of agriculture in this county up to the end of the last century were very primitive. The principal food, even in the early part of the present century, was chiefly kail, and oats ground in querns, turned by the hand, and dried in a pot. Before the Reformation it possessed more monasteries than any other county in Scotland.

Kirkcudbright is divided into twenty-eight parishes and one presbytery in the synod of Galloway. It contains two royal and parliamentary burghs (Kirkcudbright and New Galloway), and six small debt courts. The number of electors in the county is

1869 was 1883, who return one member to the House of Commons.

The principal towns, with the population of each in 1861, are the following:—

Castle-Douglas, a burgh of barony, situated near the centre of the county in the parish of Kelton, has a very large weekly market for agricultural produce. This town is quite modern, and has increased with great rapidity. The streets are wide, and cross each other at right angles. There is a town-hall, and the post-office embraces a wide extent of delivery, with many sub-offices. Population, 2261.

Gatehouse-of-the-Fleet, a municipal burgh, and river port in the parishes of Anworth and Girthon, is situated chiefly on the east bank of the river Fleet, near its entrance into Wigton Bay. A bridge crosses the river, and about one-fifth part of Gatehouse is on the west bank. Vessels of 180 tons can come up the river to this town, a distance of about 3 miles from the mouth. A canal about a mile long abridges the length of navigation. The town is 5 miles N.W. of Kirkcudbright. Population, 1635.

Kirkcudbright, the county town, is situated on the eastern bank of the estuary of the Dee, about 6 miles from the mouth of the Bay of Kirkcudbright, and 101 miles S. by W. from Edinburgh, and 10 miles from the Castle-Douglas station of the Glasgow and South-Western Railway, with which it is connected by a branch. It was anciently a burgh of barony, but it was erected by James II. into a burgh of regality in 1455. The river opposite the harbour is 20 feet deep at neap tides, and 400 feet wide. Coal and lime are imported from Cumberland in large quantities, and some timber from abroad. Wheat, oats, potatoes, and other agricultural products, are exported. Population in 1861, of the entire parish, 3407; of parliamentary burgh, 2552; of municipal, 2638. The number of the parliamentary and municipal constituency is 180. It is governed by a provost, two bailies, and seventeen councillors. Quarter sessions, stewartry, and small debt courts, are held here; it is the head of a poor-law union, and the seat of a presbytery. The town is well built. Its principal buildings are—a handsome church, lately rebuilt; court-house, custom-house, town-hall (1508), gaol, market-house, water-works, grammar-school, and union workhouse. There are remains of an old castle of the lords of Kirkcudbright in the middle of the town, with several British and Roman works in the neighbourhood. Besides the parish, there are Free and United Presbyterian churches; and a Roman Catholic chapel; a mechanics' institute, with library and reading-room, and large hall above (one of the finest rooms in the south of Scotland). The Dee is spanned by a magnificent viaduct at Tongland. Although the harbour is the best in the south of Scotland, the town has but little trade beyond the employment of a few cotton looms, some shipbuilding, &c. The scenery around the town is very beautiful, the rising grounds on each side the river, from Tongland to the sea, being embellished with plantations. About a mile distant is St. Mary's Isle, the beautiful seat of the earl of Selkirk, where are some of the largest trees in the country. Education is very cheap, and Kirkcudbright has long been noted for its schools. It has a free school, which is attended by a large

number of children, endowed by one of the inhabitants, and called the 'Johnston Free School.' The borough unites with Dumfries, Annan, Lochmaben, and Sanquhar in returning one member to Parliament. Steamers ply from hence to Liverpool.

Maxwell-Town, a burgh of barony, is situated on the west bank of the Nith, opposite Dumfries, with which it is connected by two bridges. The streets of the old part of the town are narrow and crooked; those of the new part are straight, and sufficiently wide. There is a court-house, beneath which is a gaol. There are two foundries, two roperies, a damask manufactory, and four nurseries, in which grapes and other rarer fruits are raised by artificial heat in great perfection. Population, 3599.

New Galloway is a royal and parliamentary burgh in the middle of the county, 19 miles N.W. of Kirkcudbright, in the parish of Kells, and 14 miles from the railway at Castle-Douglas. The population of the entire parish of Kells is 1167; within the limits of the parliamentary borough of New Galloway, 462; of the royal burgh, only 452. The number of voters is of course very small—only thirty. New Galloway contains a church, town-house, and gaol; and belongs to the heirs of the late Lord Kenmare, of Ken Castle. It takes its name from the district of Galloway, on the borders of which it stands, near Loch Ken. It was first chartered in 1629; is governed by a provost, two bailies, and nine councillors; and is the seat of steward, commissary, and small debt courts. This place unites with Wigtown (24 miles distant), Stranraer, and Whithorn (all in the county of Wigtown), in sending one member to the House of Commons.

KIRKDALE CAVE. This cavern in the oolitic limestone, not far from Kirkby Moorside in Yorkshire, is remarkable for a great quantity of bones, chiefly of extinct animals, which were found in it, and which gave occasion to the publication of Dr. Buckland's geological work, the 'Reliquiæ Diluvianæ.' It was discovered in 1821, and had a nearly level floor, parallel to the limestone strata. Its extent was 245 feet; the height varied from 3 to 6 feet or more. On the rocky floor was generally a bed of mud, covered over by an irregular layer of sparry stalagmite, formed by the dropping of water containing carbonate of lime in solution; and it was in this stalagmite and in the mud below it that the bones were found. Of the animals to which the bones belonged 6 were Carnivora, hyena, felis, bear, wolf, fox, weasel; 4 Pachydermata, elephant, rhinoceros, hippopotamus, horse; 4 Ruminantia, ox, and three species of deer; 4 Rodentia, hare, rabbit, water-rat, mouse; 5 Birds, raven, pigeon, lark, duck, snipe. The bones were almost universally broken. The remains of hyenas were the most abundant of all the bones; their teeth were found in every condition, from the milk tooth to the old worn stump.

KIRKHAM. [LANCASHIRE.]

KIRK SESSIONS. [SCOTLAND.]

KIRKWALL. [ORKNEY.]

KIRRIEMUIR. [FORFARSHIRE.]

KIRSCHWASSER (Ger.), 'cherrywater,' a kind of spirit made from black cherries, and much esteemed in Germany. The cherries, kernels and all, are pounded and broken in a vessel, and left to ferment for some days. The liquor is then obtained by dis-

tillation, and flavoured occasionally with hydrocyanic acid. Kirschwasser is sometimes called 'cherry brandy,' but the ordinary cherry brandy is made by mixing brandy with the juice of cherries.

KIRTLE, in the feudal ages, a sort of coat of mail, or surcoat. Sometimes it was short; but that of the knights of the Bath reached to the heels.

KIRWAN, RICHARD, was born in Ireland about the middle of the last century, and died in 1812. He was for some time president of the Royal Irish Academy, and was elected member or associate of most of the literary societies of Europe. His memoirs are diffused through the 'Transactions' of the Royal Society of London, those of the Royal Irish Academy, and other publications. One of his most remarkable separate works was 'An essay on the Constitution of Acids.'

KISHENAU or KICHENEV, the capital of Bessarabia in Russia, on the Buik, a feeder of the Dniester, 95 miles N. W. of Odessa. When it came into the possession of Russia in 1812 it was a small wretched place, but it has since increased more rapidly in proportion than any other town in the empire; the population having been 94,124 in 1863. It covers three hills, has about twenty churches, and some handsome public buildings and manufactures of woollen cloth, brandy, and leather, and a very extensive trade in corn, cattle, flax, and hemp.

KISSINGEN, a town of Bavaria, in Lower Franconia, noted for its mineral springs. They are both acidulous and chalybeate, and not only is the water used for drinking and bathing, but about 500,000 bottles are annually exported. The town is visited by large numbers of English. The resident population is only about 2000. Near the town are salt mines, from which 30,000 cwt. of salt are raised yearly. The gambling tables were suppressed in 1848.

KIT-CAT, a term applied to a Whig political club in London, founded about 1688, to which Addison and Steele belonged, so called from Christopher Cat, a pastry-cook who served the club with mutton pies. Sir Godfrey Kneller, a member of the club, painted a series of portraits of all the other members, which were hung up in the room of meeting. To accommodate the paintings to the height of the walls he was obliged to adopt a new size of canvas; hence Kit-cat is generally applied to any portrait about three-quarters of the figure in length.

KITCHEN-GARDEN. In laying out the grounds of a country residence provision should be made for the site of the kitchen-garden. Though it should not obtrude on the ornamental ground immediately adjoining the house, the design of the whole should be so formed as to leave the kitchen-garden in the most favourable situation with regard to aspect, soil, and water. The aspect should be open to the south, but sheltered on other sides, more especially from northerly and easterly winds, by rising ground or lofty trees at some distance. The surface should be nearly level, or in some cases, according to the pervious nature of the subsoil, it may be quite so; but, generally speaking, a gentle slope from north to south is best. The soil should consist of a rich loam, neither too light nor so adhesive as to be liable to bind strongly in dry weather. The depth of soil ought

not to be less than two feet, and more is absolutely necessary for some kinds of vegetables.

Much injury is done to vegetation by watering with cold spring water, or indeed with any water that is much colder than the soil and atmosphere in which the plants are placed. Plants, when not watered at all in dry weather, if they are only kept alive, succeed better when rain does come than others that are watered, or rather chilled with water, at a comparatively low temperature. Water for the kitchen-garden should therefore be derived from ponds or large reservoirs fully exposed to the sun, and even these should be supplied by open rather than underground channels.

The quantity of ground which a kitchen-garden should contain must be regulated according to the number of individuals which it is required to supply. An acre is calculated to afford a tolerable supply for sixteen individuals, but much depends on the nature of the vegetables required. Potatoes, turnips, peas, and carrots are frequently obtained of better quality and at less expense from a field than from a garden.

The form of a kitchen-garden should be composed of straight lines. If rectangular, it will prove a saving of labour; for it is practically known that more time is required to trench a piece of ground of a triangular form than if the same extent were in the shape of a square or parallelogram. A range of forcing-houses is generally placed on the north side; and as the wall on that side is the most valuable for fruit-trees, on account of its direct south aspect, it becomes desirable that it should be extended as much as possible on one or both ends of the range.

The interior departments of the kitchen-garden are usually bounded by fruit-trees planted within two or three feet of the walks. Not only are bushes, such as gooseberries, currants, and raspberries, used for this purpose, but fruit-trees of various kinds. The latter are trained either as dwarfs by grafting apples on paradise stocks, and pears on quinces, and causing their branches to proceed from near the ground, or as espaliers. They were formerly much more in use for training fruit-trees in kitchen-gardens than they are at present, as many object to their appearance, and others to their utility, as compared with their expense.

Very few of the subjects of kitchen-garden cultivation are indigenous; they are chiefly varieties of luxuriant habits, which are artificially maintained and augmented by the art of the cultivator. The principal means employed for rendering the soil of the kitchen-garden subservient to this purpose are: the application of abundance of manure; trenching, digging, and otherwise stirring the soil; and a due rotation of crops. Manure supplied in abundance will generally produce luxuriance in vegetables, although sometimes a disagreeable rankness is communicated to the flavour. This is in a great measure corrected by trenching, which becomes occasionally highly necessary; and although expensive, it will always repay the cost, if judiciously performed, particularly if the soil be of a consolidating nature.

It is always advantageous to attend to a proper rotation of crops, especially where manure is not abundantly applied, nor trenching performed. One kind of plant should not immediately follow another of the same nature, or one closely allied.

KITE. [FALCONIDÆ.]

KITTIWAKE, the popular name for one of the gulls, *Laridæ*. It is the *Larus rissa* of some ornithologists, and the *L. tridactylus* of others. It frequents the British coasts at the breeding season, but leaves in winter. It arrives on our coasts in March, and departs in October. In Scotland its favourite breeding places are on the shores of the northern Hebrides. It is a beautiful bird. The plumage is full, close, and elastic. The bill is a pale yellowish green. The head, neck, all the lower parts, the fore part of the back, and the upper tail-coverts are white. The back, the upper surface of the wings, and the scapulars are a light bluish-gray. The length of the bird is about 17 inches, the extent of the wings 36.

KITTO, JOHN, the eminent self-taught biblical scholar, was born at Plymouth, 4th December, 1804. Through the intemperance of his father his childhood was passed in poverty, so that he got no schooling worthy of the name. Having, however, through his grandmother's kindness learned to read, he devoured all the nursery literature within his reach. When he was about ten years of age he was set to work as assistant to his father, who was a mason. On the 13th of February, 1817, the little drudge, who was engaged carrying mortar and slates, missed his footing and fell from the roof of a house. Long he lay in bed afterwards, and by the accident his sense of hearing was completely extinguished. He resorted to various contrivances to gain a livelihood, groping for bits of rope and iron in Sutton pool, painting heads and flowers, &c. The love of reading still grew upon him, victim though he was of hunger and nakedness, and at length the starved and ragged lad was admitted into Plymouth workhouse. In the workhouse he kept a journal—a curious record of his history and privations. The various writings of the pauper youth began to attract attention; a subscription was made for him; and he left the hospital in which he had been an inmate for about four years. Mr. Groves, then a dentist in Exeter, took him under his charge as an apprentice; and during his stay at Exeter, and in his twentieth year, he published a small volume of essays. Kitto then went to the Missionary College in Islington to learn printing, with a view to mission work abroad. Malta was selected as his field of labour, and there he resided eighteen months. On his return he found Mr. Groves preparing to go as a missionary to the East, and he at once agreed to go with him as tutor to his children. Mr. Groves and his party reached Bagdad on the 6th December, 1829, and Kitto remained till September, 1832. During his stay in Bagdad the city was besieged; the plague broke out and carried off fifty thousand of the population in two months; and the river overflowed its banks, throwing down seven thousand houses. Kitto came home by way of Constantinople, and arrived in England, June, 1833, having kept a pretty full journal of his Eastern travels. He began at once to write in the *Penny Magazine*, and Mr. Knight engaged him for the *Penny Cyclopædia*. His travels had furnished him with a knowledge of Oriental customs and peculiarities, and he projected the Pictorial Bible, which was published in monthly parts, and finished in May, 1838. It rose at once into high popularity. The 'Pictorial History of Palestine'

followed; the 'Christian Traveller,' of which a few parts only were published; the 'History of Palestine,' the 'Cyclopædia of Biblical Literature,' the 'Pictorial Sunday Book,' and the 'Lost Senses,' containing virtually an autobiography of great interest. Then came the 'Journal of Sacred Literature,' to which he gave much of his time; and finally the 'Daily Bible Illustrations,' in eight volumes, and dedicated to the queen. But before this work was concluded he had fallen into bad health. To secure him some relaxation a sum of money was raised among his friends—a pension of 100*l.* from the civil list having been previously conferred upon him. Broken down and exhausted from constitutional debility and excessive labour, he repaired to Germany and finally settled at Canstatt on the Neckar. Recovery was hopeless, his days were clouded by family bereavement, and after some hours of severe convulsions he died on the morning of the 25th of November, 1854. The University of Giessen conferred upon him, though a layman, the degree of D.D. in 1844, and in the following year he was elected a fellow of the Royal Society of Antiquaries.

KIZIL ERMAK. [ANATOLIA.]

KLAGENFURT. [CLAGENFURT.]

KLAPROTH, MARTIN HEINRICH, was born at Wernegerode in Upper Saxony, on December 1, 1743. After passing seven years in the public laboratory at Quedlinburg, and two years in that of Hanover, he went to Berlin, and in 1770 to Danzig; he afterwards returned to Berlin as an assistant to Valentine Rose, one of the most distinguished chemists of the day, and on his death in 1771 he succeeded him. In 1780 he underwent the necessary forms and examinations for the profession of an apothecary. His thesis 'On Phosphorus and Distilled Waters' was printed in the 'Berlin Memoirs' for 1782.

His various analyses and contributions to chemical science were collected in 1796, under the title of 'Contributions to the Chemical Knowledge of Mineral Bodies;' the last and sixth volume appeared in 1815, about a year before the death of the author. He died at Berlin, January 1, 1817.

KLAPROTH, JULIUS HEINRICH VON, the son of the former, was born at Berlin on the 11th of October, 1783. He learned Chinese secretly without the help of a master. His father, perceiving that he devoted his time exclusively to Oriental languages, sent him, in 1801, to the University of Halle, to study the classical languages. He remained several years at Halle, when the learned Count John Potocki proposed to him to enter the service of the Emperor Alexander of Russia. Upon his arrival at St. Petersburg, early in 1805, the Russian government being then engaged with the plan of sending an embassy to China, Count Potocki obtained for Klaproth the place of an interpreter. He set out alone, and after having traversed the Ural Mountains, arrived at Irkutsk. On the return of the embassy, Klaproth took a solitary route through Southern Siberia, and only reached the Russian capital in the beginning of 1807. Before the end of the year he was sent on a scientific mission to the Caucasian provinces. He returned in January, 1809, with a large stock of information, most of which afterwards formed the subject of separate works and articles in learned periodicals. During his stay in Russia he was active in establishing a school of

Oriental languages at Wilna, and in making a descriptive catalogue of the Chinese and Mantchu MSS. in the imperial library at St. Petersburg. He was sent in 1811 to Berlin, to superintend the engraving of the characters which were intended for printing those MSS. In 1812 he tendered his resignation to the Russian government, and after some time received permission to leave. After various vicissitudes and changes of residence, Klaproth finally settled at Paris, where, enjoying an income which enabled him to gratify his love of pleasure and refined society, he exhibited an extraordinary activity, and it was in the years subsequent to 1816 that he published most of those literary productions which established his reputation. After long and painful sufferings he died suddenly, on the 27th of August, 1835.

Klaproth was one of the best scholars and decidedly the best linguist of an age which can justly boast of great linguists. His penetration, sagacity, and the quickness of his perception, were extraordinary; clearness and perspicuity distinguish his style; and his memory was so happy and capable of retaining the most different impressions without ever confounding them, that he seldom made more than scanty extracts. When he began a work, it was already clear and distinct in his mind, and the composition did not take him more time than was required for the mechanical art of writing.

(*Biog. Universelle; Neuer Nekrolog der Deutschen; Querard, La France Littéraire.*)

KLARENTZA, or CHIARENTZA, a seaport village and mountain fortress of Greece, at the western extremity of the Morea, near the cape of the same name, 17 miles N.E. of Zante. In the Middle Ages it formed a principality, which was inherited by a son of Edward III. of England, and from this junior branches of the royal family of England have since repeatedly borne the title of Duke of Clarence.

KLAUSENBURG, or KOLOSVAR, one of the two royal and free capital cities of Transylvania, is on the Szamos, 73 miles N.N.W. of Hermannstadt. It consists of the old and new towns, and several suburbs; is surrounded by walls, and entered by six gates. The population is 21,346; and the city is the seat of the Transylvanian Diets, of the Unitarian superintendence for Transylvania, and of a Protestant consistory. The chief manufactures are woollens, china ware, and paper. The principal public buildings are—a citadel, a cathedral, Roman Catholic, Calvinist, Unitarian, and Lutheran churches; a town-hall, military and other hospitals; and there are also Roman Catholic, Reformed, and Unitarian colleges; Piarist and other monasteries, and an institute for nobles. This town was the birthplace of Mathias Corvinus, king of Transylvania.

KLEBER, JEAN BAPTISTE, according to the best authorities, was born at Strasbourg in the year 1754. He was brought up to the profession of an architect, and sent to Paris at an early age to complete his studies; but he soon left Paris for Munich, where he entered the military college of that city. He was afterwards appointed to a sub-lieutenancy in an Austrian regiment. He served seven years in that corps, which he left in 1783, in order to return to his native country. He there resumed his former profession, and obtained the situation of inspector of public buildings at BÉFORT in Upper Alsace.

The breaking out of the French revolution opened to him a more brilliant career. He enlisted as a private soldier in the grenadier company of the battalion of volunteers which had been raised in the department of the Upper Rhine. By his bravery and talents he soon attained the rank of adjutant-major. At the siege of Mainz, in 1793, he displayed considerable courage and judgment: his services were rewarded by the rank of adjutant-general, and shortly afterwards he became brigadier-general. He continued in active employment, and to rise in rank, until at the battle of Fleurus (June 26, 1794) he commanded the left wing of the French army, and by his skilful manoeuvres greatly contributed to the victory. When Bonaparte was appointed to the chief command of the army for Egypt, he made it a special request to the Directory to be allowed to take him as one of his generals of division. He continued to act with Bonaparte throughout the campaign in Egypt, and when, after the repulse from Acre in 1799, Bonaparte resolved to return to France, he appointed Kléber his successor. He did not, however, at first justify the favourable opinion formed of his talents for command. He seemed to despond, and opened a communication with the Grand Vizier for evacuating Egypt. After many debates and frequent delays, a convention was signed at El Arish, on January 28, 1800, by which it was agreed that the whole of the French army should return to Europe, with its arms and baggage, either on board their own vessels or some furnished by the Turks. The English admiral, Sir Sidney Smith, though not vested with full authority from his government to conclude such a convention, had entered into it. The British government had, however, previously despatched orders to Lord Keith to refuse his consent to any treaty in which it was not stipulated that the French army should be considered prisoners of war; and a letter from this admiral reached General Kléber, warning him of his intention to detain any vessel returning to Europe by virtue of a capitulation. The French commander immediately ordered the evacuation of the strongholds to be stopped, and prepared to resume hostilities. On the night of March 19, 1800, Kléber drew up his army, which was 12,000 strong, on the plain fronting the ruins of Heliópolis. Before them was the Ottoman army, amounting to upwards of 40,000 men. The contest commenced, and after an obstinate fight the Turks were defeated with great slaughter, Cairo was occupied, and the Mameluke commander, Mourad Bey, concluded an honourable convention with the French commander. Thus, within a month of the battle of Heliópolis, the French were again in possession of their previous conquests.

Released from immediate danger, Kléber now began to direct his energies to more pacific labours, and to apply them to the administration of the conquered country, but on June 14, 1800, he was assassinated by a religious fanatic named Suleiman, and with him perished the hopes of the Eastern expedition.

KLOPSTOCK, FRIEDRICH GOTTLIEB, was born at Quedlinburg in 1724, of respectable parents. In his sixteenth year he went to the school at Naumburg, where his poetical character was first developed. In 1745 he studied theology at Jena, where he projected the design of his 'Messiah,' and in 1748 the

first three cantos appeared. The excitement created by this poem was surprising. He composed in 1764 his 'Hermannsschlacht' ('the battle of Arminius'), which is scarcely so much a drama as a lyric poem in a dramatic form. His other dramas are of a similar character. In 1771 he settled at Hamburg, where he completed his 'Messiah.' His 'Odes' are generally more read and valued than his 'Messiah' or his dramas. He died in 1803.

KMETY, GEORGE, was the son of a Protestant clergyman, and was born on one of the southern slopes of the Carpathians, in May, 1813. He had such a passion for a military life that he enlisted as a private in the Austrian army, and in spite of the great difficulties in the path of any one without interest or money, he rose to the rank of captain. On the breaking out of the Hungarian revolution in 1848, he succeeded in raising the best battalion in the Hungarian service, and played a conspicuous and noble part during the whole of the war, his corps firing the last shot at the village of Farcet. He afterwards entered the Turkish army, and greatly distinguished himself at the siege of Kars. The campaign, however, ruined his health, and he was obliged to retire from the service. The Turkish government granted him a liberal pension, which enabled him to reside as a private gentleman in London for some years. He died April 25, 1865.

KNAPPIDIA, a genus of plants belonging to the natural order *Gramineæ*. There is only one species of Knappidia, *K. agrostioides*, an elegant but very small grass, with a small fibrous root, having numerous stems and short rough leaves. It is found in sandy maritime pastures, but is a rare grass.

KNARESBOROUGH. [YORKSHIRE.]

KNAUTIA (named after Christopher Knaut, a German botanist), a genus of plants belonging to the natural order *Dipsacæ*. There are a few species of *Knautia* natives of Europe. The only British species is *K. arvensis*, with purple flowers, in large convex long-stalked heads.

KNEB'ELITE, a hard and brittle mineral, of grayish colour, and spotted with red, green, brown, and white. It occurs massive, with a glistening lustre; and its constituents are—silica, protoxide of manganese, and protoxide of iron, nearly in equal proportions. It was so called in honour of Major Von Knebel.

KNELLER, SIR GODFREY, was born in 1646, in the city of Lübeck, and received his first instruction in the art of painting in the school of Rembrandt. He afterwards became a pupil of Ferdinand Bol. At Rome, Venice, and Hamburg he met with very great success. In London he was state painter to Charles II., James II., William III., Queen Anne, and George I.

Kneller had much of the freedom of Vandeyck, but less nature. His beauties of the court of William III. are inferior and tame, in comparison with Sir Peter Lely's beauties of the court of Charles II. Sir Godfrey died in 1723, aged seventy-eight.

KNIGHT, KNIGHTHOOD (Saxon, *cniht*; German, *knecht*.) During the feudal system the military strength of the nation was measured by the number and efficiency of the knights whom the king was able to summon to the field. By distress the king could compel those who held knight's fees

[FEUDAL SYSTEM] to take upon themselves the order of knighthood, or to prove by their reception into that order that they had received the training, and possessed the arms and accoutrements, and were as to other requisites qualified to take the field as knights.

That power of distraining upon persons till they received knighthood, or compounded with the king by way of fine, which originally was a means of enforcing the performance of a duty to the Crown, by persons holding a certain property in the country, was perverted into a process for extorting money from those who would have been exempt at common law, which regulated the amount of a knight's fee by the sufficiency of the land to support a knight, and not by its fluctuating nominal value in a debased currency. This oppressive proceeding, which was occasionally resorted to in the reigns of Edward VI. and Elizabeth, was reduced into a system by Charles I., and was adopted by him as one of the modes of raising money without resorting to a parliament. [KNIGHT'S SERVICE, TENURE BY.] The manner in which this ancient prerogative was abused led to its total abolition. By 16 & 17 Car. I., c. 20, it is enacted that none shall be compelled, by writ or otherwise, to take upon him the order of knighthood, and that all proceedings concerning the same shall be void.

Knighthood in England is now conferred by the Crown by simple verbal declaration, attended with a slight form, without any patent or other written instrument. Sometimes, but rarely, knighthood is conferred on persons who do not come into the presence of royalty. This is occasionally done to governors of colonies, and other persons in high stations abroad. The lord-lieutenant of Ireland has a delegated authority of conferring this honour.

Knighthood gives precedence over esquires and other untitled gentlemen. 'Sir' is prefixed to the baptismal name of knights and baronets, and their wives have the legal designation of 'Dame,' which is ordinarily converted into 'Lady.' Knighthood, however, is not hereditary, but merely personal.

Besides those who are simply knights, there are knights who are members of particular orders or classes. These orders exist in most of the kingdoms of Europe, and have had generally for their founder a sovereign prince. The three British orders, the Garter, the Thistle, and St. Patrick, belong to this class. [GARTER, ORDER OF.]

The order of the Thistle was instituted in 1540, by James V., king of Scotland; but it fell into decay, till in the reign of Queen Anne, 1703, it was revived. The number of knights was limited to thirteen, but in 1827 the number was increased to sixteen, all of whom are nobility of Scotland.

The order of St. Patrick was instituted in 1783. The knights were fifteen, increased in 1833 to twenty-two, who are peers of Ireland.

The order of the Bath differs in some respects from those just spoken of. [BATH, KNIGHTS OF.]

The order of the Star of India, and the Order of Valour, or the Victoria Cross, have been founded of late years for objects indicated by their respective titles. [VICTORIA CROSS.]

KNIGHT OF THE SHIRE is the designation given to the representative in Parliament of English

counties at large, as distinguished from such cities and towns as are counties of themselves (which are seldom, if ever, called shires), and the representatives of which, as well as the members for other cities and towns, are denominated citizens or burgesses. Formerly it was requisite that they should be knights girt with the sword, now notable esquires may be elected. The wages payable to knights of the shire for their attendance in Parliament, including a reasonable time for their going up and coming down, were 4s. a day, or double what was received by citizens and burgesses. At the close of every session of Parliament, the king, in dismissing them to their homes, informed them that they might sue out writs for their wages, upon which each knight separately obtained a writ out of Chancery directed to the sheriff, mentioning the number of days and the sum to be paid, and commanding the sheriff to levy the amount. Upon this the sheriff, in a public county court, divided the burden among the different hundreds and townships, and issued process to levy the amount, which, to the extent of the money levied, he paid over to the knight. Knights of the shire, and also their electors, were formerly required to be persons either resident or having a household in the county. This regulation, though confirmed by several statutes, had fallen into neglect, and was formally repealed in both its branches by 14 Geo. III., c. 58. The removal of the latter part of the restriction has greatly added to the expense of county elections; and though the Reform Acts of 1832 and 1867 disfranchised out-voters in boroughs, they did not restore the old law as to non-resident county electors. By the 1 & 2 Vict. c. 48, every county member was to be entitled for his own use and benefit to an estate legal or equitable of the clear yearly value of 600*l.* in lands, tenements, or hereditaments, lying within the United Kingdom, or in the rents and profits thereof; or to the like estate in personality in the United Kingdom; or to an estate of the same value composed jointly of these several qualifications. The property qualification was, however, entirely abolished by 21 & 22 Vict. c. 26.

KNIGHTON. [RADNOR.]

KNIGHTON, HENRY, an English historian of the close of the fourteenth and beginning of the fifteenth century, was a canon-regular of Leicester Abbey. His '*Compilatio de Eventibus Angliæ à tempore Regis Edgari usque ad mortem Regis Ricardi Secundi*,' was published by Twysden in the '*Decem Scriptores*,' folio, London, 1652, col. 2311-2741.

KNIGHT'S FEE. [FEUDAL SYSTEM.]

KNIGHTS, MILITARY, an institution of military knights at Windsor, formerly called 'Poor Knights.' It is a provision for a limited number of old officers, chiefly veterans, and owes its origin to Edward III. It is composed of a governor and seventeen knights, who are allowed three rooms each in Windsor Palace, and 2s. per day (besides other allowances) for subsistence.

KNIGHT'S SERVICE, TENURE BY, otherwise called Tenure in Chivalry, or per Servitium Militaire, was, from the times immediately succeeding the Norman Conquest in the eleventh century to the period of the civil war in the seventeenth, considered the first and the most important, as it

was also the most general, mode of holding land in England. The land held by this species of tenure was said to consist of so many knights' fees, *feoda militis*, i.e., so many portions of land capable of supporting the dignity of a knight. [FEUDAL SYSTEM.] The duty attached to knight service was that of following the lord to the wars, according to certain rules.

Besides the liability to military service, the tenant by knight's service was subject to other occasional burdens. The principal of these are the following:—1. *Aids* [AIDS]. 2. *Reliefs*. 3. *Primer Seisin*. 4. *Wardship*. 5. *Marriage*. 6. *Fines upon Alienation*.

This system fell to the ground during the existence of the Commonwealth; and the abolition of this species of tenure was confirmed upon the Restoration by the 12 Car. II., c. 24, which converted all tenures by knight's service into free and common socage. [SOCAGE.] The statute, after taking away the court of wards and liveries, enumerates wardships, liveries, primer seisins, &c., and sweeps away the whole. But rents certain, heriots, suit of court, and other services incident to common socage and fealty, and also fines for alienation due by the customs of particular manors, are preserved. Reliefs for lands of which the tenure is converted into common socage, are saved in cases where a quit-rent is also payable.

Under the feudal system as observed in Scotland, tenure by knight's service was known by the name of *Ward-holding*. The burdens or *casualties* peculiar to this tenure were—1, *Ward*, the guardianship by the superior of the vassal during his minority. 2, *Recognition*, the return of the lands to the over-lord when the vassal had sold or alienated the whole or the greater part of them without his superior's consent; and 3, *Marriage*, which was a fine payable by the heir of the last vassal infeft on his being married or becoming marriageable.

Lands held *Ward* were further liable to the casualties common to all holdings. *Ward-holding* was abolished by 20 Geo. II. c. 50. [HOLDING.]

KNIGHTS TEMPLARS. [TEMPLARS.]

KNOT, a sea-faring term for a nautical mile of 2208 yards; there being sixty knots to a degree and three to a league. The knot is used for ascertaining the speed of a ship's sailing by means of the line-knots, which are placed at 50 feet from each other. It is then calculated that 120 times 50 feet make a geographical mile; and that as many knots will run from the reel in one trial as the vessel sails miles in an hour, the proportion of each length into which the line is divided being to a geographical mile as half a minute is to an hour, viz., as 1 is to 120. Note is then taken of how many of these knots run out in half a minute, and it follows that the vessel is passing through the water at the same number of geographical miles per hour.

KNOUT, an instrument of punishment used in Russia until recently for all kinds of criminals. It is a scourge made of several thongs of skin plaited, and interwoven with wire. It is only employed at the present time to whip assassins and those soldiers who have been dismissed from the army in disgrace. The punishment is usually inflicted by a criminal, who thereby earns exemption from exile to Siberia.

If as many lashes as 120 are given, the victim generally dies under the operation.

KNOWLES, JAMES SHERIDAN, was born in the city of Cork on the 12th of May, 1784. His father was a man of learning and ability, the nephew of Sheridan the lexicographer, and first cousin of the more distinguished Richard Brinsley Sheridan. The family removed to London in 1792, and here the boy James was educated, forming acquaintance, as he grew up, with Hazlitt, Coleridge, Lamb, Edmund Kean, and Macready. Knowles made his first appearance as an actor at Crow Street Theatre, Dublin, having previously written some minor poems and tragedies. He next joined a company at Waterford, and produced for Kean the tragedy of 'Leo the Gipsy,' his first acted play. He afterwards lived in Belfast and Glasgow as a teacher of elocution. In 1815 appeared his first successful play of 'Caius Gracchus,' which was followed by 'Virginius,' produced on the London stage by Macready, and identified with his genius. The drama of 'William Tell' appeared in 1825, establishing Knowles' reputation as a dramatist; this was succeeded by 'The Beggar's Daughter of Bethnal Green' and 'Alfred the Great.' Then came another triumph, 'The Hunchback,' produced at Covent Garden in 1832; quickly followed by 'The Wife' in each of which Knowles himself supported the principal character. He brought out the 'Love Chase' in 1837, which was played at the Haymarket for more than a hundred nights. At the instance of the Dramatic Authors' Society, a pension of 200*l.* a year was granted to him out of the civil list in 1843. His dramatic works are published in three volumes. In 1852 he became a Baptist preacher, published some controversial works, and distinguished himself by his religious zeal. He died at Torquay in Devonshire, 1st December, 1862.

KNOWLTONIA, a genus of plants belonging to the natural order *Ranunculaceæ*. The species are one-seeded perennial herbs, with greenish yellow flowers. *K. vesicatoria* is a plant the leaves of which are used as vesicants at the Cape of Good Hope. There are four other species, natives of the Cape of Good Hope, where these plants grow in abundance.

KNOX, JOHN, the famous Scottish reformer, was born at Gifford in East Lothian in 1505. His father was descended from an ancient family in Renfrewshire, possessed of the lands of Knock, Craighends, and Ranfurly—this last being now the title of an Irish earl, a descendant of the old house. His mother's name was Sinclair—a name which in days of danger he sometimes assumed, or 'wrait in time of trubill.' In his boyhood he attended the grammar-school at Haddington, and in 1522 his father sent him to the University of Glasgow. Mair, or Major, was his preceptor, being then professor of philosophy and theology. On Major's removal to St. Andrews during the following year, Knox seems to have followed him. Before his twenty-fifth year he was ordained a priest, though he had not reached the age fixed by ecclesiastical canons. But his mind grew weary of scholastic subtleties and refinements; he preferred studies more useful and practical in their nature. The popish theology did not satisfy him, and suspicions of his heresy were soon and easily

excited. Accordingly he retired to the south of Scotland, where he formally renounced the papal faith. His enemies in St. Andrews passed sentence against him, and ruffians were employed by Cardinal Beaton to assassinate him. After shifting his residence various times, he found an asylum in the house of Hugh Douglas, of Longniddrie, to whose sons, and those of the neighbouring proprietor of Ormiston, he acted for a brief period as tutor. His mind was profoundly impressed at this period by the preaching of Thomas Guillaume, a reformed Benedictine, and that of George Wishart, the saintly martyr. The persecution against the reformers did not pause at Beaton's death, though his tragic end produced a wide and deep sensation. But persecution did not check the progress of opinion and religious change in Scotland. The conspirators against Cardinal Beaton still held the castle of St. Andrews; and as it was reckoned a place of safety, Knox and his pupils took refuge in it at Easter, 1547. In the castle of St. Andrews Knox taught and exhorted so much to the satisfaction of his audience, that it was resolved to call him to the ministry as colleague to John Rough, who was chaplain to the garrison. Knox reluctantly, and after great mental distress, obeyed the call, and soon preached and disputed to the terror of all his priestly antagonists. Many of the inhabitants were then induced to abandon popery; and for the first time in Scotland, the Lord's Supper was publicly celebrated in Protestant form. But in the month of June a French fleet came to the assistance of the regent, and the castle, invested by sea and land, was forced to capitulate. Knox and some other persons were transported to Rouen, the terms of capitulation were violated, and at the instigation of the pope and the Scottish clergy, they were confined on board the galleys and loaded with chains. The galleys in which Knox and his fellows were confined sailed to Nantes, and lay all winter in the Loire. Every inducement was held out to the captives to recant; but cajolery and menace were alike in vain. The French vessels returned to the east coast of Scotland, probably in 1548. Knox had been seized with fever, and his life was despaired of; yet there was in his soul the inborn persuasion that God had some work for him to do in Scotland. At length, after a rigorous and unhealthy imprisonment of nineteen months, he was liberated in February, 1549. He repaired at once to England, was recommended to the English council, and sent down to preach in Berwick. For two years he laboured there, preaching the gospel, smiting Popery, and gaining over crowds of converts to Protestantism. Tonstall, bishop of Durham, summoned him to Newcastle. Thither Knox went, and with characteristic intrepidity delivered a pithy and thorough vindication before the bishop and his clergy. This appearance so increased his fame that he was transferred to Newcastle, and appointed one of King Edward's chaplains, with a salary of 40*l.* a year.

His undaunted preaching in the north of England raised up many bitter enemies, and by the influence of the ambitious and unprincipled duke of Northumberland he was summoned to London, and so nobly cleared himself of all imputation, or from what he himself styles 'heinous delations and numerous lies,' that he was at once acquitted. He preached before his majesty, who was greatly delighted with his

sermons; and the council ordered that next year he should be employed in London and the southern counties. Archbishop Cranmer presented him to the living of All-Hallows, but he declined it, and gave his reasons stoutly before the privy council, alleging that the reformed church of England still needed further reformation. King Edward, with the consent of the privy council, offered him a bishopric, which he also declined. King Edward died 6th July, 1553, and Knox waited in London till the accession of Mary on the 19th of the same month, when, after itinerating through Kent and Buckinghamshire, he returned to Newcastle. At this period he was married at Berwick to Marjory Bowes, a lady to whom he had been long and warmly attached. The reign of Mary was now unfolding its terrors in England; and obeying the 'voices of his brethren,' and rather against his own will, Knox left the kingdom, and landed at Dieppe in Normandy on the 20th January, 1554. He departed from Dieppe in February, 'whither God knoweth,' proceeding through France to Switzerland, and was cordially received by the leading divines of the Helvetic churches, between whom and many of the English reformers a correspondence had been kept up. At Geneva he won the friendship of Calvin; he applied himself to hard study, though he was close on fifty years of age, and according to Dr. M'Crie, made himself master of the Hebrew language. A congregation of English exiles at Frankfort having elected him as their pastor, he set out for that city, and immediately commenced his ministry. But the germs of dispute had been already sown on the question of surplice, litany, and order—the puritan controversy in miniature. The English litany was followed to a great extent; but Dr. Cox, who had been preceptor to Edward VI., came with other exiles to Frankfort, and raised immediate disturbance by declaring their resolution 'to do as they had done in England.' Meetings were held, keen controversy commenced, the faction of Cox accused Knox of treason; and though the magistrates of the city would not listen to the calumny, they advised him for the sake of peace to leave the city. Knox went again to Geneva, but his desire to visit Scotland, from which he had gleaned favourable tidings, so grew upon him that he recrossed the Channel in 1555, and journeyed at once to Berwick to his wife and household. He then went to Edinburgh and preached privately to many little audiences. Next he accompanied Erskine of Dun into Angus, where during a month's sojourn he preached every day; then he was for a season with Sir James Sandilands at Calder House, still urging on the work of reformation. Afterwards he visited the district of Kyle, the seat of the Scottish Lollards; returning to Angus, where the gentlemen professing the new faith formed and subscribed a bond or covenant for mutual defence and encouragement—probably the first instrument of the kind in Scotland. But his movements were at length discovered, and his preaching was vehemently denounced by the alarmed clergy. Knox was at once summoned to appear before a clerical convention, to be held in the church of the Blackfriars, Edinburgh. But his accusers, never imagining that he would attend, and being not wholly sure of the regent's support, wavered, and then conveniently finding some informality in the summons, resolved to set it aside. At

this crisis he wrote his well-known letter to the queen regent; and quiet, earnest, and void of all oburgation as it was, she threw it from her contemptuously, calling it 'a pasquil.' Word was now brought him that the English congregation at Geneva had chosen him one of their ministers, and he resolved to accede to their wishes. He left Scotland in July, 1556, his wife and family having preceded him; and having joined them at Dieppe he proceeded to Geneva, where he remained the two following years. No sooner was it known that he had left the kingdom, than the clergy who had deserted the diet against him met at Edinburgh, and passed the usual sentence of condemnation upon him; and because they had not his person to chain to the stake, they gratified their malice by causing him to be burnt in effigy at the cross. Against this sentence Knox wrote a sturdy 'Appellation,' which he sent over to the nobility and people of Scotland.

In the midst of his peaceful life in Geneva he received an invitation to return to Scotland. But at Dieppe he learned adverse tidings which sorely distressed him, and he sent a letter full of rebuke and sorrow to the nobility who had invited him. Knox went back to Geneva in 1558. At this epoch the English translation of the Old Testament was made, commonly called the Geneva Bible. Knox probably had a hand in it, along with Coverdale, Gilby, and others. Then and there, too, he published his 'First Blast of the Trumpet against the monstrous regiment of women,' a vehement defence of what is termed the Salique law, in reference at least to France, and which allows no female to reign. Meanwhile, changes favourable to the Reformation were taking place in Scotland; the Protestants had grown in numbers and influence. Persecution indeed broke out; electric clouds were gathering from all parts of the heavens; and as a resolute struggle was impending, Knox was invited over, and sailing from Dieppe on the 22nd of April, he landed at Leith on the 2nd of May, 1559.

No sooner was Knox's arrival known than, through the influence of the panic-stricken clergy, he was proclaimed an outlaw, in virtue of the former sentence pronounced against him. Going north to Dundee, he joined with the Protestants who had there assembled in great numbers and proceeded with them to Perth, where he thundered against image-worship and the idolatry of the mass. The discourse being finished and the audience quietly dispersing, a priest uncovered an ornate altar and prepared to celebrate mass. A boy uttered some words of juvenile disapprobation, and the priest struck him. The youth pitched a stone at his castigator, and it broke one of the images on the altar. The fracture of the image was as the spark that suddenly creates an explosion. The onlookers were roused, and without a moment's thought, rushed on altar and images and demolished them. The tumult grew as the mob maddened—religious houses were pulled down, and all pictures and images defaced. This demolition, so often misrepresented, Knox distinctly ascribes to the 'rascal multitude.' The queen regent looked on this riot as a serious rebellion, and mustered an army to quell it, but the Protestants, aware of her ultimate designs, levied a host in self-defence. An opportune treaty prevented any hostile conflict. The 'lords of the

congregation,' finding from various circumstances that the regent was not to be trusted, were alarmed into activity. Knox would not be silenced, and going to St. Andrews, he preached so effectively that the popish worship was peacefully abolished, and the churches stripped of what were held to be idols or idolatrous symbols. Other parts of the country imitated St. Andrews, but not so peacefully; many fine edifices were demolished, and many valuable works of art perished in the surge and fury of the popular revolution. When the army of the congregation with which Knox had been at Cupar Moor, where they lay face to face with the regent's forces, reached Edinburgh, the Reformer, who was still with them, preached on the day of their entrance in the church of St. Giles, and next day in the church of the Abbey. The inhabitants immediately met and elected him their minister, and Knox complying with the call commenced his labours in the city. On the approach of the regent's host Knox quitted Edinburgh, made an extensive tour through the country, and preached in many of the larger towns; 'men,' as he says, 'of all sorts and conditions obeying the truth.' During the negotiations for military assistance from England, Knox for a time conducted the greater part of the correspondence. These negotiations failed, and the party of the regent, on whom sentence of suspension had been passed by a convention, appeared for a season to triumph, and a price was set on the reformer's head. But his eloquence cheered the despondent reformers. Queen Elizabeth at length favoured their cause, and a treaty was concluded. The French troops were dismissed from Scotland, and the English regiments that had been sent down marched back. Parliament met—a confession of faith was speedily drawn up, and on the 24th of August, 1560, the papal jurisdiction was formally abolished, and all penal laws in its favour rescinded. A book of discipline was compiled, pastors, doctors, elders, and readers were appointed, and five superintendents were set over various provinces. The patrimony of the church was to be allotted to the ministry, schools, and the poor—a scheme of division soon frustrated by the court and the greed of the nobility and gentry. The first meeting of the General Assembly of the Protestant church of Scotland was held at Edinburgh on the 20th of December, 1560.

No sooner had Queen Mary arrived from France in August, 1561, than she had a long interview with the stern reformer, after a sermon which had galled her. She accused him of many things, and even of effecting his ends by magical arts. Knox had interviews with the queen on various occasions, but neither menace nor flattery could move him. Parliament met, but it had lost some of its earnest attachment to Protestantism. The preaching of Knox became more stormy and vehement; his tongue was felt to be a match for Mary's sceptre. The queen having heard that he had preached about her marriage, summoned him into her presence, and in her petulant censure of him burst into tears. A riot having taken place in the chapel at Holyrood, and Knox having sent a circular to several gentlemen to attend at the trial of the rioters, he fell under the royal displeasure, and was summoned before an extraordinary meeting of the council and nobility. This act on his part can only be justified on the plea of necessity—for it

virtually implies a species of double government, that is, anarchy. The queen would have him found guilty of treason, and could not but exult over one 'who had made her weep.' The nobility at once acquitted the reformer, and 'madam was disappointed of her purpose.' In March, 1564, Knox, who had been three years a widower, and was now on the verge of sixty, married Margaret Stewart, daughter of Lord Ochiltree—his lordship being a descendant of Robert, duke of Albany, second son of King Robert II. The union appears to have been a happy one. The marriage of the queen with Darnley soon followed. Knox's tongue gave no little scandal on the occasion, and he was ordered in 1565 to desist from preaching. A secret league was formed in France by the duke of Alva and Catherine de Medici to extirpate Protestantism, and the queen, at the instigation of her uncle the cardinal of Lorraine, had subscribed to it. These measures were counteracted, Rizzio was assassinated, and Knox withdrew from Edinburgh. Tytler's assertion, that Knox was 'precognisant of the intended murder,' rests on no sufficient proof. The murder of Darnley soon followed; Mary wedded Bothwell, and resigned the crown in favour of her son, appointing the earl of Moray regent during his minority. On the 29th July Knox preached the sermon in Stirling at the coronation of James VI. Under the regency of Moray harmony subsisted between the church and the court, and Knox carried out as far as he could his various plans for strengthening the Protestant interest, and securing a liberal income to the clergy. But the regent was shot in Linlithgow, and died 23rd January, 1570. The regent's death, and his numerous and pressing anxieties during that critical period, preyed upon Knox's health, and in October of the same year he was struck with apoplexy. In a few days he recovered his speech, and was able to preach again, but not with his wonted vigour. The death of the regent produced disastrous results, and through the weakness of Lennox his successor, the abilities of Maitland, and the defection of Kirkcaldy of Grange, the queen's party gained strength, and Knox was subjected to numberless annoyances. His life was often threatened, and an assassin fired into his house. He left Edinburgh, and took up his abode in St. Andrews, still carrying on by tongue, pen, and counsel the great work to which his life had been devoted. In January, 1572, a convention of the church met at Leith, and to save somewhat of the revenues of the church, agreed to set up a modified episcopacy. It was a compromise which Knox was too old and feeble to oppose, and he yielded to the necessity. During a cessation of arms he returned to Edinburgh, and denounced in glowing terms the massacre of St. Bartholomew, the news of which had recently arrived. Sickness again seized him; he paid his servants' wages—adding, it was the last they should receive from him. His session met in his chamber, and he delivered them a farewell charge. On Friday, the 21st, he desired his servant to order his coffin to be made, and he died on Monday, 24th November, 1572, in the sixty-seventh year of his age. Two days afterwards his body was interred in St. Giles. The funeral was attended by an immense concourse of people, weeping, and of the resident nobility; and as his body was laid in its last resting-place, the earl of Morton, who had been newly elected

to the regency, pronounced the well-known eulogy, 'Here lies he who never feared the face of man.' John Knox left five children, two sons by his first wife, and three daughters by his second wife. His sons were educated at St. John's College, Cambridge. Knox's life was a busy and uncertain one, yet he found time to write a 'History of the Reformation in Scotland.' Many additional tracts were published by him, as the times demanded, and many letters and exhortations are still extant. The Reformer was rather small in stature, and wore a beard which reached almost down to his girdle. (*Life* by Dr. M'Crie.)

KNUTSFORD. [CHESHIRE.]

KOALA (*Phascogaleos cinereus*), a marsupial animal belonging to the family *Phalangistidae*, or Phalangiers. It is a native of New South Wales, about two feet long and covered with a gray fur. On the ears are tufts of long hair. It is a nocturnal animal, lives in trees, and feeds on their tender shoots. The Mahrattas apply the same name to the jackal.

KOBRE'SIA, a genus of plants belonging to the natural order *Cyperaceæ*. There is only one species of this genus, *K. caricina*, which is found throughout Europe, and in Great Britain on moors in Yorkshire, Durham, and Perthshire.

KOELE'RIA, a genus of plants belonging to the natural order *Gramineæ*. There is only one British species of this genus, *K. cristata*.

KOENIG, FRIEDRICH, one of the inventors of the first practically successful printing machine, was born at Eisleben on the 17th of April, 1775, and died at Oberzell on the 17th January, 1833. He became a printer, and worked in that capacity till 1797. He then established a printing office in his native town, and for years laboured to invent a method of printing by machinery, and had, in conjunction with his friend and coadjutor Bauer, devised a project for that purpose about 1806, but was baffled in his attempts to carry it into execution by the difficulty of finding any capitalist able and willing to pay the expense. Having at length visited England in pursuit of this object, he was furnished with the necessary funds by the well-known printers, Bensley, Woodfall, and Richard Taylor. The first patent of Koenig and Bauer was obtained in 1810, for a machine in which the paper was pressed against the type by a flat platen, as in the common printing press. Their most important patent was that of 1811, for a machine in which the paper was pressed against the types by a revolving cylinder. This machine may be considered the parent of all the successful printing machines which have since been invented, for though they have been improved in many respects, its essential principle is found in them all. In 1814 occurred one of the most remarkable events in the history of printing: a machine on the principle of Koenig's invention, of unprecedented size and power, was erected by the proprietors of the *Times*, the number of which for the 14th of November of that year was the first newspaper printed by steam-power. From that time the art of machine printing made rapid progress, and has of late years attained an enormous extension. Koenig and Bauer subsequently established a manufactory of steam printing presses at Oberzell, near Würzburg, in Bavaria. It is gratifying to know that this undertaking succeeded, and that the in-

ventors of the printing machine were rewarded by a prosperity which rarely falls to the lot of the greatest benefactors of mankind.

KOETHEN. [ANHALT.]

KOH-I-NOOR (Mountain of Light), the name of the large diamond obtained by Queen Victoria from Maharajah Dhuleep Singh, the ruler of the Punjab, on the annexation of that country to British India in 1849. It is said to have originally weighed 900 carats, but being badly cut it was reduced to 279 carats. It was still further reduced, by recutting, to 186 carats, and was thus shown in the Great Exhibition of 1851. In 1852 it was once more recut, and now weighs about 123 carats. Its present value is estimated at 120,664*l*. The last process of recutting was performed by M. Coster, of Amsterdam, in the employ of Messrs. Garrard, and occupied several weeks, on account of the extreme precautions necessary in dealing with a gem of such enormous value. [LAPIDARY WORK.]

KOLA. [ARCHANGEL.]

KOLA NUTS, *Kola, Cola, Cura, or Curo*, the seeds of the *Cola acuminata*, are made use of as food and medicine by the natives of West Central Africa. Their value seems due to the presence in them of about two per cent. of *theine*, a substance which also exists in tea, coffee, and maté. If eaten in large quantities they produce wakefulness.

KOLAPOOR. [COLAPOOR.]

KOLLIN. [COLLIN.]

KOMORN, or COMORN, a royal free town of Hungary, on the left bank of the Danube, 48 miles N.N.W. of Buda. It is a steam-packet station, and has an active trade in corn, wine, wood, and fish. The celebrated wine called Monostor grows in its neighbourhood. The town is fortified, and its citadel, constructed by Corvinus, and extended in 1805, is considered one of the strongest in Europe. It was long unsuccessfully besieged by the Austrians in 1849, and only surrendered on honourable terms when the struggle had ceased elsewhere. In the town the inhabitants, who are mostly Protestants, number altogether 12,160. It stands at the mouth of the Waag.

KONG MOUNTAINS. Between 9° and 10° N. lat., and 9° and 10° W. long., there exists a high mountain knot, in which the Joliba, Quorra, or Niger, the Gambia, the Rokelle, and the upper feeders of the Senegal take their rise. From this same plateau one mountain range runs N.E., forming the watershed between the basins of the Niger and the Senegal; another takes a north-western direction, dividing the feeders of the Senegal from those of the Gambia; while a third range runs nearly E. along the parallel of 9° N. lat., to the northward of the territories of the Mandingoes, the Foolaahs, and the Ashantees. To this last range the name of the Kong mountains has been given, from the word *kong*, which in the dialect of the Mandingoes is said by Park to mean a mountain. In the kingdom of Yarriba the range is said to turn S.E., and to terminate on the banks of the Niger, near the confluence of the Tehadda with that river. But of this range, if it forms one continuous mass, very little is known. Nothing definite has been ascertained regarding its length, width, or height, though it is said many of its peaks reach the snow line. [SENEGAMBIA.]

KONIGA, a genus of plants of the order of *Cruciferae*. The flowers are white and sweet scented.

KÖNIGGRÄTZ, a village in Bohemia, near which was fought the famous battle of Sadowa, between the Prussians and Austrians, July 3, 1866. [SADOWA.]

KÖNIGSBERG, one of the two governments into which the province of East Prussia is divided, extends along the Baltic from the Gulf of Danzig to the frontiers of Russia, and is bounded S. by the government of Gumbinnen and by Polish Prussia. The area is 8636 square miles, and the population in 1868 was 1,067,313. The coast is low and indented by two extensive shallow fresh-water bays, which communicate with the Baltic each by a narrow strait towards its eastern extremity. One of these is called the *Curische-Haff*. The other, called the *Frische-Haff*, extends for 57 miles in a south-west direction from Königsberg, with an average breadth of 5 miles. The Gatt, or strait, by which it joins the Gulf of Danzig at Pillau, has 12 feet depth of water, and is in breadth 3000 feet. In all the rest of its length it is separated from the Baltic by the *Frische-Nehrung*, a narrow tongue of land, consisting chiefly of sandbanks. The water in the Haff is shallow, in no place more than 12 feet, especially in summer, so that no large vessels can navigate it. Several arms of the *Vistula*, the *Passarge*, which is navigable, and many other rivers, fall into the *Frische-Haff*. The surface of the government is a flat agricultural country, with some extensive forests. Wheat, rye, flax, hemp, &c., are the chief products. Cattle and sheep are numerous.

The chief town of the government of Königsberg is **KÖNIGSBERG**. *Memel*, the most northern town in Prussia, is situated at the mouth of the *Dange*, and on the eastern side of the strait that joins the *Curische-Haff* to the Baltic, 74 miles N.N.E. of Königsberg. It is well built, and has a safe harbour defended by a citadel and by a strong fort on the south side, the construction of which was completed in 1868. The entrance to the harbour is crossed by a bar, on which there is from 13 to 18 feet of water, so that it can be entered at nearly all seasons by vessels drawing about 17 feet, and an unlimited number of ships can lie in it with perfect safety. It is, indeed, one of the best harbours in the Baltic, and its communication with the sea is never impeded by ice, even in winter. The town is well situated for commerce, and has a large trade with the interior of Prussia; also with Russia, Great Britain, Holland, Belgium, Denmark, Bremen, Hanover, and Norway. The number of ships which entered the port in 1867 was 980 (228,716 tons), and the clearances 968 (210,700 tons). Value of the imports, 318,195*l.*; the principal articles being coal, herrings, salt, spirits, and sugar. The exports amounted to 861,178*l.*, of which two-thirds were destined for Great Britain. Timber constituted more than one-half, and corn, flax, hemp, hides, and rags the remainder. There is a lighthouse 128 feet high in front of the harbour, and in the town are several breweries, distilleries, woollen and soap factories, oil and saw mills, &c. In consequence of a fire in 1854, the town has undergone almost a complete renovation, and is now clean and well built. It was inclosed by walls in the time of the Teutonic knights, and has Lutheran, Calvinistic, and Roman Catholic churches, a Jews' synagogue, arsenal, ex-

change, theatre, high schools, hospital, &c. There are large docks in which shipbuilding is extensively carried on, and for which the town has long been noted. The population in 1861 was 17,596. *Braunsberg*, a busy commercial town on the *Passarge*, and near the entrance of that river into the *Frische-Haff*, has a population of 9000, who manufacture cloth, leather, and yarn, and export corn and timber.

The other government of East Prussia, *Gumbinnen*, lies S.E. and S. of the government of Königsberg. It has an area of 6310 square miles, and its population in 1868 was 743,783. The surface of Gumbinnen, like that of Königsberg, is flat, except in the south, where a large portion of the surface is hilly, and abounds with lakes. The produce is similar to that of the government of Königsberg. The largest horses in Prussia are bred in the government of Gumbinnen. The chief rivers are the *Memel* [*NIE-MEN*], which passes *Tilsit*, and flows by several arms into the *Curische-Haff*; and the *Pregel*, which flows due west, and falls into the *Frische-Haff* below Königsberg. [PRUSSIA.]

In the government of Gumbinnen the most important town, *Tilsit*, is situated on the left bank of the *Memel*, at the point where the *Tilse* falls into that river, which is here crossed by a bridge of boats, 60 miles N.E. of Königsberg. It is a pretty, well-built town, and contains five churches, a fine town-hall, a gymnasium, very extensive barracks, two hospitals, and 16,146 inhabitants, including the garrison. The townspeople trade in corn, linseed, timber, beer, spirits, leather, &c. There are manufactures of woollen cloth, hosiery, arms, and hardware; hemp and flax are also exported. The town is defended by a strong castle. *Tilsit* has acquired celebrity by being the place where the famous treaties were concluded between France, and Russia, and Prussia, on the 7th and 9th of July, 1807. *Interburg*, a town of 10,900 inhabitants, stands near the junction of the *Pregel* and the *Instar*, on the left bank of the *Angeper*. It has manufactures of cloth, linen, woollen stockings, leather, and spirits, and trades extensively in corn and flax. There are Lutheran and Calvinistic churches, a normal school, and several breeding studs. *Gumbinnen*, the chief town of the government, stands on the *Pissa*, a few miles E. of *Interburg*, and has 6800 inhabitants. The town is regularly built, and has woollen and linen factories, distilleries, breweries, a good trade in corn, and a gymnasium, two hospitals, public library, and schools of architecture and midwifery. The inhabitants are mostly all Protestants.

KÖNIGSBERG, the capital of East Prussia, is situated near the mouth of the *Pregel*, 78 miles E. by N. from Danzig, in 54° 42' N. lat., 20° 29' E. long., and had in 1861 87,072 civil and 7487 military inhabitants. In 1865 the total number was estimated at 102,000. It consists of three parts, called the Old Town, *Löbenicht*, and the *Kneiphof*, besides the royal palace and the citadel *Fredericksberg*, and fourteen suburbs. The Old Town and *Löbenicht* are on the north side of the river; the *Kneiphof* stands on an island formed by the *Pregel*. The origin of the city dates from 1255, when the Teutonic knights built a fortress on the height where the castle now stands. After 1365 it became one of the principal cities of the Hanseatic League; and here, in 1701,

Frederick III. of Brandenburg was crowned the first king of Prussia. In 1855 it celebrated the completion of the sixth century of its existence.

The town is irregularly built, and the streets are generally narrow and crooked; but during the last few years some better edifices have been erected. The Pregel is crossed by seven bridges. The most remarkable buildings are the castle or royal palace, and the cathedral, in the library attached to which are several autograph letters of Luther to Catherine Bora. Among the numerous public institutions is the university, founded in 1544, with which are combined two theological seminaries, one Polish and one Lithuanian, a library of 160,000 volumes, a botanic garden, and an observatory. There are likewise an exchange, town-house, citadel, and theatre, three gymnasia, school of arts and architecture, deaf-mute and blind asylums, and many other charitable institutions. Königsberg has communication by the Friedrichs-Gruben Canal with the Memel, by which river, the Oginski Canal, and the Dnieper, it has the advantage of a complete interior navigation into Poland, Lithuania, and even to the Black Sea. The port of Königsberg is Pillau [PILLAU], where vessels that cannot take all their cargo from the warehouses of Königsberg ship the remainder of their freight, which is brought from the Pregel to Pillau in lighters from 20 to 100 tons burthen. The manufactures consist of woollen cloth, linen, cotton, silk, leather, tobacco, sugar, soap, starch, sealing-wax, beer, and spirits. The exports are composed of corn, flax-seed, flax, hemp, oil cakes, feathers, rags, hair, wood, zinc, iron, and hides, and were valued in 1867 at 7,320,922*l.*, of which 1,877,185*l.* were for goods forwarded to foreign countries by sea, and the remainder to other Prussian ports and to Russia. The export trade in grain is very extensive, and there are some shipbuilding yards. The imports are chiefly sugar, coffee, spices, dyewoods, tobacco, salt, various raw materials, and manufactured goods, the total value amounting to 7,192,725*l.* One-half of the sea-trade is with Great Britain. The number of vessels which entered the port of Pillau in 1867 was 1603 (167,000 tons), of which one-third was British. The regulation of harbour affairs for Pillau and Königsberg, which was formerly in the hands of the corporation of merchants at Königsberg, was by mutual agreement given up to the state in 1864. The Prussian government has since built strong forts to protect the harbour, and executed works of great magnitude for the greater convenience and safety of vessels. A railway from Königsberg to Pillau was opened in 1867, and extended to Rassenberg and Lyck in 1868. It is being carried on to a point on the Petersburg and Warsaw Railway, and will thus have the advantage of a carrying trade between the west of Europe on the one side, and Poland and Russia on the other.

KODDOO (*Strepsiceros kudu*), an exceedingly beautiful African antelope. It is of a brownish-gray colour, and its sides are marked by from seven to ten white stripes. The horns are long and twisted. It is about 3½ feet high at the shoulder, and not more than 4½ feet long. The flesh of the koodoo is much valued by the natives.

KOORDISTAN. [KURDISTAN.]

KOORIA MOORIA or CURIA MURIA ISLANDS, a group of six islands distant about 20

miles from the south-east coast of Arabia, in lat. 17° 33' N., long. 56° 6' E. They were ceded to Great Britain in 1854. Hellaneeyah, the largest, is inhabited by a few fishermen; the others are very desolate and sterile. Large quantities of guano have, however, been procured from here. In 1858 the value of the exports of this article was 81,877*l.*, which gradually decreased, till, in 1861, they stopped entirely.

KOPECK, a Russian coin, about the value of a halfpenny.

KORAN. [MOHAMMED.]

KORDOFAN, or KORDUFAN, a country lying to the south of Nubia, in Central Africa, formerly a dependency of Sennar, since 1820 a province of Egypt, between lat. 12° 21' and 15° 18' N., long. 24° 34' to 27° 37' E. The Bahr-el-Abiad (White Nile) traverses the south-eastern part of the country, which consists of an assemblage of several small oases, divided from Dar-Fur by vast deserts. The population is composed chiefly of negroes, who devote themselves to agriculture. The rest of the inhabitants are settlers from Dongola, who are merchants, and frequent the caravan routes, and Arabs, who in general wander from place to place in the deserts. Gold dust and iron ore are found; the latter is worked. On the oases the principal objects of cultivation are millet, sesamum, and some wheat and barley. The soil is peculiarly adapted to the cultivation of the first article, which is the staple food of the country. The wealth of the Arab tribes consists of their horses, cattle, and camels, which latter are lent on hire. The negroes rear great numbers of cattle, sheep, and goats. Among the wild animals are elephants, giraffes, and antelopes. This district was first made known in Europe by Browne. Slavery was abolished in 1857. Obeid, formerly a considerable town, was, on the occupation of the Egyptian Turks, almost destroyed. It now consists of several villages of mud houses, covered with straw, clustered together in an oasis, and is said to contain 20,000 inhabitants. It has a considerable trade.

KÖRNER, THEODOR, was born at Dresden in the year 1791, of respectable parents. The weakness of his health prevented any great application to study; but as he grew, both his mind and body gained strength, and he showed an early inclination to history, mathematics, and physical science. He went to the universities of Leipzig, Berlin, and Vienna, where he laboured much at poetical composition. Two pieces, 'Die Brant' (The Bride), and 'Der Grüne Domino' (The Green Domino), were acted at Vienna in 1812, and meeting with success were followed by others, of which 'Zriny' and 'Rosamunde' (the English Fair Rosamond), two tragedies, were works aiming at a high character.

The events of the year 1813 made a deep impression on Körner. Inspired by patriotic zeal he joined a volunteer corps in the cause of Prussia against the French. He was wounded by two sabre cuts at the battle of Kitzén, and in a subsequent battle, August 28, he was killed by a shot, and buried by his comrades at the foot of an oak on the road from Lübelow to Dreikrug.

As Körner was scarcely twenty-two years of age at the time of his death, his works, which are rather numerous, must be judged with lenity. His fame chiefly rests on a collection of lyrical pieces called

'Leier und Schwert' (Lyre and Sword), many of which were written in the camp. His happiest effort of imagination is the 'Schwert Lied' (Sword Song), in which the sword becomes a person and addresses its owner—a piece which has been translated (not very closely) by Lord F. L. Gower.

A complete edition of his works, in one volume, was published at Berlin in 1835.

KOSCIUSKO, THADDEUS, born in 1756, of a noble family of Lithuania, after studying at Warsaw and Paris, was made a captain in the Polish army. He afterwards accompanied La Fayette to assist the revolted American colonies against England. He obtained the rank of general officer in the American army, with a pension. In 1789 he was made major-general in the Polish army. He served with distinction in 1792 against the Russians, but King Stanislaus having submitted to the empress, and Poland being occupied by Russian troops, Kosciuszko with several other officers left the service, and withdrew to Germany. When the revolution broke out in Poland at the beginning of 1794, Kosciuszko was put at the head of the national forces. After some temporary successes he was overpowered by superior numbers at the battle of Macziewicz, October 10, 1794, and taken prisoner. He was conveyed to St. Petersburg; but being released by the Emperor Paul, he repaired to America, and returned to France about 1798, where he refused all offers of employment from Napoleon, and exerted himself to procure an extension of the new kingdom of Poland, founded in 1815.

In 1816 Kosciuszko settled at Soleure, in Switzerland, and energetically applied himself to agricultural pursuits. He died 15th October, 1817, in consequence of a fall from his horse. His remains were removed to Cracow, and placed in the vaults of the kings of Poland.

KOSTROMA. [COSTROMA.]

KOTBUS. [BRANDENBURG.]

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON, was born at Weimar in 1761. He studied at the gymnasium of that town, and also at the University of Jena. His poetical and dramatic tastes had manifested themselves at an early age. He studied the law, but at the same time composed slight theatrical pieces. In 1781 he went to St. Petersburg, and was kindly received by the emperor of Russia, who raised him to the rank of nobility, and made him president of the government of Esthonia. While at Revel he wrote several favourite works, and among them 'Menschenhass und Reue,' (Misanthropy and Repentance), well known in this country under the title of 'The Stranger.' He travelled in 1790 to Pyrmont, visited Paris, and returned to Esthonia in 1795, where he wrote above twenty dramas. In 1798 he went to Vienna as poet to the Court Theatre, but gave up that place in two years, and received a yearly pension of 1000 crowns. He returned to Russia, where he had scarcely arrived when he was arrested and sent to Siberia. A translation made by a young Russian of a paltry little piece by Kotzebue, called 'Der Leibkutscher Peters des Grossen' (The Body-Coachman of Peter the Great), so delighted the Emperor Paul that he was recalled from banishment. After the death of this emperor he went to Weimar, and thence to Jena. Some disagreement with Goethe caused him to remove to

Berlin, where he edited one or two periodical works. The events of 1806 caused him to fly to Russia, where in his writings he unceasingly attacked the Emperor Napoleon and the French. In 1817, after having again visited St. Petersburg, he was despatched to Germany by the emperor of Russia (Alexander), with a large salary, to watch the state of literature and public opinion, and to communicate all that he could learn. He edited a weekly literary paper; but the German people became disgusted with his scoffing at liberal opinions, and his conduct particularly roused the indignation of Sand, a student and political enthusiast, who, considering him an enemy to liberty, assassinated him on the 23rd of March, 1819.

Kotzebue's fame rests almost entirely on his dramas, which are nearly 100 in number, and of the most various degrees of merit. Many of them have been translated into English. We need only mention 'The Stranger,' 'Lovers' Vows,' and 'Pizarro.'

KOURSK. [KURSK.]

KOW-LOON, a suburb of Hong-Kong, on the mainland of China, ceded to the British in January, 1861. The area is only a few square miles, the place being reserved as a sanitarium for troops and for the villa residences of the colonists.

KOWRIE PINE (*Dammara Australis*), a beautiful pine of New Zealand. It sometimes attains a height of 130 feet. The wood is white and close grained. The gum known as Australian copal is obtained from a species of kowrie pine.

KRAAL. In the southern part of Africa, among the Hottentots, a collection of huts.

KRAKEN (German), a name applied to a fabulous ocean monster or sea-serpent of enormous size. No satisfactory proof of its actual existence has ever been adduced.

KRAMERIA/CEÆ, a small natural order of poly-petalous exogenous plants, by most botanists referred to *Polygalaceæ*, but apparently distinct. *Krameria triandria*, or *Rhatany*, is a small low-lying under-shrub, growing on the dry projecting parts of the mountains of Peru near Huanaco, &c. The root is heavy, and devoid of odour; but the taste, especially of the bark, is strongly astringent and bitter, yet not disagreeable. Iodine turns it black. According to the analysis of Gmelin, it contains much tannin, with saccharine and mucilaginous matter, woody fibre, and salts.

KREASOTE. [CREASOTE.]

KREFELD. [CREFELD.]

KREMNITZ. [CREMNITZ.]

KREUTZER, a small copper coin of Germany, of different values in different states. In some places thirty kreutzers are equivalent to 1s. But in Frankfurt, and in the southern parts of Germany, three kreutzers are equal to 1d. sterling. In the canton of Berne, the coin passes for six deniers, and in Bale for five. The Austrian paper currency, marked zechn (ten) kreutzers, passes for twelve.

KRISHNA. [VISHNU.]

KROKIDOLITE (Gr. *kroke*, 'woof,' and *lithos*, 'a stone'), a mineral so called from its resembling asbestos, and having elastic fibres. It is massive and opaque, and of a light-blue colour. Its specific gravity is 3.2; and its constituents are silica, protoxide of iron, soda, magnesia, and lime.

KRUMAN. [BETCHOUANA.]

KUBAN, or KOOBAN, a Russian river that rises in Mount Elbrouz, the highest peak of the Caucasian mountains, and flows in a general N.W. direction between high mountain ranges, from which it receives numerous feeders, until it reaches the level country E. of the Sea of Azof. It here turns westward, and continues in that direction for the rest of its course. Towards its mouth it enters a low flat country, and along its banks salt marshes extend to a considerable distance. In this plain the river divides into two branches, and forms the Island of Taman. One arm of this river falls into the Sea of Azof; the other falls into the Kubanskoi Liman, or Lake of Kuban, which is united by a narrow passage to the Black Sea. The Kuban is about 400 miles in length, and generally runs with a rapid current, rendering it difficult of navigation, though barges come up to Yekaterinodar. Along the banks of this river are numerous Russian forts.

KUBLA KHAN, or KHUBILAI KHAN, the grand khan or khagan of the Mongols, and emperor of China, first appears in history as the conqueror of the north of China in the year 1260. He was a learned and enlightened monarch, and endeared himself to the Chinese by his attention to the men of letters, and by the respect he paid to the memory of their former renowned monarchs. In 1280 he finally extinguished the Sung dynasty, invading and subduing southern China, and founding a new government, which, however, only lasted eighty years. After the Mongolian conquest of China, Kubla's dominions extended from the Arctic Ocean to the Chinese Sea, and from the Corea to Asia Minor, being the largest territory ever governed by any one monarch. His court was attended by the learned men of India, Persia, and some even from Europe, notably the renowned Marco Polo. Kubla died at Peking in 1294.

KUGLER, FRANZ THEODOR, Professor of the History of Art in the Royal Academy of Berlin, and distinguished for numerous works on the history of art, was born at Stettin in 1808. His principal work was his 'Handbook of the History of Painting, from the age of Constantine to the present time.' It has been translated into the principal languages of Europe. He died in 1858.

KUJIE, the ancient Arabic characters; so called from Kujia, a town on the Euphrates. Their study has recently attracted the special attention of Oriental scholars.

KUMAON, a district forming part of the British territory in Northern Hindustan, presidency of Bengal, comprehending an area of about 7000 square miles, includes the country between the sources of the Ganges and the river Kalee, extending as far south as 29° 20' N. lat. The whole of this district presents a succession of mountainous ridges, increasing in elevation as they approach the north, until they reach the snowy peaks of the Himalayas. Towards the south the country presents an almost uninterrupted succession of forests, containing many large trees; but in the higher region to the north, where the height amounts to 2500 feet above the plains, tropical productions disappear, there are no longer forests of any description, but in their place numerous groups of trees of various kinds commonly found

in Europe; among these are the oak, fir, willow, mulberry, and birch. The country was acquired by the British in 1815, to whom it offers little advantage, except from its climate, which is found to be almost as efficient in restoring tone to the constitution of Europeans as a visit to Europe. For this purpose the capital, Almora, is much frequented. [ALMORA.] The population is estimated at 166,755. Wheat, hemp, rice, and a little corn are raised in the higher plains, and the cultivation of the tea plant has lately been introduced with a fair amount of success. The mineral products comprise gold, copper, and lead, which, with ginger, turmeric, &c., are sent to the lowlands, and exchanged for chintz and cotton cloths, tobacco, sugar-candy, glass, hardwares, and European manufactures. Some coarse woollen, hempen, cotton, and camlet fabrics are woven, and an active transit trade is carried on between Tibet and Hindustan. The district of Kumaon contains many Hindu temples and places of pilgrimage. The marsh land in the south part of the territory is unhealthy from the middle of March to the beginning of October, during which period it is deserted by strangers and natives.

KUNDUZ. [TURKISTAN.]

KUPFER SCHIEFER (Germ.), the copper slate of Thuringia, in which the remains of reptiles, especially saurians, have been found. This is the earliest instance yet noticed of the occurrence of oviparous quadrupeds in the history of the earth's crust. These reptiles were first discovered in the time of Leibnitz, and have been classed by Cuvier among the living Monitors.

KUR. [ARAS; GEORGIA.]

KURDISTAN (the country of the Kurds) comprehends the larger portion of that mountain region which divides the elevated table-land of Iran (Persia) from the low plains of Mesopotamia or Al-Jezireh. As it does not constitute a political division, its boundaries are not exactly determined; but the latitudes vary between 34° and 38° N., while the width of this mountain region may be about a hundred miles. About three-fourths are under the dominion of the Turkish sultan. The remainder belongs to Persia.

The mountain ranges, with which the country is almost covered, and which in some cases rise to a height of 13,000 feet, divide the surface into fertile valleys and extensive table-lands.

The largest river of Kurdistan is the Zab Ala, or Great Zab. It rises within the boundary of Persia, at an elevation of about 7000 feet above the sea-level, receives by its numerous affluents the drainage of almost the whole of Northern Kurdistan, enters Southern Kurdistan by a narrow glen, and joins the Tigris about 30 miles below Mosul. At the place of their confluence the rivers are nearly equal in size. The other large rivers of Kurdistan are the Zab Asfal, or Lesser Zab, and the Diyálah. They rise in the elevated region dividing Southern Kurdistan from the table-land of Iran, and after draining the first-mentioned country, they fall into the Tigris.

A sultry and vehement east wind, resembling the sirocco, is the terror of the country. The soil is generally parched in summer, but verdant during the wet season.

Suleimaniyeh, the modern capital of Southern

Kurdistan, and the residence of the hereditary pasha or wali, was built in 1788, and contains more than 2000 houses and about 10,000 inhabitants, six caravanserais, several baths, and five mosques. The commerce with the adjacent countries is considerable, and is concentrated in this place, the vicinity of which is famed for its breed of horses.

The fields of Kurdistan produce wheat, barley, and Indian corn; millet and rice are grown only in the lower districts towards the banks of the Tigris. Tobacco and cotton are largely cultivated, and supply articles of commerce. Fruits of various kinds are grown, but the only cultivated ground is near the villages. The country also yields the remarkable vegetable substance known as manna, but called in Turkish 'the Divine Sweetmeat.' It is found on the leaves of the dwarf oak, the flowering ash, and other plants. The Kurds go out before sunrise, after rainy or dewy nights, to collect it, spreading cloths under the trees, and shaking down the manna from the branches. The castor oil shrub abounds near the Tigris, and the slopes of the hills are covered with different kinds of oaks, some of which furnish the finest nut galls of commerce.

Sheep, cattle, and horses abound. A great trade is carried on in the latter with Turkey and Persia; the Kurdish breed being so famed for its spirit and endurance as to be almost exclusively employed in the Turkish and Persian cavalry. There are bears, wild hogs, wild goats, antelopes, jackals, and land-turtles. Bees are abundant.

Minerals are scarce, except building-stone. In the mountain region iron and sulphur are met with. There are several salt springs, and also springs which yield naphtha and petroleum.

As the passes through the ranges of mountains and hills are difficult, and single travellers are subject to be robbed and murdered, commerce is carried on by caravans. At least one caravan departs every month from Suleimaniyeh for the Persian towns of Tabriz and Hamadan. There are other caravans to Hamadan for goods from Bagdad, to Mosul for goods from Damascus, and to Erzerum for goods from the Black Sea.

The population of Turkish Kurdistan is estimated at about two millions, of which four-fifths are Kurds, and the remainder Armenians, Persians, Jews, and Turks. The Kurds are a stout race of men, of dark complexion, with black hair, a large mouth, small eyes, and a savage look. Their language is derived from the same stock as that of the modern Persian; but not having been fixed by writing, it has degenerated, and is divided into many dialects. In Turkish Kurdistan the nation is composed of two castes, the warriors, and the working people or agriculturists. The Kurds are Mohammedans.

The Kurds were known to the ancients. When subject to the kings of ancient Persia, they belonged partly to the province of Assyria, and partly to Media. After the time of Alexander their country was united to the kingdom of Syria, but was dismembered from it in the third century before Christ by the Parthians. It afterwards became a part of the new Persian empire, and fell with it under the dominion of the caliphs of Bagdad. After the destruction of the caliphate, Kurdistan partook of the numerous revolutions in Persia and Mesopotamia. The famous

Sultan Saladin was a Kurd, and appears to have got possession at least of a part of the country. But it soon passed under the dominion of the Mongols (1258), and finally (1388) was conquered by Timur. After the establishment of the Soofî dynasty (1502), Kurdistan constituted a part of Persia, and remained so till the seventeenth century, when the Kurds, oppressed by the Persians, revolted, and submitted themselves to the dominion of the Turkish emperor.

(Rich, *Narrative of a Residence in Kurdistan*; Ainsworth and Sheil, in *London Geographical Journal*; Ainsworth, *Travels and Researches in Asia Minor*, &c.; Rawlinson, *Journey from Tabriz through Persian Kurdistan*, &c.)

KURILE ISLES, a series of twenty-five islands extending between Kamchatka and the Japanese island of Jesso. They are all of volcanic origin, consisting of high masses of lava. Ten active volcanoes are known to exist on the nineteen northern islands. The vegetation is scanty, and on those near Kamchatka trees do not grow; but the southern islands are more fertile, especially Kunashir and Iturup, on which the Japanese have settled. The remainder are claimed by the Russians. The number of inhabitants are about 1200, who live mostly by hunting and fishing, the products of which they barter to Russian, American, Japanese, and Dutch traders. There are large quantities of beavers in the islands.

KURRACHEE is the principal seaport town of Seinde, on an islet of the Indian Ocean, in lat. 24° 51' N., long. 67° 2' E. The population in the town and suburbs is about 30,000. It stands on a low sandy shore, and formerly consisted, with its extensive suburbs, mostly of straggling huts; but it has been almost rebuilt, and greatly improved since it came into the possession of the British; and its trade and consequence are rapidly augmenting. The harbour, which has been deepened and extended, is sheltered by Point Munorah, about 4 miles to the south-west, on which is a fort, and beyond it a roadstead. Kurrachee was bombarded and taken by the English in 1839. A railway to Kotree, opposite Hyderabad (105 miles), was opened in 1861; and from thence the traffic is extended to Mooltan and other cities in the Punjab by means of steamers. In 1864 telegraphic communication was established with Calcutta, and with Europe by the Persian Gulf in 1865. The town has large warehouses, banking establishments, and all the requisites for a vast commercial emporium; and a regular steam communication exists with Europe and India.

KURRICHAHE. [BETCHOUANA.]

KURSK, or KOURSK, a government of European Russia, lying between 50° 10' and 52° 26' N. lat., 33° 40' and 38° 20' E. long., is bounded N. by Orel, E. by Voronetz, S. and W. by Kharkov and Tschernigov. Its area is 17,433 square miles, and the population 1,811,972. The surface of the province is undulating. It contains no mountains, but is traversed by many small eminences. There are no navigable rivers or large lakes, nor are the forests extensive. The east and south parts of the government belong to the basin of the Don, and are drained by numerous small streams that fall into the Donetz; the western and northern parts are drained by the rivers that form the Seim, a feeder of the Desna, which falls into the Dnieper. Kursk is one of the

most fertile provinces of the empire; the soil is so rich that it needs no manure; but the system of agriculture is very rude. The chief products are rye, wheat, barley, oats, peas, buckwheat, millet, poppy, hemp, hops, tobacco, and flax. Corn, of which there is always a large surplus for exportation, is sometimes kept in caves or pits for five, six, or even ten years. Horticulture is very general and successful; apples, cherries, plums, pears, hazel nuts, and melons are grown. Fuel is scarce; straw and dried cowdung are used as substitutes for firewood. The breeding of oxen, horses, and sheep is carried on very extensively, and the inhabitants keep great numbers of swine, domestic poultry, and bees. The minerals are iron, limestone, flints, and saltpetre. The manufactures comprise coarse woollens, leather, tallow, soap, saltpetre, and pottery. The exports consist chiefly of the natural productions of the country.

Koursk, the capital of the government, a town of 27,000 inhabitants, situated on the right bank of the Seim, 290 miles S.S.W. of Moscow, in $51^{\circ} 43' 30''$ N. lat., $36^{\circ} 27' 45''$ E. long., is the residence of the military governor of Koursk and Orel, and of the bishops of Koursk and Belgorod. The town is surrounded with palisades, the old ramparts having been converted into walks and gardens. The streets are narrow and crooked. There are sixteen churches, two convents, an ecclesiastical seminary, a gymnasium, hospital, several manufactories of leather, wax, and tallow, and an active commerce. It is the see of a Greek eparchy. A large annual fair is held near here in July, when goods are sold to the value of 1,000,000*l*. The other towns are—*BELGOROD*: *Karotcha*, on the left bank of a river of the same name in the south of the province, which has six churches, saltpetre factories, and 11,000 inhabitants; *Putiwl*, on the Seim, in the west of the province; population, 9000; it is well built, and though mostly of wood, has some good public edifices, churches, and charitable institutions, and brick-kilns: *Sudscha*, 50 miles S.W. from Koursk; population, 3000.

KÜSTRIN. [BRANDENBURG.]

KUTAIS. [GEORGIA.]

KUTCH, or CUTCH. [HINDUSTAN.]

KUTCH, or CUTCH (GUNDAVA), a province of Beloochistan, between lat. $27^{\circ} 40'$ and $29^{\circ} 50'$ N., long. $67^{\circ} 21'$ and $69^{\circ} 15'$ E.; bounded by Afghanistan, Scinde, and the provinces of Sarawan and Jhalawan. The length is 160 miles; the breadth, 130 miles; and the area 10,000 square miles. The population is supposed to be 100,000. The surface is low, and generally level, but ill watered, and destitute of forest land. The climate is oppressively hot. Where irrigated, the soil yields grain, pulse, cotton, sugar, madder, and fruits; and this is the most valuable part of the Khan of Kelat's

dominions. The country has also some commercial importance, from being traversed by the principal routes from Scinde to Afghanistan. The chief towns are Gundava, Dadur, Bhag, Lehee, and Kotree. (Johnston's *Dictionary of Geography*, 1864.)

KUYP, or CUYP, ALBERT, the son and disciple of Jacob Gerutze Kuyp, a landscape painter of Dort, was born at Dort in 1606. Scarcely anything is known of the circumstances of his life, except that he was a rigid Calvinist, of retired habits. The date of his death is not known. Kuyp is a great favourite in England, and it is here that his finest works are found. He has been called the Dutch Claude. Admirable as were his landscapes, however, his portraits are scarcely inferior in merit.

KY'ANITE, a mineral of a fine bright blue colour, and sometimes with a shade of green or gray. It is found both massive and crystallized, in six-sided prisms, with bases a little inclined.

KYANIZING, a process invented by John Howard Kyan for preserving timber from dry-rot and decay, by injecting into the pores of the wood a solution of corrosive sublimate or bichloride of mercury. Kyan was a practical chemist, born in Dublin in 1774, who died at New York on the 5th of January, 1850.

KYD, THOMAS, was one of those dramatic poets who immediately preceded Shakspeare. Three plays of his are extant—1, 'Cornelia; or Pompey the Great, his fair Cornelia's Tragedy,' a translation, respectfully executed, from the French of Garnier, printed in 4to, 1594, 1595; 2, 'The First Part of Jeronymo,' 1605, 4to; 3, 'The Spanish Tragedy, or Hieronymo is Mad Again,' of which there are many editions, the oldest known being of 1599, though the play was certainly printed earlier. All the three are in Dodsley's 'Old Plays.' As a writer of blank verse, Collier places him next to Marlowe, among the predecessors of Shakspeare.

KY'DIA, a genus of trees of the natural family of *Byttneriaceæ*, which is sometimes called *Sterculiaceæ*. The species are only two, found in the hilly parts of Hindustan, as far as the foot of the Himalaya mountains. *K. calycina* abounds in a bland mucilage, which is employed in clarifying sugar.

KYRIE ELEISON, a Greek phrase, signifying 'Lord have mercy.' It is the name given to a form of prayer common to the ancient Greek, the Roman Catholic, and the Anglican liturgies. In the Roman mass it follows the introit, and forms the introduction to the hymn, 'Gloria in excelsis Deo.' The Greek words are still used, being, as Dr. Milman says, one of many evidences of the predominance of the Greek element in the early Roman Church. In the English Prayer-book it is placed between the Creed and the Lord's Prayer in both morning and evening services.

L, the first of the letters called *liquids* or *semi-vowels*, is formed at that part of the palate which is near the teeth. It is therefore allied to the adjoining liquids *r* and *n*, and to the palatodental consonants. It is identical with the Greek *lambda* and the Hebrew *lamed*, and is found in almost every language. As a numeral, **L** represents fifty. The interchanges to which it is liable are as follows:—

1. **L** is interchangeable with *r*. Hence from the Greek or rather Latin *apostolo*, *epistola*, the French have derived *apostre*, *apôtre*; *épistre*, *épître*.

2. **L** with *n*, as *Barcino* (onis), *Barcelona*; *Ruscino*, *Roussillon*; *Bononia*, *Bologna* or *Boulogne*; *λίτρον*, *nitrum*; *anima* in Lat., Ital. *alma*.

3. **L** with *d*, as *St. Aegidius*, *St. Giles*; *gridiron*, meaning *grill-iron*; and the English title *admiral* is derived from the Spanish *almirante*. **L** is also interchangeable with *T*.

4. **Ll** in the middle of words with *li*. Examples of this are abundant in the French pronunciation of the *l mouillé*. Hence from the French *billards* is derived without much alteration of sound the English *billiards*. This change prevails between the Greek and Latin languages, as *φύλλο* and *folio*, 'a leaf'; *ἄλλο* and *alio*, 'other'; *ἄλλ* and *sali*, 'leap.' With these forms may be compared *Mallorca*, pronounced *Mayorca*, the Spanish name for *Majorca*. Lastly, the Portuguese write *lh* with the same sound.

5. **L** disappearing. Not very dissimilar from the preceding section is the Italian interchange of *pl*, *cl*, *fl*, with *pi*, *chi*, *fi*; as from *pleno*, 'full', *pieno*; *plano*, 'flat or low', *piano*; *clavi*, 'a key', *chiave*; *claro*, 'bright', *chiaro*; *clamare*, 'to call', *chiamare*; and *flor*, 'a flower', *fiore*; *Florenza*, once *Fiorenza*, now *Firenze*, the name of Florence.

This loss of an *l* after a consonant appears in other languages. The German *fliegen*, 'to fly,' has for its chief element *flug*, corresponding to the Latin *fug*. In the same language *fisperm* and *fispenn* both mean 'to whisper'; *flittich* and *fitlich* both mean 'a wing'; *blinzen* corresponds to the English words *blink* and *wink*.

6. **L** with *u*, particularly after an *a*. *Alfidenā*, 'a town,' or *Aufidena*; *ἐλεημοσύνη*, 'pity,' Ital. *limosina*, Fr. *aumône*, Eng. *alms*; Lat. *altari*, 'an altar,' Fr. *autel*; Lat. *aliqui-uno*, Ital. *alcuno*, Fr. *aucun*; Lat. *ulna*, Fr. *aune*. The French also contract the preposition and article *à le*, *à les*, to *au* and *aux*.

7. Many words beginning with an *l* once had other consonants before the *l*; as in Latin, *loco*, 'a place,' *liti*, 'a suit,' *lato*, 'broad,' were once preceded by *st*—thus, *stloco*, *stliti*, *stlato*. This explains how *lato* in Latin is the participle of *toll*. It must once have been *tlato*, corresponding to the Greek forms of the same root, viz., *τλη-τος*, *τλη-μων*, as well as *τολ-μη*.

8. **L** is very apt to appear in a root, sometimes

before a vowel, sometimes after one, as in the Greek words *καλι* or *κλη*, *βαλ* or *βλη*, &c. Where this slipping occurs after a sound like *k*, the *l* is apt to be converted into an *r*. Thus the Greek *σκαλεν*, 'poke,' is in Latin *scrutari* (compare the phrase *scrutari ignem*, 'to poke the fire').

LA, in music, used by the French and Italians, is synonymous with our note *A*.

LAALAND, a flat and exceedingly fertile island in the Baltic, belonging to Denmark. The area is 450 square miles, and the population 56,000. The surface is low and level. There are some rather extensive forests of beech and oak, and some beautiful gardens. It is one of the most fertile of the Danish islands, producing corn, hemp, hops, and apples. The chief town is Nakskov, which has a good harbour and coasting trade, principally in corn. The population is 3687.

LABARUM, the famous standard of Constantine the Great, which he designed in remembrance of the vision of a cross in the heavens that occurred to him on his march against Byzantium. The Greek historians describe it as a long pike surmounted by a crown of gold; the crown inclosing a monogram of the first two letters of Christ's name. From its shape it also served as an emblem of the Cross. A silken banner hanging from it was embroidered with the figures of the great emperor and his family. It was jealously preserved for many generations, and carried before the Greek armies in terrible emergencies, as if it could insure the safety of the empire. On Constantine's medals it is accompanied with the legend which he professed to have seen blazoned in the skies, *En touto nika* ('conquer by this.')

LABEO (Cuvier), a genus of fishes belonging to the *Cyprinidae*. The species of this genus resemble the true Carps in having the dorsal fin long, but they do not possess the strong spine of the anal and dorsal fins. The lips are very thick and fleshy, and more or less crenulated. There are no cirri. An illustration of this genus will be found in the *Cyprinus Niloticus* of Geoffroy St. Hilaire. The *Cyprinus fimbriatus* of Bloch and the *Catostomus cyprinus* of Lesueur also belong to the genus *Labeo*, which has no representative in the European seas.

LABIALS (Lat. *labium*, 'a lip'). The letters *B*, *P*, *V*, *F*, *M*, are so called, because the lip is chiefly employed in their pronunciation.

LABIATE. [*LAMIACEÆ*.]

LABIENUS. [*CÆSAR*.]

LABIOBARBUS (Lat. *labium*, 'a lip,' and *barbus*, 'bearded'), a genus of the family *Salmonideæ*.

LABLAB, a name of Arabic origin, which has been adopted by botanists to designate a genus of *papilionaceous Leguminosæ* of the tribe *Phaseoleæ*, or tropical pulse.

LABORATORY, the room in which chemical operations are performed. The requisites for the proper arrangement of, and the necessary instruments for a laboratory, may be seen at length in the late Professor Faraday's 'Chemical Manipulation.'

LABORATORY-ROYAL, a department of Woolwich arsenal for the manufacture of warlike stores, has been in existence for many years, and in 1855 was considerably enlarged and improved. Here are made shot, shell, bullets, percussion-caps, cartridges, and all kinds of ammunition. The machinery is of a very ingenious and powerful description. The annual cost of the Laboratory varied from 503,935*l.* in 1861 to 195,743*l.* in 1863. In the estimate for 1869-70 the cost was set down at 223,888*l.*; of which 86,200*l.* was for wages, 54,500*l.* for materials, and 7182*l.* for instruction and superintendence. The superintendent's salary is 975*l.*, his assistant's 440*l.*, and forty clerks are attached to the establishment.

LABOUR. [WAGES.]

LABOUR. [BASQUES, LE PAYS DES.]

LABRADOR is the name of a vast peninsula of British North America, between lat. 49° and 63° N., long. 55° and 79° W., bounded S. by the Gulf of St. Lawrence, E. by the Atlantic Ocean, W. by Hudson's Bay, and N. by Hudson's Straits. Its area is estimated at 170,000 square miles, and the population at 5000. This country was discovered by Cabot in 1496, and re-discovered by Hudson in 1610. It is very thinly peopled by wandering tribes of Indians, and in the northern coasts by nomadic Esquimaux. The table-land in the interior is very sterile; cariboo moss covers the rocks, and stunted spruce, birch, and aspen grow in the ravines. It is strewn with immense numbers of boulders, which are perched on the summits of the hills. The climate is less foggy than in Newfoundland, but very severe, the temperature in winter being about 30° below zero; and in the summer it does not rise above 85° Fahr. Indeed this immense region is quite unfit for the abode of civilized man; and though once rich in fur-bearing animals, and in cariboo or reindeer, it is now almost a desert.

The peninsula is divided into three parts—one belonging to Canada, comprising the country drained by the St. Lawrence; another on the coast of the Atlantic, called Labrador, is under the jurisdiction of Canada; and the third, called East Main, is included in the territory of Hudson's Bay.

The whale, seal, cod, salmon, and herring fisheries, off Labrador, employ during the season about 1000 decked vessels. Much of the produce is sent to Newfoundland before being exported to Europe. The total annual value of the fish, oil, &c., is estimated at 600,000*l.*

The European settlements on the east coast consist of Forteau and Bradore bays, Anse, Le Blanc, and the Moravian mission stations of Nain, Okhak, Hopedale, and Hebron. The mean annual temperature of Nain, the oldest settlement, although in about the same latitude as Edinburgh, is 4° or 28° below freezing point. The Hudson's Bay Company have several settlements on the west coast, or East Main.

LABRADO'RITE, Labrador feldspar, the constituents of which are silica, alumina, soda, and oxide of iron; specific gravity, 2.7.

LABRAX (Cuvier), a genus of fishes of the section *Acanthopterygii* and family *Percidæ*. The fishes of this genus are closely allied to the true Perches, but may be distinguished by the opercular bones being covered with scales, the absence of denticulations on the suborbital and interopercular bones, the operculum being terminated by two spines, and likewise by the tongue being almost entirely covered with minute and closely set teeth. There are two dorsal fins.

Examples.—*Labrax lupus* (the Basse, or Sea Dace), abundant in the Mediterranean; *Labrax lineatus* (the Rock Fish, or Striped Basse of the United States); and a second American species, *Labrax mucronatus*.

LA'BRIDÆ (*Labroides*, Cuvier), the family of Bream, or Rock Fishes, belonging to the order *Acanthopterygii*. The fishes of this family are of an oblong form, covered with scales, usually of a large size, formed of simple laminae, and with the external or posterior margin smooth; they have a single dorsal fin supported in front by spinous rays, each of which is generally furnished with a membranous appendage; the jaws are covered by thick fleshy lips; two upper pharyngeals are attached to the cranium, and together with a large lower pharyngeal are armed with teeth which are large and rounded, sometimes pointed or laminated, and generally very strong. The intestinal canal is without cæca, or, when these appendages are present, they are of small size, and there is a simple and strong natatory bladder.

The fishes of this family are generally most beautifully coloured; they frequent rocky places, spawning in spring or summer. Their flesh is held in no estimation.

The following genera are contained in the family Labridæ:—

1. *Labrus*, of which six British species are described by Mr. Yarrell ('British Fishes'). 2. *Cheilinus*. Locality, Indian Ocean. 3. *Lachnolaimus*. Locality, American seas. 4. *Julis*, the Rainbow Wrasse, a Mediterranean species (*Julis Mediterranea*), has been caught off the British coast. 5. *Anampses*. Locality, Indian seas. 6. *Crenilabrus*. Mr. Yarrell figures and describes four British species. 7. *Coricus*. Locality, Mediterranean. 8. *Epibulus*. Locality, Indian seas. 9. *Clepticus*. Locality, Antilles. 10. *Gomphosus*. Locality, Indian seas. 11. *Xirichthys*. Locality, Mediterranean and other seas. 12. *Chromis*. Locality, Mediterranean, the Nile. 13. *Cychla*. 14. *Plesiops*. 15. *Malacanthus*. 16. *Scarus*. To this genus, according to Cuvier, belonged the celebrated fish *Scarus Creticus*, which the ancients esteemed so highly for its flesh. 17. *Calliodon*. 18. *Odx*.

LA BRUYERE. [BRUYERE, LA.]

LABUAN. [BORNEO.]

LABURNUM, the common name of the early flowering European trees, named by botanists *Cytisus alpinus*, and *C. laburnum*. Laburnum is a native of the Alps of Europe, and is well known in gardens for the beauty of its pendulous racemes of beautiful yellow flowers. Every part of it is poisonous.

LABYRINTH (Greek, *labyrinthos*), a place involved in countless and almost inextricable sinuosities—a species of gigantic puzzle, such as the Maze at Hampton Court. In ancient history and mythology four famous labyrinths are described: one in Crete, which Dædalus built, at the instigation of Minos,

to inclose the Minotaur; one in the island of Meröe, devised by the Egyptian king Psammetichus, and composed of twelve palaces, all communicating with one another, and so divided into rooms and corridors that the person once astray within its walls could not hope to discover an egress without a guide. This was partly extant in the time of Pliny, and was probably a place of royal sepulture. A third labyrinth existed, it is said, at Lemnos; and a fourth was built by Porsenna, king of Etruria. The latter is described by Varro, but, undoubtedly, is a pure myth.

LABYRINTHODON (literally, labyrinth-toothed), a name given to a remarkable frog-like saurian of the New Red Sandstone formation. No complete skeleton has been found. The fragments of remains and the footprints of the animal left on the sandstone, have been used by the comparative anatomist to determine the form of the Labyrinthodon and its place in the zoological scale. It is generally held by geologists to be the same as the *Cheirotherium*. In handbooks of geology figures of this animal are given; but it should be borne in mind that these are much indebted to the imagination of their authors.

LA CAILLE, NICHOLAS LOUIS DE, was born at Rumigny, in the department of Ardennes, March 15, 1713. His father, a retired military officer, was in the service of the duchess of Vendôme, and, himself attached to science, he endeavoured to cultivate the same taste in his son. He died, however, while the latter was at the college of Lisieux, and his son was enabled to continue his studies by the generosity of the duke of Bourbon. He chose theology as his profession; but in passing his first examination he showed so much frankness in his answers to some questions proposed by a doctor of the old school, that this examiner would have refused him his degree but for the remonstrances of the rest. This incident discouraged him, and he remained content with the title of abbé, beyond which he never proceeded. He had previously turned his attention to astronomy under great disadvantages; and upon his renunciation of theology he was introduced to James Cassini, who gave him employment at the observatory. In the following year, in conjunction with Maraldi, he made a survey of part of the coast of France, where the talent which he showed occasioned his being employed in the verification of the arc of the meridian. This operation (in which Cassini de Thury took a part) commenced at the beginning of May, 1739, and before the end of the year he had completed the triangulation from Paris to Perpignan, had measured three bases, made the requisite astronomical observations at three stations, and had taken a prominent part in the measurement of a degree of longitude. In the winter of 1740 he extended his operations to the mountains of Auvergne, in order to test some suspicions which he had formed upon the accuracy of Picard's measurement. The result of these labours was the complete establishment of the gradual increase of the degree in ascending from the equator to the poles; which, though long known to be theoretically true, had not previously been confirmed by measurement. In the meanwhile La Caille had been appointed to a chair of mathematics in the Mazarin College, the duties of which he fulfilled with care, and for which he published treatises on geometry, mechanics, astronomy, and optics. In 1751 he made

his celebrated voyage to the Cape of Good Hope, where he remained nearly four years. His object was to form a collection of southern stars, and up to the present time his results have been highly esteemed, though the labours of Herschel and others have made important additions. He determined the places of about ten thousand stars, and grouped them in constellations; measured a degree of the meridian at the Cape, and made a survey of the Mauritius and Island of Bourbon. He returned to Paris in 1754, and occupied himself in the preparation of his 'Fundamenta Astronomiæ,' for the publication of which he engaged to furnish a bookseller with almanacks for ten years. At the end of 1761 he was seized with gout, but he remained during the winter employed in his observatory, passing several nights upon cold stones in his scientific investigations: a fever was the consequence, and he died March 21, 1762, aged forty-nine years.

La Caille was an astronomer whose observations will have the highest value as long as the science is cultivated; which cannot be said of others, his superiors in originality of discovery. Lalande said of him that he alone had made more observations than all his contemporaries put together; which Delambre states would be no exaggeration, if spoken of the twenty-seven years during which he laboured. But though his utility was much increased by his extraordinary activity, industry, and honesty, yet his reputation was still more indebted to the genius which he displayed in producing exactness out of imperfect instruments.

LAC. [MONEY.]

LAC (Greek, *gala, galaktos*), a resinous substance, which in the East Indies flows from certain trees in the state of a milky fluid, on account of the puncture made by a small insect, the *Coccus ficus*, in their branches, in order to deposit its ova. The trees are principally the *Ficus indica*, *Ficus religiosa*, and *Rhamnus jujuba* and a species of *Celtis*.

There are three kinds of lac known in commerce, distinguished by the names of *Stick Lac*, *Seed Lac*, and *Shell Lac*. *Stick Lac* is the substance in its natural state; it is of a reddish colour, and incrusts small twigs; when broken off and boiled in water it loses its red colour, and is then termed *Seed Lac*; and when melted and reduced to the state of thin plates, it is called *Shell Lac*. The imports are given in the article *GUM*.

The different varieties have been analyzed, with the following results:—

	Stick Lac.	Seed Lac.	Shell Lac.
Resin, ...	68.0	88.5	90.9
Colouring matter, .	10.0	2.5	0.5
Wax, ...	6.0	4.5	4.0
Gluten, ...	5.5	2.0	2.8
Foreign bodies, .	6.5	—	—
Loss, ...	4.0	2.5	1.8
	100.0	100.0	100.0

Laccin is the substance which remains after the lac has been repeatedly digested in alcohol and water. It is insoluble in water, alcohol, or ether, but is dis-

solved by concentrated sulphuric acid. Solution of potash also dissolves it readily.

Laccic Acid separates from solution in water, by spontaneous evaporation, in crystalline grains. With the alkalis and with lime it forms salts which are soluble in alcohol and in water, and are deliquescent.

Cochinellin, or the colouring matter of stick lac, is similar to that of cochineal, used for the same purposes, and yields a scarlet colour little inferior to it.

Lac Dye and *Lac Lake*, two preparations of lac which are manufactured in the East Indies, are used to a very considerable extent in scarlet dyeing.

LACCADIVE ISLANDS are situated in the Indian Ocean, opposite the coast of Malabar, between 10° and 13° N. lat., and 72° and 75° E. long. They are seventeen in number, but only eight are inhabited. They consist chiefly of low coral formations, and are surrounded with deep water. The largest of these islands, Anderot, is only three miles in length and one mile broad. They are based on coral reefs, and are nearly flat. The principal products are coir, jaggery, cocoa and betel nuts, with some rice, sweet potatoes, and small cattle. An annual tribute of 1000*l.* is paid to the British district of Cananore, in the presidency of Madras. The population is said to amount to between 6000 and 7000.

LACE (Ital. *laccio*). This fabric differs essentially in form and appearance from the products of an ordinary loom, and until the early part of the present century was made without the employment of machinery. The finest and most costly kinds are still made by hand, and require both skill and patience of no ordinary kind. (See Plate for specimen of lace curtain.) The implements which are used by hand lacemakers are few in number, and inartificial in their character. They consist of a pillow or cushion, a series of bobbins or small cylindrical pieces of wood round which the thread or silk employed is wound, and pins which are stuck into the cushion and around which the threads are twisted, the pattern of the lace being determined by the disposition of the pins, and this again being regulated by holes pierced in a piece of parchment which is laid upon the cushion. It is not possible, however, to give in writing an intelligible description of the hand lace manufacture. The principal seat of the trade in England is Buckinghamshire; but the most esteemed qualities are imported from foreign countries—especially Belgium and France—and is generally known by the name of the town in which it was made. Of late years lace-making, as formerly conducted, has very much declined in this country, owing to the greater cheapness of machine-made lace, better known as bobbin-net. The manufacture is principally carried on in and about Nottingham, Leicester, and Derby, and in the west of England, especially at Honiton in Devonshire. There are also a large number of females employed in the trade in the north of Ireland. The machines by which this bobbin-net is made are among the most exquisite pieces of mechanism employed in manufactures. They were first invented by Mr. John Heathcoat in 1809, and have since been much improved by other makers. Heathcoat, like many other inventors, was driven from his residence at Loughborough, in Leicestershire, by the hand lacemakers of the midland counties. He went to live at Tiverton, and thus introduced the trade

into the west of England. His machines ultimately bore down all opposition at Nottingham and elsewhere. Machine lace is now made as wide as five yards; and the manufacture has wonderfully increased at Nottingham (which may now be looked upon as the head-quarters of the trade) during the last fifteen years. There are about 180 wholesale lace firms in that town alone. Lace-making machines have also been introduced into France and Belgium, chiefly from England.

The following were the imports of lace into the United Kingdom in 1867:—

	Value.
Pillow of thread and cotton, . . .	£68,726
Pillow of silk, ...	30,942
Machine or imitation, ...	91,789
Mohair or worsted, ...	200

Nearly the whole came from France. (*The History of Lace from the Earliest Period*, by Mrs. Bury Palliser, third edition, 1868.)

LACE-BARK TREE. [*DAPHNE*.]

LACEDÆMON, LACEDÆMONIANS. [*SPARTA*.]

LACÉPÈDE, BERNARD GERMAIN ÉTIENNE DE LA VILLE, COMTE DE, was born at Agen, in France, December 26, 1756. His youth was spent at home in the cultivation of literature and science; and when, for the sake of nominal employment, he obtained a commission in the army, it was in a regiment where he had no duties to perform. This enabled him to cultivate his musical taste, but he abandoned any public display of his talents in this line, after the failure of an opera which he was induced to bring out.

In 1781 he published an essay on natural and artificial electricity, and in 1782 a treatise on physics, entitled '*Physique Générale et Particulière*.' These works did not meet with success. Buffon, however, was much pleased with them, and proposed to him to continue his '*Natural History*,' and in 1785 offered him the appointment of curator and sub-demonstrator in the Cabinet du Roi. Lacépède gladly accepted the offer, and left the army. He now applied himself with energy to natural history, and published his '*Histoire Naturelle des Quadrupèdes, Ovipares, et des Serpents*' in 1788–89. Lacépède formed classes, orders, and genera, but his arrangement was, like that of Linnæus, artificial and unphilosophical, founded only on external characters, without reference to internal organization. When the Jardin du Roi was converted by the Convention into a public school, and named the Museum of Natural History, a new chair of zoology was created for him. In 1798 he brought out the first part of his '*Histoire Naturelle des Poissons*.' In 1804 his '*Histoire Naturelle des Cétacés*' was published. He was a member of the Institute at the time of its formation, and afterwards of the Academy of Sciences. He died October 6, 1825.

LACERTA (the *Lizard*), a constellation of the northern hemisphere, surrounded by Andromeda, Cepheus, Cygnus, and Pegasus, found by Hevelius.

LACE'RTIDÆ, or *Lacertians*. Under the family name of *Lacertians* Cuvier arranged—

1. The *Monitors* and their subdivisions, viz., the *Monitors* properly so called, including the *Ourans* of the Arabs (*Varanus*), &c.; the *Dragons* (*Crocodil-*

urus of Spix, *Ada* of Gray); and the *Sauvegardes* (*Monitor* of Fitzinger and Ameiva).

2. The *Lizards* properly so called. This second group comprises, according to Cuvier, the genera *Lacerta*, *Algyra*, and *Tachydromus*.

MM. Duméril and Bibron make the *Varanians*, or *Sauriens Platynotes* ('broad-backed Saurians'), a family which comes immediately after the *Geckotians* in their *Erpétologie*. They allow that the *Varanians* are nearly allied to the *Lacertians*, as modified by them, and rest the distinctions of the former family from the latter—1st, On the presence in the latter of polygonal scales which cover the head; 2nd, on the form of the scales of the back and of the belly, and their non-compressed tail; and 3rd, on the form and disposition of the teeth, which are not distant, obtuse, and conical, but placed on the same line, and trenchant at their summit in the antero-posterior direction.

As the family of the *Varanians* is highly interesting, and the differences between that family and the *Lacertide* are not very wide, it will be most instructive to treat of both in the same article. [VARANIDÆ.]

LACHESIS, in Zoology, a genus of venomous serpents, allied to the viper. In Mythology, one of the Parcae, or Fates, who presided over futurity, and was represented as spinning the thread of life.

LACHRYMAL ORGANS. [EYE.]

LACHRYMATORY (Lat. *lachryma*, 'a tear'), a small glass phial, or globular earthen vessel, with a long neck, frequently found in the ancient Roman sepulchres. In these vessels it is supposed the tears of the friends of the deceased were dropped, and preserved with the ashes contained in the funeral urn. They are often found in our museums, and in the cabinets of the curious.

LACISTEMA'CEE, a small and obscure natural order of incomplete exogenous plants, containing a few arborescent species, inhabiting the woods of equinoctial America, in low places.

LACONICA, called by the Roman writers *Laconia*, a country of ancient Greece, was bounded on the W. by Messenia, on the N. by Arcadia and Argolis, and was surrounded by the sea on the E. and S. Laconica is a long narrow valley, running from north to south, between two mountain masses which stretch from Arcadia to the southern extremity of the Peloponnesus: the western range, which terminated in the promontory of Tænaron, now Matapan (36° 28' N. lat.), the most southerly point of Greece, was called Taygetus; and the eastern, terminating in Cape Målea, was known by the names of Parnon, Thornax, and Zarex. Between the mountains which form the eastern boundary of the valley of the Eurotas and the sea there was a narrow strip of land, which contained the towns of Delium, Minoa, and Epidaurus Liméra, belonging to Laconica. The area of Laconica was probably about 1896 square miles. The district of Thyreatis, on the borders of Argolis, was conquered by the Spartans about 547 B.C.

There were no large towns in Laconica except Sparta. [SPARTA.] One of the most ancient towns was Amyclæ, the residence of the Achæan kings, situated a little to the south of Sparta, in a fertile plain.

The Léleges, according to the most ancient traditions of Laconica, were the earliest inhabitants. At the time of the Trojan war Laconica was in possession of the Achæans, who settled in Laconica at a very early period, and probably conquered the Léleges. During the reign of Tisámenus Peloponnesus was invaded by the Dorians, and Laconica fell to the share of Aristodémus, or his sons Eurýsthenes and Procles. The condition of the original inhabitants of the land, and their relation to their Dorian rulers, belong to the history of SPARTA.

The area of the modern government of Laconica is 1632 square miles, and the population 112,910. The principal town is Mistra. [GREECE.]

LACONISM, a brief, sententious, pointed saying, so called from the mode of expression popular among the ancient Lacedæmonians. In English, the Rev. Charles Cotton's 'Laconics' may be cited as an example.

LACQUERING. [JAPANING.]

LACTANTIUS, LUCIUS CÆLIUS (or *Cæcilius Firmianus Lactantius*), one of the Latin fathers, lived at the end of the third and the beginning of the fourth century. He is generally supposed to have been an African. On the invitation of Diocletian, he went to Nicomedia, where he taught rhetoric. He became afterwards preceptor to Crispus, the son of Constantine, in Gaul. The time of his death is not known.

His chief works are the 'Divine Institutions,' in seven books, written in reply to two heathens who wrote against Christianity at the beginning of Diocletian's persecution; a treatise on the 'Workmanship of God;' on the 'Wrath of God;' and a work entitled 'Symposion,' which he wrote when very young.

Complete editions of his works were published by Hermann at Göttingen in 1736, and by the Abbé Lenglet, 2 vols. 4to, Paris, 1748.

LACTEALS (from *lac*, 'milk') are so called from their containing an opaque, white, milky fluid. They are the system of vessels by which the chyle, or nutritive part of the food, is conveyed from the intestines to the left subclavian vein, in which it is mixed with the blood. They have their origin in the villi of the small intestines, which are short hair-like processes, each consisting of a fine network of lacteal vessels, surrounded by capillary arteries and veins. [DIGESTION.]

LACTIC ACID. This substance exists in milk, and in larger proportions when it has become sour; it also exists in various other animal fluids, and in many vegetable juices. Lactic acid is colourless, inodorous, very sour, and may be so concentrated as to have a specific gravity of 1.215; it attracts moisture from the air, and dissolves in water and alcohol in all proportions. When concentrated lactic acid is heated gradually to 265°, it becomes more fluid, darker-coloured, and yields acetic acid and inflammable gas, charcoal, and a white solid matter, which is both sour and bitter; when this is dried between folds of bibulous paper, and afterwards dissolved in alcohol, it yields perfectly white rhombic crystals, which are anhydrous lactic acid (= C₁₂ H₁₀ O₁₀). The pure uncrystallizable acid, soluble in alcohol and ether, is represented by the formula C₁₂ H₁₀ O₁₀, 2 HO.

The lactates are not an important class of salts. Lactate of ammonia is deliquescent and uncrystallizable. Lactate of potash and lactate of soda are deliquescent, soluble in alcohol, and by evaporation in vacuo they become crystalline masses. Lactate of lime and lactate of barytes yield gum-like products. The lactates of alumina, peroxide of iron, and copper, do not crystallize; but lactate of magnesia and lactate of zinc crystallize in quadrilateral prisms, and lactate of silver in colourless needles.

LACTOMETER (Lat. *lac* and *metrum*), an instrument for ascertaining the different qualities of milk. Several sorts have been invented, one consisting of a glass tube a foot long with a funnel at the top. The upper two inches of the tube are marked in small divisions; and when the instrument is filled with milk to the height of one foot, the depth of cream it yields is noted by the gradations on the upper part.

LACTUCA, a genus of plants belonging to the natural order *Composita*. *L. virosa*, Acid Lettuce, is found on hedges, old walls, and the skirts of fields throughout Europe. It yields a milky juice, which contains *Lactucio acid*. [**LETTUCE.**] *L. scariola*, Prickly Lettuce, is not so acid as *L. virosa*, but possesses the same properties.

LACTUCARIUM is obtained from the *Lactuca sativa*, being the inspissated milky juice of the plant, and which is at first white, but afterwards, by exposure to the air and sun, concretes and becomes brownish. The juice of the leaves only should be collected before the flowering has begun; puncturing the leaves is the best mode of procuring it.

The inspissated concrete juice resembles opium in its action, but is much feebler. In pulmonary diseases it is often a useful sedative. The common lettuce also possesses sedative properties, and eaten towards bedtime has often contributed to procure rest in cases of morbid wakefulness, or to allay pains of the stomach.

LADAKH, or MIDDLE TIBET, is a kingdom in Asia, situated to the east of Cashmere, from which it is separated by a branch of the Himalaya mountains. On the east and north it is bounded by Tibet. It is part of the central plateau of Asia, and has a general elevation of about 9000 feet. The surface is a continual succession of ascents and descents, many of which are very steep. Through the middle of the country runs the valley of the river Indus, which passes the towns of Roodok and Leh, and receives the waters of the Shayuk and other tributaries. There are several lakes, most of which are salt, and furnish great quantities of that article.

The soil is sterile, and the climate severe and variable. The rays of the sun are oppressive. In September, at an elevation of 15,500 feet, the thermometer, resting on the rocks, reached 158°; at 14,500 feet, on the sand, it gave 130°; and in a tent, pitched at a height of 13,000 feet, it reached 110° Fahr. This phenomenon is attributed to the rarefaction and tenuity of the atmosphere, from elevation, and absence of moisture. From December to February the thermometer ranges from 10° to 20° Fahr.; yet the mountain sides being carefully embanked with stone dykes, and industriously cultivated, pretty good crops of wheat, barley, buckwheat, apples, and apricots are grown. Prangos, a peculiar

kind of fodder, is abundant. The minerals comprise sulphur, iron, lead, copper, and gold, which abounds in the beds of the rivers, but is prohibited by the government from being collected. The transit trade with all the neighbouring regions is extensive, and conducted mostly by means of mules and sheep.

Leh, the capital of the country, contains about 1000 houses, each several stories high, and substantially built. The population is about 4000. There are several bazaars, each containing from twelve to fourteen shops. *Leh* is a place of great trade, being the principal entrepôt for the shawl wool, and three great fairs are annually held here, at which merchants attend from China, Tibet, the Punjab, and Cashmere. It has several temples, and the palace of the rajah is of great size, though rudely finished. *Roodok*, on the right bank of the Indus, but higher up the river, is another place of considerable traffic.

The inhabitants of Ladakh belong to the same race as the inhabitants of Tibet. They are stated to number altogether about 125,000, and are good farmers, peaceable, honest, and hospitable. Lamaism is the prevailing religion. [**LAMAISM.**]

The armed force consists of a peasant militia, and Ladakh has been repeatedly under the rule of more powerful neighbours. During the life of Runjeet Singh it formed a part of his dominions.

Ladakh has a considerable commerce with surrounding countries, the chief article of which is the wool of the goats, which is used in the manufacture of Cashmere shawls.

LADANUM, sometimes written *Labdanum*, but incorrectly, a gum resin produced by several species of *Cistus*. *C. ladaniferus*, *C. Creticus*, *C. laurifolius*, and *C. Ledon* are usually mentioned as the species which are indigenous in the Grecian islands, in Spain, Italy, and the south of France. That obtained from the Levant is the most celebrated. The juice exudes upon the leaves and branches of these shrubs, and is collected, according to Tournefort, by means of an instrument resembling a rake, with leather thongs instead of teeth, which is drawn over the plant; the juice adheres to the thongs, and is afterwards separated.

LADIES OF THE QUEEN'S HOUSEHOLD, **THE**, consist of the mistress of the robes, the ladies of the bedchamber, the bedchamber women, and the maids of honour. The mistress of the robes has superintendence of all the others, and the custody of the robes. On state occasions she must see that the ceremony of robing the Queen is properly performed. The ladies of the bedchamber and the bedchamber women, of each of whom there are eight, with several extra ladies, are personal attendants upon Her Majesty. There are also eight maids of honour, who in rotation perform the duty of accompanying the Queen on all occasions. They are styled 'honourable,' even if not entitled to that distinction by birth. [**BEDCHAMBER, LORDS AND LADIES OF.**]

LADING, BILL OF. [**BILL OF LADING.**]

LADOGA, Lake. [**RUSSIA.**]

LADRONE ISLANDS, a group in the North Pacific, belonging to Spain, extend between 13° and 20° 30' N. lat., and between 144° and 145° 30' E. long, and are about 20 in number. They are mostly of a volcanic character, and are very rugged;

but they yield nearly every kind of intertropical product, such as cotton, rice, indigo, Indian corn, sugar, cacao, cocoa nuts, tobacco, plantains, &c. Cattle, horses, mules, and asses are numerous, and the llama has been introduced from Peru, and thrives well on the mountains. The principal island is Guajan, which is about 90 miles in circumference. Its capital, S. Ygnacio de Agaña, is fortified, and has an open roadstead, and a good harbour a few miles farther north. Tinian, another island, exhibits extensive ruins, which indicate that these islands were once inhabited by a people well acquainted with the arts of civilization. The islands were discovered by Magelhaens in 1521, and were settled by the Spaniards in the middle of the next century. The aborigines have now almost disappeared, and the Spaniards are few, the chief inhabitants being settlers from Mexico and the Philippines. The total population of these islands was once 100,000, but is now greatly reduced, probably not more than about 6000.

LADY (Saxon, *hlæfdiga*), a title of distinction corresponding to Lord. It belongs to peeresses, and the wives of peers, as a prefix to the peerage title. The daughters and daughters-in-law of dukes, marquises, earls, and peers, are also entitled to it. To the wives of baronets and knights is legally given the prefix 'Dame,' but they are now by courtesy always addressed as 'My Lady' and 'Your Ladyship.'

The word *lady* is used in common speech as a correlative of gentleman. For its origin, see Professor Max Müller's *Lectures on Languages*, 2nd series, p. 235.

LADYBIRD (*Coccinella*), a genus of coleopterous insects. The family *Coccinellidae* consists of twenty-three genera and of more than 500 species. Their bodies are hemispherical, and spots occur on their elytra, or wing-cases. They are very pretty beetles, and many of them are well known. The most common is the form which has seven spots on its elytra; it is abundant in this country, and a favourite with most observers. [TRIMERA.]

LADY-CHAPEL, a chapel frequently attached to cathedrals and ancient churches, dedicated to the Virgin Mary. They are usually elegant specimens of architecture, and have often been used as burying places for renowned and illustrious personages. Henry VII.'s Chapel is the Lady-chapel of Westminster Abbey.

LADY-DAY, the day of the Annunciation of the Holy Virgin, March 25. It is one of the immovable festivals of the English Church, and precedes the day of Christ's nativity by nine months.

LADY'S SLIPPER. [CYPRIPEDIUM.]

LÆMODIPODA, Latreille's fourth order of *Crustaceans*, placed by him between the *Amphipoda* and the *Isopoda*. He describes them as being the only forms among the *Malacostraceans* with sessile eyes, whose posterior extremity does not present distinct branchiæ, and which have hardly any tail, the last two feet being inserted at that end, or the segment to which they are attached being followed by not more than one or two other joints, which are very small. They are also, he states, the only ones in which the two anterior feet (which agree with the second jaw-feet) make a part of the head.

The *Læmodipoda* of Latreille have all four setaceous antennæ carried upon a peduncle of three joints,

mandibles without palps, a vesicular body at the base of four pair of the feet at least, beginning with the second or third pair, reckoning those of the head. The body, which is most frequently filiform or linear, is composed (reckoning the head) of from eight to nine joints, with some small appendages, in form of tubercles, at its posterior and inferior extremity. The feet are terminated by a strong hook. The four anterior feet, of which the second are the greatest, are always terminated by a monodactylous claw. In many the four succeeding feet are shortened, less articulated, without any hook at the end, or rudimentary, and not at all fit for ordinary use. The females carry their eggs under the second and third segments of the body, in a pouch formed by approximated scales.

The *Læmodipoda* are marine, and Savigny considers them as approaching the *Pycnogonids*, and making, with that form, the passage from the *Crustaceans* to the *Arachnids*.

Latreille brought the forms under one genus, *Cyamus*, with certain subdivisions and subgeneric appellations. (Cuvier's *Règne Animal*.)

LA FAYETTE. [FAYETTE, LA.]

LAFITTE, JACQUES, the celebrated French banker and financier, was born in 1767; and in the banking-house where he was first employed as a clerk, he rose to be cashier and partner, and afterwards became the head of the most eminent bank in France. Having obtained this distinguished position, he was elected a member of the Chamber of Deputies. He strongly advocated liberal measures and liberal opinions, and eventually rendered himself so popular, that when Charles X. was driven from the throne, his influence, notwithstanding the general wish for a republic, was mainly instrumental in electing the citizen king, Louis Philippe, to the throne. The revolution, however, was followed by so many commercial revulsions, which fell with overwhelming pressure on the house of Lafitte, that he was obliged to suspend payments. Yet so much sympathy was excited on his behalf, that a public subscription was entered into, and nearly a million and a half of francs raised for his use. It appeared, however, that after the payment of all demands, he was in the clear possession of nearly 280,000*l*. He died, full of years and honours, in 1844.

LA FONTAINE. [FONTAINE, LA.]

LAGENARIA, a genus of plants belonging to the natural order *Cucurbitaceæ*. *L. vulgaris*, common Bottle-gourd, has a fruit in shape like a bottle, when ripe of a pale yellow colour, sometimes six feet in length. When dried it becomes hard, and is used to contain water; it is then of a pale bay colour. In its wild state this plant produces a poisonous fruit. This species grows abundantly in Egypt and Arabia.

LAGERSTRE'MIA, a genus of plants of the natural family of *Lythraceæ*. The species are few in number, but most of them are highly ornamental.

LA'GO MAGGIO'RE, the ancient *Lacus Verbanus*, the largest lake in Italy, extends about 40 miles in length from north to south, separating Lombardy from Piedmont, and stretching at its northern extremity into the Swiss canton of Tessin. Its greatest breadth is 8 miles; but it is much less at the north and south extremities, and the average

is only two miles. The elevation of its surface above the sea is 678 feet, and its greatest depth is 1800 feet. The principal affluents of the Lago Maggiore are—the Toccia, which comes from the Val d'Ossola; the Maggia, which flows through the valley of that name; the Ticino, coming from the St. Gothard; and the Tresa, which flows out of the neighbouring lake of the Lugano. The outlet of the lake is formed by the Ticino, which issues from the Lago Maggiore at Sesto, and divides Lombardy from Sardinia to its junction with the Po. About the middle of the length of the lake, and in its broadest part, where it forms a gulf indenting the western shore, is a group of beautiful islands, called Isole Borromée, from the family name of the proprietor. They are four in number, Isola Madre, Isola Bella, Isola dei Pescatori, and the Isolino, the smallest of all. The Lago Maggiore abounds with fish; and a considerable trade is carried on in steamboats and barges between the various points of its coast. The Simplon road follows its western shore from Feriolo to Arona. The climate of the lake is cool, owing to the proximity of glaciers; and it is subject to sudden thunderstorms in summer. The granite mountains which surround it on the north and west, and the vineyard-covered hills on the south and east, render its scenery a combination of wild grandeur and soft beauty.

LAGOMYS, a genus of animals belonging to the order *Rodentia*, or gnawers, and family *Leporida*. They have short ears, no tail, and very strongly developed incisive teeth. They are natives of Asia. The Sadajac (*Lagomys alpinus*) is a native of Siberia. The calling hare (*L. pusillus*) is found in Russia. It is noted for its piping call, and, indeed, but for this would seldom be captured, as it burrows in remote and inaccessible localities.

LAGOON, or LAGUNE (Lat. *lacuna*). Lagoons are sheets of water formed either by the encroachments of rivers or seas upon the land, or by the separation of a portion of the sea by the intervention of a bank. Thus there are fluvial and marine lagoons. The former are not confined to the lower parts of water-courses, though they are most frequently there. Marine lagoons are the most common. They are formed sometimes by the encroachments of the sea, and sometimes by the throwing up of a bar or bank, which eventually divides off a portion of the sea altogether, or leaves merely a small opening. In Europe there are many marine lagoons: the Adriatic, on its north and north-western parts particularly, is full of them. The Zuyder Zee is a vast lagoon.

LAGOPHTHALMIA, a disease, generally a paralytic affection, in which the eye cannot be closed. Its name (from the Greek *lagos*, 'a hare,' and *ophthalmos*, 'an eye') refers to the popular idea that hares sleep with their eyes open.

LAGOS. [ALGARVE.]

LAGOS. [GUINEA.]

LAGRANGE, JOSEPH LOUIS DE, was born at Turin, 25th January, 1736. His parents were Joseph Luis Lagrange and Marie Thérèse Grass, the daughter of a physician at Cambiano. His father held the office of treasurer of war at Turin, and had once been in affluent circumstances, but had ruined himself by injudiciously entering into hazardous speculations. To this circumstance, which was then regarded as a misfortune, Lagrange himself has frequently attri-

buted a considerable share of his subsequent fame and happiness. 'Had I been rich,' he has been heard to say, 'I should probably not have become a mathematician.'

In the early part of his studies he manifested no particular love either for the pure mathematics or the physical sciences. His chief delight consisted in the perusal of the Latin authors, especially the works of Cicero and Virgil. These, however, were soon superseded by the synthetical writings of the ancient geometers, and these in their turn gave place to the more powerful analysis of modern times. The perusal of a memoir by Dr. Halley ('Phil. Trans.,' 1693) 'On the superiority of modern Algebra in determining the foci of Object-glasses,' is said to have convinced him of the utter inadequacy of geometrical methods as instruments of investigation; and it is not improbable that this might have been the occasion of his selecting the path which he thenceforth pursued with so much honour to himself and so great advantage to science.

Before he attained the age of nineteen he was appointed to the professorship of mathematics at the military college of Turin, where by far the greater part of his pupils were older than himself. The year following (1755) he addressed a letter to Euler, relative to the isoperimetric problems, and that of the curve of quickest descent, which had engrossed so much of the attention of the principal mathematicians of the day, and of Euler in particular; but owing to the want of general methods, their labours had proved but partially successful. Each problem had been resolved by methods peculiar to itself, and the solutions rested upon artifices unsatisfactorily indirect. In this letter Lagrange communicates the germs of his calculus of variations.

In 1758 he took an active part in the foundation of the Royal Academy of Turin, in which he was unanimously chosen the director of the physico-mathematical sciences. The following year appeared the first volume of the 'Transactions' of that Society, consisting principally of the researches of Lagrange on the propagation of sound, and on the integration of differential equations, and those of finite differences.

The calculus of variations is eminently important in many branches of the mathematics, as in the determination of the maxima and minima values of indefinite integral formulae, &c.; but its utility is most conspicuous in the higher branches of physical astronomy.

When the Academy of Berlin was threatened with the departure of Euler for St. Petersburg, Frederick renewed his importunities to the great French *savant* D'Alembert to succeed him. [D'ALEMBERT.] D'Alembert however, from various motives, being unwilling to quit his native country, suggested that the proffered honour might be conferred upon Lagrange, who was accordingly appointed professor of the physical and mathematical sciences, and continued for more than twenty years to enrich the memoirs of the Academy with his researches in physical astronomy and other subjects of importance. Lagrange quitted Berlin after the death of Frederick, not being satisfied with the treatment he received from his successor. He had previously been invited by the ministers of Louis XVI. to settle in Paris. In 1772 he was elected foreign associate of the

Royal Academy of Paris, and in 1787, on his arrival at the French capital, received the honorary title of veteran pensioner. Apartments were allotted to him in the Louvre; and here, surrounded by the principal mathematicians of the day, he continued to live happily up to the time of the Revolution. After this he began to be subject to fits of melancholy, which so far increased upon him that he has been heard to say that his enthusiasm for the sciences was extinguished, and that his love of physical research had disappeared. He was successively appointed professor of mathematics to the normal and polytechnic schools, member of the Institut, of the Board of Longitude, grand officer of the Legion of Honour, and Count of the empire. He died at Paris, the 10th April, 1813, in his seventy-eighth year. His remains were deposited in the Pantheon, and his funeral oration was spoken by his illustrious friends Laplace and Lacépède.

'Among those who have most effectually extended the limits of our knowledge,' said Laplace, in his funeral oration, 'Newton and Lagrange appear to have possessed in the highest degree the happy art of detecting general principles, which constitutes the true genius of science. This art, joined to a rare elegance in the exposition of the most abstract theories, characterized Lagrange.' His work on Mechanics, resting upon the method of variations of which he was the inventor, flows wholly from a single formula, and from a principle known before his time, but of which no one but himself was able to appreciate the importance. 'Among the successors of Galileo and Newton,' says Professor Hamilton, speaking of the theoretical development of the laws of motion, 'Lagrange has perhaps done more than any analyst to give extent and harmony to such deductive researches, by showing that the most varied consequences respecting the motions of systems of bodies may be derived from one radical formula; the beauty of the method so suiting the dignity of the results as to make of his great work a kind of scientific poem.'

LAGRIIDÆ (*Lagriaria*, Latreille), a family of coleopterous insects of the section *Heteromera*. Latreille assigns to it the following genera: *Lagriaria*, and, with a doubt, *Hemipeplus*.

LAGURUS, a genus of plants belonging to the natural order *Gramineæ*. *L. ovatus*, the only species, is found in sandy places in Guernsey, and on the continent of Europe.

LAHORE, the capital of the Punjab, British India, is situated in 31° 27' N. lat., 74° 26' E. long., on the south-eastern bank of the Ravee, the middle of the five rivers which give name to the country. It is a place of great antiquity, and was the residence of the first Mohammedan conquerors of Hindustan, before they succeeded in establishing themselves in the central parts of the peninsula. The city and suburbs are of great extent, and the population is said to amount to 95,000. The city of Lahore is inclosed by a double line of defences, the outer one being about 7 miles in circuit. It contains many large and handsome mosques and Hindoo temples, and around it for many miles are extensive Mohammedan ruins, with the fine tomb of the Emperor Jehangire, and the garden of Shah Jehan. There is also a citadel, containing the palace of the Sikh sovereigns. Under the Mogul emperors, Lahore was

of much greater extent, and is said to have contained 1,000,000 inhabitants. In 1748 it fell into the hands of Ahmed Shah; in 1798 Runjeet Singh was invested governor and rajah, but as he chose Umritsur for his head-quarters, Lahore rapidly declined. The city was taken possession of by the British after the final defeat of the Sikhs in 1849. In the fort are preserved the hair, sandals, and staff of Mohammed, brought by Timur to India, and long held by Runjeet Singh, who refused a lac of rupees for one of the sandals.

Lahore has a very successful government school, in which the upper class is devoted to the sons of natives of rank, and which usually has 500 pupils in training. There are several other schools, a fine gaol, penitentiary, lunatic asylum, and a medical college. The town is the see of a bishop. Its markets are well supplied, but the streets are narrow and gloomy, and the bazaars do not exhibit much appearance of wealth, the commerce of the Punjab being centred at Umritsur. A line of railway connects the latter place with Lahore, and is one of the most important public works lately constructed in that portion of the empire. The Punjab Railway, 252 miles in length, also runs through Lahore, and extends from Umritsur to Mooltan, constituting, with the Delhi Railway, the crown of that great railway system, 2200 miles in length, which will unite Calcutta in the Bay of Bengal with Kurrachee on the Arabian Sea. In the environs of Lahore are numerous gardens and wells, and since its occupation by the British it has very much advanced in commerce and wealth.

L'AIGLE. [ORNE.]

LAINÉZ. [JESUITS.]

LAING, MALCOLM, an historian, was born in Orkney, in 1762. He studied at Edinburgh, and in 1785 he joined the Scottish bar, but does not appear to have obtained much practice as a lawyer. His first known literary effort was editing the last volume of Henry's 'History of Britain,' in 1793, after the author's death. In 1800 he published 'The History of Scotland, from the Union of the Crowns, on the accession of James VI. to the throne of England, to the Union of the Kingdoms in the reign of Queen Anne,' accompanied by 'Two Dissertations, historical and critical, on the Gowrie Conspiracy, and on the supposed Authenticity of Ossian's Poems.' To the second edition of his History, published in 1804, he added 'A Preliminary Dissertation on the Participation of Mary, Queen of Scots, in the Murder of Darnley.' He was for some time member of Parliament for Orkney, and enjoyed the confidence and esteem of Fox. He died in 1818.

LAITY, persons not clergy; that is, the whole population except those who are in holy orders. All the lexicographers agree in deriving it from the Greek word *laos* (λαός), 'the people.' A *layman* is one of the laity. [CLERGY.] The word laity appears to have been first used in the second century, when the priests began to be looked upon as a separate class—intermediate between Christ and the people. The laity at first possessed great influence in the church, but it gradually declined, as the priests became more and more powerful, and in 502 they were forbidden to interfere in any affairs of the church whatever. The distinction has never been so marked in the Protestant as in the Roman Catholic Church.

LAKE, GERARD, first *Viscount Lake*, was born July 27, 1744. Having entered the army at the age of fourteen, and made his first campaigns in the Seven Years' War, he served in the American War, in Holland with the duke of York in 1793, and was appointed to the chief command in Ireland during the Rebellion of 1797-98. In 1800 he was sent as commander-in-chief to India, during the marquis of Wellesley's government. By a series of successes the whole of Scindia's possessions north of the river Chumbul fell into his hands; and in reward General Lake was raised to the peerage, September 1, 1804. In 1804-5, Lord Lake again took the field in the same part of India, against Holkar. He returned to England in September, 1807, and was created a Viscount, October 31. He died February 20, 1808.

LAKES are sheets of water of greater or less extent, surrounded on all sides by land, as islands are by water. They are distinguished from ponds by the fact that a lake is fed by streams either flowing at the surface of the soil or subterranean, while a pond, however large, is only the accumulation of rain-water in some hollow. Thus ponds are usually dried up in hot weather, while true lakes are only temporarily diminished by heat.

The principal difference in lakes is this:—1, Some have no apparent affluents nor outlets; 2, others have affluents without any visible outlet; 3, some have an outlet without any visible affluents; 4, others have both affluents and an outlet.

1. Lakes without apparent affluents or outlets are comparatively small, and yet they are, relatively speaking, more permanent than larger lakes, because, being fed chiefly by subterranean springs, they are not liable to be filled by those deposits of earth and sand which are the main cause of the rapid desiccation of such lakes as receive the troubled waters of torrents and rivers. Small lakes of this kind sometimes occur in hollows resembling the craters of extinct volcanoes.

2. Of lakes which receive affluents without having any visible outlet, the largest is the Caspian. The Aral and the Dead Sea are also examples of this kind of lake, which is very common in Asia. The excess of water brought into lakes that have no outlet is supposed to be carried off by evaporation, and in some cases perhaps by infiltration or subaqueous drainage also. Several of these lakes have formerly had outlets; but water has ceased to flow from them, because the lakes have sunk in consequence of receiving now a much smaller quantity of water than formerly.

3. Lakes that have an outlet without any apparent affluent are fed by subaqueous springs, which, bursting out in a hollow, must fill it up before the waters can flow off in a stream. These lakes are generally situated at considerable elevations above the level of the sea. Thus there is one on Monte Rotondo in Corsica, at an elevation of 9069 feet. From lakes of this kind some of the largest rivers take their rise; the Volga, for instance, springs from such a lake in the government of Tver in Russia.

4. Lakes which receive one or more tributary streams and have a visible outlet for their superabundant waters are the most common and the largest; such are the lakes of Geneva, Maggiore, Ladoga, Onega, Baikal, Superior, Huron, Erie, Ontario, &c.

Lakes differ very much in temperature, transparency, and in the colour of their waters. Those fed by the water of melted snows in summer are generally much colder than would be thought conformable with the season; but the difference is principally in the lower waters, which, being cold, remain at the bottom by reason of their greater density. Some never freeze, which is owing to their great depth.

The remarkable transparency of certain lakes is truly astonishing; thus the waters of Lake Superior and of the Norwegian lakes are so pellucid that fish, shells, and rocks may be seen at a depth incredible to persons who have never visited these regions. Elliot, in his 'Letters from the North of Europe,' says, 'Nothing appears more singular to a foreigner than the transparency of the waters of the Norwegian lakes. At the depth of 100 or 120 feet the surface of the ground beneath is perfectly visible; sometimes it may be seen wholly covered with shells, sometimes only sprinkled with them; now a submarine forest presents itself to view, and now a subaqueous mountain.'

With regard to the colour of lakes, it may be observed that it is sometimes very difficult to account for the tints of large masses of water. The colour of the bottom, the depth, the shadows and reflected colours of surrounding bodies, subaqueous vegetation, springs, and many other circumstances, affect the colour of lakes.

Lakes perform a very important function in the economy of the earth. Rain does not always fall; and, were it not for lakes, the greater number of rivers would be dried up in summer, and canals could not have a constant supply of water. The humidity which these sheets of water occasion by their evaporation is also eminently favourable to the vegetation in their environs.

LAKES are colours chiefly used by calico-printers and paper-stainers. They are made by mixing alumina with animal and vegetable colouring matters. Carmine or Florentine lake is prepared from a solution of cochineal. Lakes of many shades of red and purple are made from Brazil wood and madder root. Several yellow lakes are made from yellow-berries and arnotto; and almost every variety of animal or vegetable colour may be converted into a lake. Potash is sometimes used in the preparation to accelerate the precipitation, and regulate the colour.

LALANDE, JOSEPH JEROME LE FRANÇAIS DE, was born at Bourg in the department of Ain, July 11, 1732. When about thirteen or fourteen years old he was sent to a college at Lyons, where for a time he appears to have derived equal pleasure from the study of poetry and eloquence, and from attending the lectures of the several professors on natural and metaphysical philosophy. Upon the occurrence of the great eclipse of 1748, of which, with the assistance of his tutor, Le Père Béraud, he made a telescopic observation, he took great interest in the explanation given to him of that phenomenon, and thenceforward showed a more decided partiality for the mathematical sciences. In 1751 he was sent by the French Academy to Berlin to determine the moon's parallax—Lacaille being sent for the same purpose to the Cape of Good Hope. On his return he was made one of the astronomers royal, and in 1762

he succeeded Delille as professor of astronomy to the College of France. In 1764 he published his large treatise on astronomy, containing many very interesting biographical and historical notes. Lalande died at Paris, 4th April, 1807, in his seventy-fifth year. As an observer, an author, and a tutor, he undoubtedly did much for the promotion of astronomy; but looking to the state of mathematics at the time in which he lived, his knowledge of the exact sciences appears to have been very limited.

LAMA, LAMAISM, is the name given to the Buddhist religion in Mongolia and Tibet. Lama in these languages properly means 'priest.' The title is given to the head of every monastery, and every lama is considered a vicar of the Deity, and requires implicit obedience to all his commands, like the Dalai Lama himself. Much interesting information on Lamaism may be found in M. Huc's '*Souvenirs d'un Voyage dans la Tartarie, le Tibet, et la Chine*' (Paris 1852). He says that the lamas are the physicians of Tibet, and are supposed to cure by prayers and some insignificant medicaments. They are persons of the most limited information, and their faith is full of the grossest superstitions. Worship takes place three times a day, and consists chiefly of the recital of prayers and sacred texts, and the intonation of a hymn, accompanied with most inharmonious music. Offerings of tea, flour, milk, butter, and similar articles, are often made to the lamas or priests. Sacrifices of animals, or offerings entailing injury to life, are prohibited, as in the Buddhist faith. There are three great festivals in the year, and two sacraments—baptism and confirmation. Lamaism does not allow of the interment of the body after death; but the priests assert that it is necessary for them to be present at the moment of dissolution, so as to superintend the proper separation of the soul and body, and calm the spirit and enable it to be reborn in a happy existence. They also fix the day when it will be best to expose the body, for corpses are often placed on the tops of rocks to be the prey of beasts and birds. There are several orders of the clergy, all of whom are compelled to take the vow of celibacy, and many of whom live in monasteries. At the head of their faith is the Dalai Lama, who is never supposed to die, as his gifted soul is said to pass immediately to his successor. This favoured individual is believed to be indicated by the priests by certain signs, but the Chinese emperor, it is generally believed, really makes the selection. The residence of the Dalai Lama is at Lassa, the capital of Great Tibet, a city from which Europeans are carefully excluded. Huc reached it, but was at once conducted out of the country.

Perhaps the best work of reference yet published on Lamaism is *Die Lamaische Hierarchie und Kirche*, von Karl Friedrich Koepen (Berlin 1859).

LAMA, LLAMA, or GLAMA, the name of a species of the camel tribe peculiar to South America, where it is employed as a beast of burden, especially in crossing the Andes. It is very patient and docile, and will carry 125 lbs. at the rate of 15 miles a day. Its wool is used for similar purposes to that of the alpaca, but is inferior to it in quality.

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONNET, CHEVALIER DE,

was born August 1, 1744, at Bazentin in Picardy, of a noble family. He devoted himself to science and formed a new classification of the plants in the Jardin du Roi, Paris, on a system formed upon the most easily reconciled theories of Jussieu and Linnaeus, and also on the older system of Tournefort. He named his work the '*Flore Française*.' It bears the date of 1778, and is in three vols., 8vo. In 1779 Lamarck was elected a member of the ancient Academy of Sciences. He had been appointed assistant to Daubenton in the Cabinet du Jardin du Roi, in 1788; and on the establishment of the Museum in 1793, he was appointed to the department which comprised the invertebrata. The '*Système des Animaux sans Vertèbres*,' published in 1801, was the fruit of his labours, and laid the foundation of his greater work, the '*Histoire Naturelle des Animaux sans Vertèbres*,' published at Paris from 1815 to 1822. His last work, the '*Mémoires sur les Coquilles*,' was published in the '*Annales du Muséum*.' He died in Paris in December, 1829.

LAMARTINE, ALPHONSE DE, an illustrious French poet, orator, and statesman, was born at Macon, in Burgundy, October 21, 1791. He had descended from a family which suffered much during the Reign of Terror, as described in after years in his '*Meditations of My Youth*.' After a very irregular education, he entered the army in 1814, but feeling weary of its inaction he quitted it two years later. It was in 1820 that he first became known as a poet, by his '*Meditations Poétiques*,' for which he had found great difficulty in getting a publisher. It was printed in the most modest form, but in a short time excited universal admiration, as it introduced a new and original style in the lyric poetry of France. The government recompensed Lamartine by appointing him secretary of embassy to Naples, where he met the young English lady, Miss Birch, who soon became his wife. He was afterwards sent to London in the same capacity, and thence transferred to Florence as chargé d'affaires. In 1823 appeared his '*Nouvelles Méditations*,' the sequel to the first; but it had by no means the success of its predecessor, in spite of the beauty of some of its pieces. On the publication of his '*Harmonies Poétiques et Religieuses*' (1829) he was elected a member of the French Academy. In 1832 he set out on a journey to the East, accompanied by his wife and only child—a daughter sixteen years of age, whom he had the misfortune to lose at Beyrout. The fruit of his travels was a work on the East, in imitation of Chateaubriand, which purported to treat of every subject—religion, history, philosophy, politics, poetry, &c. Owing chiefly to the numerous inaccuracies with regard to facts and negligence of composition, it had not the success which the writer and the public had anticipated. He was consoled, however, by the fact that during his absence he had been named deputy for Dunkirk. His first essay as a parliamentary speaker, on the discussion of the address (1834), was a decided failure. He made an elaborate speech, in which he treated of justice, morals, tolerance, &c., but passed over the question before the House. In 1835 he produced his poem of '*Jocelyn*,' which the public at first

received with hesitation, but which gradually attained a success as great as that of his first 'Meditations.' Two years later appeared 'La Chute d'un Ange'—an antediluvian episode of a great universal epic which he had planned, but which was received as coldly as his maiden speech or as his 'Voyage en Orient,' and for the same reason. In 1839 he published his 'Recueils Poétiques,' as the farewell of the poet to the muse. His literary labours did not, however, entirely detach Lamartine from politics; and though not a practical politician, he made considerable progress as an orator. In 1847 he published his 'Histoire des Girondins,' full of historical inaccuracies as usual, but written in the most attractive style. In this work he threw a sort of poetical halo round the actors in the most sanguinary events of the Revolution. The work proved immensely popular; parts of it were dramatized, and a new revolutionary hymn was prepared, when the revolution of February broke out. When the flight of the king left the field free, the popular voice called upon Lamartine to form part of the provisional government which soon proclaimed the Republic. Whatever may be thought of his influence in bringing about that revolution, and however severely he may be judged for the part he took in it, it is certain that the name of Lamartine, during the struggles which soon broke out between his colleagues, was regarded by the country at large as the symbol of order and moderation. During the confusion which followed, it was his eloquence that for several days protected the Hôtel de Ville when the provisional government was installed; and his courage, presence of mind, and energy saved Paris. There was a moment when he might easily have assumed the dictatorship; but his influence was of short continuance. The insurrection of June overthrew him and his colleagues, and at the general elections for the Legislative Assembly he was not returned. The *coup d'état* of 1851 put an end to his career in public, and he retired into private life.

His latter years were devoted to what has been well called the 'travaux forcés' of literature. His expensive tastes and his disregard or ignorance of the details of practical life had seriously compromised the fortune which he had inherited from his family, or which he had acquired by marriage; the political agitation in which he was engaged completed his ruin. He continued to send forth, fortnight after fortnight, his 'Entretiens,' and thus consumed in ephemeral productions the energies which he might have concentrated on the composition of a work more worthy of his fame. Offers of pecuniary assistance were more than once conveyed to him in the most delicate form by Napoleon III., but were declined until about two years before his death a bill was presented by the Government to the Legislative Chamber for an annuity of 25,000*fr.* to be paid out of the public funds, which was voted, and in this form relief was accepted by Lamartine. He died at Paris March 1, 1869.

LAMB. [SHEEP.]

LAMB, CHARLES, was born February 18, 1775, in Crown Office Row, Inner Temple, London. He was educated at Christ's Hospital; but labouring under an impediment of speech, which prevented his

succeeding to an exhibition in one of our universities, he became in 1792 a clerk in the accountant's office in the India House. Being unmarried, he dwelt through life with an only sister, whose occasional fits of insanity caused him continual anxiety, but who was only more endeared to him on account of her malady. The terrible ordeal through which he passed affected his own reason, but the attack was of short duration, and never returned.

Lamb's first appearance as an author was in a small volume of poems published jointly with Coleridge and Lloyd, in 1797, but which excited little attention. In the following year he published his prose tale of 'Rosamond Gray,' which sold better than his poems. His tragedy of 'John Woodvil' was completed in 1799, but it was never acted, and was not published till 1801, when it met with an unfavourable reception from the Edinburgh reviewers. In 1810 he became a contributor to a quarterly magazine entitled the *Reflector*, edited by Leigh Hunt; and some of Lamb's best effusions appeared in that short-lived periodical. On the establishment of the *London Magazine* in 1820, he began his 'Essays of Elia'—the name under the cover of which he acquired his most brilliant reputation. In the beginning of 1823 the 'Essays of Elia' were collected and published in a separate form, and met with a rapid sale. In 1825 he was permitted to retire from the drudgery of his clerkship with a liberal pension. His feelings on being emancipated from the desk, to which he had grown as it were until the wood had entered his soul, are beautifully depicted in his essay on 'The Superannuated Man.' But after the first enjoyment of freedom and uninterrupted leisure was over, he languished for want of steady employment, and discovered when too late that his happiness had not been promoted by the change. He occupied himself with occasional contributions to the *New Monthly*, the *Athenæum*, and other periodicals, and with assisting Hone in the preparation of his 'Every Day Book' and 'Table Talk.' A small volume of poems entitled 'Album Verses' appeared in 1830, and the 'Last Essays of Elia' in 1833. He died somewhat suddenly of erysipelas, 27th December, 1834, in the sixtieth year of his age. Mary Lamb, his sister, survived till 1847. In conjunction with her brother she wrote 'Mrs. Leicester's School,' 'Tales from Shakspeare,' and 'Poetry for Children.' The field which Lamb occupies is limited, but he reigns there supreme. He reflects every mood and touches every chord with a master hand. His works, like his conversation, exhibit by turns wit, humour, fun, quaintness, pathos, and varied fancy; and mingled with all is constantly seen the kindly, loving, honest, enjoying nature of the writer. It may be safely predicted that his incomparable 'Essays of Elia' will last as long as the English language. His letters to his distinguished friends Coleridge, Southey, Wordsworth, Bernard Barton, Manning, Procter, and other eminent writers, are among the happiest and the most delightful specimens of epistolary composition which the language affords. See 'Letters of Charles Lamb and Final Memorials,' by Judge Talfourd.

LAMBALLE. [CÔTES-DU-NORD.]

LAMBARDE, WILLIAM, the son of John Lambarde, an alderman of London, was born October

18, 1536. In 1556 he entered at Lincoln's Inn as a student. The first fruits of his studies appeared in a collection and translation of the Saxon laws, under the title of '*Αρχαιονομία*, sive de Priscis Anglorum Legibus Libri,' 4to, 1568. His '*Perambulation of Kent*' was published in 1576. In 1578 he was admitted a bencher of Lincoln's Inn, and in 1579 was appointed a justice of the peace for the county of Kent—an office which he explained in his '*Eirenarcha*, or the Office of the Justices of the Peace,' in four books, 4to, 1581. He also published a small treatise on '*The Duties of Constables*,' &c., 8vo, 1582. He died August 19, 1701. His '*Archeion*, or a Discourse upon the High Courts of Justice in England,' was not published till 1635. The materials which he had collected for a general account of Great Britain were published in 1730, in quarto, under the title of '*Dictionarium Angliæ Topographicum et Historicum*.'

LAMBERT, JOHANN HEINRICH, was born at Mühlhausen, August 29, 1728. He was sent to a school in the town, where he acquired the rudiments of a classical education; but the want of means obliged his father to withdraw him thence at an early age.

At home, however, the youth availed himself of every means in his power to preserve the knowledge he had acquired of the Latin tongue; and a great part of each night was spent in reading such of the Roman authors as he could procure, or in studying arithmetic and geometry. In 1749, on the recommendation of his patron, Dr. Iselin, he was appointed tutor to the children of M. de Salis, the president of the Swiss Confederacy; and while communicating instruction to his pupils, was enabled to study the Greek, Italian, and French languages, as well as to advance his knowledge of optics, astronomy, and philosophy.

In 1756 Lambert accompanied two of the sons of M. de Salis to the University of Göttingen; and after proceeding thence to Holland and France, he returned in 1758 to Coire. In 1763 he was employed as one of the commissioners in settling the boundaries between the territories of the Valais and the duchy of Milan; and in the following year, in consequence of an invitation from the king of Prussia, he proceeded to Berlin, where he passed the remainder of his life. He died September 25, 1777.

His great philosophical work, entitled '*Neues Organon*,' was published at Leipzig in 1764. This is divided into four parts, of which the first contains the rules of thinking, and the second is on truth considered in its elements; the third is on the external characters of truth; and the fourth, on the means of distinguishing the real from the apparent.

LAMBERT, JOHN, was born probably about 1620, and was educated for the bar. On the breaking out of the contest between the king and the Parliament, he joined the parliamentary army, and held the rank of colonel at the battle of Marston Moor (2nd of July, 1644). After distinguishing himself at Naseby, with Cromwell in Scotland, at Worcester, and on other occasions, and rising to the rank of major-general, the appointment of Fleetwood to the chief command of the forces in Ireland produced an alienation between Lambert and Cromwell which was never wholly healed, although he was one

of the officers whom Cromwell summoned in June, 1653, and was appointed in May, 1655, by the Protector one of his eleven major-generals. After the death of Cromwell he became the soul of the confederacy of discontented officers which was formed against the new protector, Richard. [CROMWELL, RICHARD.] On the breaking out of the Royalist insurrection in July, 1659, he was sent by the Rump Parliament to suppress it; but immediately after his success he turned round upon the Parliament, and on its resistance to his demands, dispersed it on October 13. At the beginning of January, 1660, having been deserted by the force with which he had set out for the north to encounter Monk, he was seized by orders of the restored Parliament, and committed to the Tower. On the 9th of April following he made his escape from confinement; but the activity of Colonel Ingoldsby recaptured him at Daventry on the 22nd of the same month. He was eventually banished to the island of Guernsey, where he lived for above thirty years.

LAMBESC. [BOUCHES-DU-RHÔNE.]

LAMBETH. [SURREY.]

LAMBOURN. [BERKSHIRE.]

LAMEGO. [BEYRA.]

LAMELLIBRANCHIATA, M. De Blainville's third order of *Acephalophora* (*Acéphales Testacés* of Cuvier). M. De Blainville divides this order into ten families, each family containing several genera. The families are—*Ostracea*, *Subostracea*, *Margaritacea*, *Mytilacea*, *Polydonta* or *Arcacea*, *Submytilacea*, *Chamacea*, *Conchacea*, *Pyloridia*, and *Adesmacea*. M. Rang's arrangement is different. He separates the order into two primary divisions—*Monomyaria* and *Dimyaria*, each having its respective families.

LAMELLICORNES (Latreille), one of the sections of the order *Coleoptera*, in which the antennæ of the insects are inserted in a small hollow in front of the eyes, and are usually composed of nine or ten joints, the last of which are large, flat, and open like a fan. Latreille divides the Lamellicornes into two great tribes, *Scarabæides* and *Lucanides*. (Cuvier, *Règne Animal*, vol. iv., p. 526.)

LAMELLIROSTRALES (Lat. *lamella*, 'a thin plate,' and *rostrum*, 'a beak'), a tribe of swimming birds, as the swan, goose, &c.

LAMENTATIONS, the name of the funeral music practised among the ancient Hebrews, whence, probably, the scriptural term, as applied to the Lamentations of Jeremiah. The *Lamentatrices* were the female vocal performers, who were hired to chant the lamentations over the dead, and to sing dirges of funerals, when they were accompanied with flutes.

LAMIA (Latin and Greek), a fabulous being which figures in many monstrous inventions of the ancient mythology, and has suggested to our English poet Keats a poem of great beauty. It is generally represented as a species of vampire with the power of assuming a woman's form. In the myth of Philemon and Machates, on which Goethe has founded his ballad of the 'Bride of Corinth,' a young man marries one of these lamias, who sucks his blood at night. The whole conception is grotesquely horrible.

LAMIA/CEÆ, or LABIATE, a very extensive and important natural order of exogenous plants. The species are generally aromatic and tonic—a pro-

perty which is in most cases owing to the secretion of a volatile oil in little cysts or glands occupying the leafy organs. The aromatic qualities are familiar to us in the Sage, Marjoram, Thyme, Basil, and similar plants, commonly cultivated for the service of the kitchen, as condiments; of Lavender, so much valued for its peculiar fragrance; of Mint and Peppermint, well known for their stimulating power, and of many others. Betony, Ground Ivy, Horehound, and others, are examples of the bitter tonic qualities of such plants.

LAM'MIUM, a genus of plants belonging to the natural order *Labiata*, which includes the Dead, Blind, and Dumb Nettles of our peasants, so called from their resemblance to the *Urtica* in many points, except their stings. *L. amplexicaule* is found in sandy and chalky fields in Great Britain, the North of Africa, and Middle Asia. *L. intermedium* is common in Scotland, Sweden, and the North of Germany. *L. purpureum* is found in Great Britain and Sweden, where, according to Linnæus, it is boiled and eaten. *L. incisum* is a British plant, and is likewise found in France, Germany, and Sweden. *L. album* was once used medicinally, but is now disregarded. This species is eaten in Sweden as a pot-herb. It is found in Great Britain and the southern parts of Europe.

There are several other species of Lamium, growing chiefly in the southern parts of Europe.

LAMLASH. [BUTESHIRE.]

LAMMAS DAY, the name for the first of August, from the Anglo-Saxon *Hlaf Messe*, Loaf Mass or Feast, when the Saxons offered an oblation of loaves made from new corn. Others derive it from a custom of bringing a lamb alive on this day into the church at High Mass. A term-day in Scotland.

LAMMERMUIR, or LAMMERMOOR HILLS, a range of mountains in Scotland, extending from the south-eastern extremity of the county of Edinburgh, through Haddington and Berwickshire, to the North Sea. Their surface is chiefly moorland and sheep-walks, though on the lower slopes are extensive tillage farms. The geological structure of this range consists of the lower silurian or grauwacke beds, with porphyry and granite rocks. The principal summits are—Sayrs Law, 1753 feet high; Whitestone Cairn, 1656 feet; and Lowrans Law, 1631 feet above the sea.

LAMP. [LIGHTS, ARTIFICIAL.]

LAMP-BLACK, a fine charcoal prepared from certain kinds of fir containing much resin, and the refuse and residuary resin left by the distillation of turpentine. The furnace chimney is long, and the greater part of it nearly horizontal, and its exit is covered with old sacking; or the smoke containing the charcoal is carried into chambers, where it is deposited on coarse cloths. The purest lamp-black is procured by the combustion of oils, but that is much too expensive for common use. Lamp-black is extensively employed as a black colour, and mixed with other pigments.

LAMP, SAFETY. It has been long known that coal mines, and especially such as are deep, are occasionally infested with carburetted hydrogen, known to the miners as *fire-damp*. Several contrivances were proposed for safely lighting coal mines subject to the visitations of this gas, but the safety-lamp

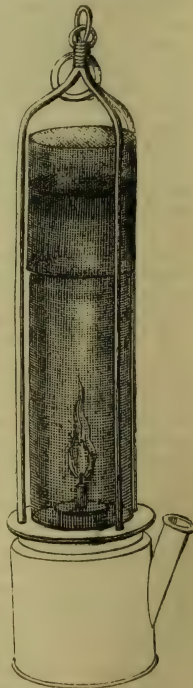
of Sir H. Davy was the first which was extensively employed.

Davy found that this gas requires an admixture of a large quantity of atmospheric air to render it explosive; that explosions of inflammable gases are incapable of being passed through long narrow metallic tubes; and that this principle of security is still obtained by diminishing their length and diameter at the same time, and likewise diminishing their length and increasing their number, so that a great number of small apertures will not pass explosion when their depth is equal to their diameter. This led to trials upon sieves made of wire gauze; and he found that, if a piece of wire gauze was held over the flame of a lamp, or of coal gas, it prevented the flame from passing; and he ascertained that a flame confined in a cylinder of very fine wire gauze did not explode even a mixture of oxygen and hydrogen, but that the gases burnt in it with great vivacity.

These experiments enabled Davy to determine the principles of a new safety-lamp. It consists of a cylinder of wire gauze, formed of iron wire about 1-50th of an inch in diameter, the meshes being about 1-24th of an inch. The wire cylinder is strongly jointed, and is defended by three upright strong wires, which meet at the top, and to them a ring is fixed, from which the instrument is suspended. The lamp is screwed on to the bottom of the wire gauze, and is supplied with oil by the pipe projecting from it, when the top is unscrewed and removed. A wire, bent at the upper end, is passed through the bottom of the lamp for raising, lowering, or trimming the wick.

When the lamp is lighted and introduced into an atmosphere gradually mixed with fire-damp, the first effect of the fire-damp is to increase the size and length of the flame. When the inflammable gas forms as much as 1-12th of the volume of the air, the cylinder becomes filled with a feeble blue flame, but the flame of the wick appears burning brightly within the blue flame; and the light of the wick continues till the fire-damp increases to one-sixth, or one-fifth, when it is lost in the flame of the fire-damp, which in this case fills the cylinder with a pretty strong light; and when the foul air constitutes one-third of the atmosphere, it is no longer fit for respiration.

The operation of the wire gauze in preventing the communication of flame is thus explained:—Flame is gaseous matter so intensely heated as to



be luminous, and the temperature requisite for producing it exceeds that of the white heat of solids. When the flame comes into contact with wire gauze, it loses so much heat in consequence of the conducting power of the metal which conveys it to the surrounding air, that it is cooled below the point at which gaseous matter can remain luminous, and consequently the flame of the gaseous matter burning within the lamp is incapable of passing through it so as to set fire to and explode the mixture of fire-damp and air by which it is surrounded; and this cooling power is exerted, even though the wire gauze, by effecting it, is rendered and remains red-hot.

Much discussion arose from time to time concerning the safety of this instrument: it was admitted that there were situations where it would not be danger-proof; but for a long time it was obliged to be confessed that no other invention was equal to it in respect to safety. In consequence of some very fatal explosions in collieries, committees were appointed by the Houses of Lords and Commons in 1849 and 1852 to consider the whole subject; and although in most cases it was shown that the accidents occurred in consequence of the miners not attending to the regulations with respect to the use of the Davy safety lamps, one of the results of the inquiries instituted by the committees was the introduction of several new safety lamps. In principle they are, of course, similar to the old Davy lamp, but differ somewhat in detail; some, for instance, have glass inside the wire gauze, some outside, and others dispense with the gauze altogether, and admit the air into a glass chimney, with a copper cone, through perforations in a metal bottom. Great difference of opinion exists as to the relative merits of the various lamps at present in use; but it is generally admitted that the gauze cylinder should be accompanied by one of glass, to resist the action of strong currents of air; and that the glass without the gauze is not sufficiently protected from fracture. As an historical fact in connection with the safety lamp, it may be stated that, in his 'Life of George Stephenson,' Mr. Smiles has sought to prove that, a year before Sir Humphrey Davy commenced his experiments on the subject, Stephenson was also employed in a similar manner, and so far succeeded that his lamps were for a long time used in Killingworth colliery, where he was at work as engine-wright at the time, and are still employed in several of the northern collieries.

LAMPETER. [CARDIGANSHIRE.]

LAMPIC ACID, a term given by Daniell to the acid which results from the slow combustion of alcoholic vapour and ether in the lamp without flame. It is acetic acid modified by the presence of a peculiar hydrocarbon.

LAMPREY. [PETROMYZON.]

LAMPYRIDÆ (*Lampyrus*, Linn.), a family of coleopterous insects of the section *Malacodermi*, in the great group of Latreille's *Serricornes*. To this family belong the genera *Lygus*, *Dictyoptera*, *Omalisus*, *Lampyrus*, and others. To the genus *Lampyrus* belongs the Glow-worm (*Lampyrus noctiluca*, Linn.). This insect is rather more than half an inch in length, of a blackish colour; the thorax is margined with dusky red, the legs and the edges of the segments of the body of the same colour. The female resembles the male, but is quite destitute of

wings, and the terminal segments of the abdomen beneath are yellowish; the thorax is semicircular; the body is very soft, of an oblong form, pointed at the extremity, and composed of ten segments. The male glow-worm is said to emit the phosphorescent light in a slight degree, but it is chiefly the female from which the brilliant light proceeds which we so often see on banks, beneath hedges, and in various other situations. This light proceeds from the under part of the abdomen and near the tip, and it appears that the animal has the power of varying its intensity. Glow-worms will live, we are informed by Latreille, a long time in vacuo, and in different kinds of gases; the nitrous acid, muriatic, and sulphurous gases excepted, for in these they soon expire. When placed in hydrogen gas, they sometimes detonate. If the luminous portion of the abdomen be removed, it retains its luminous property for some time, and when apparently extinct, it may be reproduced by softening the matter with water. The insects emit a brilliant light if immersed in warm water, but in cold water it is extinguished. The females being apterous, and consequently restricted in their powers of locomotion, and the insect being nocturnal, it is supposed that the light emitted by the female is for the purpose of attracting the other sex. The larvae may be kept alive for a considerable time; they feed voraciously upon snails, killing those of the largest size; sometimes they seize a snail whilst crawling, and when the animal retires within its shell, they still keep their hold, and allow themselves to be carried into the shell with the snail, and although they become enveloped in the mucous secretion, it very seldom appears to adhere to their bodies. Upon being touched or disturbed they emit the phosphoric light, but not to so great a degree as the perfect insect.

LANARKSHIRE, or CLYDESDALE, is an inland county of Scotland, bounded N. and N.W. by the shires of Stirling and Dumbarton, W. and S.W. by those of Renfrew and Ayr, E. and N.E. by those of Linlithgow, Edinburgh, and Peebles, and S. by Dumfriesshire. It is comprised between 55° 15' and 55° 56' N. lat., and between 3° 23' and 4° 23' W. long. The greatest length N. by W. to S. by E. is 52 miles; the greatest breadth E. to W. is 33 miles. The area is 889 square miles, or 568,867 acres, of which about five-twelfths are cultivated, and an equal quantity moorland. In 1861 the inhabitants numbered 631,566—304,151 males, and 327,415 females—being a large increase since 1851, when the population was 530,169. At last census there were 46,675 inhabited houses in the county. In 1868 it was officially estimated by the registrar-general that the population had further increased to 718,223.

The coal, iron, and lead mines of Lanarkshire are very extensive and rich—there being more than 150 collieries and thirteen or fourteen ironworks, with ninety blast furnaces, and all kinds of manufactures are carried on in and around Glasgow in the Lower Ward. Besides the fire-clay which there abounds, millstone, limestone, and slate are quarried in various parts of the county, and lead is found at Leadhills, combined with a little silver.

Lanarkshire is divided into three districts, named the Upper Ward, Middle Ward, and Lower Ward.

The Upper Ward, or southern part of the county, is covered by hills and mountains, of which the

highest elevations are about 2400 feet. On the summits of the hills and sides of the mountains are pastured numerous flocks of sheep, which, in the valleys, are intermingled with herds of black cattle. The Clyde and its tributaries, the Douglas, Avon, Calder, and several smaller rivers, have their sources in these mountains. [CLYDE.] The arable portion of this ward is inconsiderable, and chiefly on the banks of the Clyde and its tributaries. In this ward is the village of Leadhills, 1323 feet above the sea, and the highest inhabited place in Scotland. The lead mines here yield from 800 to 900 tons yearly. It was the birthplace of Allan Ramsay the poet, in 1685. There are also in this section of the county seams of excellent clay-band ironstone, limestone, coal, freestone, and slate, all of which are worked.

The Middle Ward is diversified by gently undulating grounds, there being no plains of any extent except in the valley along the banks of the Clyde. The prevailing soil is of a clayey nature, intermixed with sand. In some parts it consists of a deep fertile loam, resting upon a subsoil of loose gravel; in others it partakes more of a mossy character, and yields, in early seasons, good crops of oats, flax, and rye-grass hay, but in cold or late seasons the oats do not ripen well. Oats, barley, potatoes, and turnips form the principal crops, but there is also much wheat raised both in this and the adjoining ward to the north. This ward is peculiarly rich in a mineralogical point of view, containing, besides an abundance of limestone and sandstone, ironstone and coal; the latter almost of inexhaustible supply, and favourably situated. And in this ward, near Coatbridge, are placed the more extensive of the works for smelting iron. Works for the manufacture of wrought iron, tin-plates, tubes, shovels, &c., are rapidly increasing in this vicinity. The population of the parish of Old Monkland, in which Coatbridge is situated, under 10,000 in 1821, was in 1861 29,545, and in 1867 estimated at 35,000.

The Lower Ward, or northern part of the county, is of very limited extent, but as it contains the city of Glasgow, it is a very important one. There are immense fields of fire-clay, and the quality is considered fully equal to the Stourbridge clay. In their vicinity extensive works have been founded for the manufacture of crucibles, &c.; and there are extensive sandstone quarries and collieries, yielding coal and ironstone to a considerable extent. There is a considerable proportion of arable land, but the soil of some parts is moist and moorish. Many of the mosses have been reclaimed, and they are all gradually lessening by peat-cutting, so that oats, rye-grass, and even wheat, now grow luxuriantly where once the moor-fowl fed and the long heath waved. The wheat is sown from the end of August to the beginning of November, and sometimes, though very rarely, in spring.

Much of the land of this county belongs to large proprietors. The dairy system has been prosecuted with great success. The cows are mostly of the Ayrshire breed, and what are denominated Dunlop cheeses are largely made. The draught horses of Lanarkshire are held in great estimation in the north of England and throughout the south of Scotland.

The climate of the county is almost as various as its soil. The Lower Ward, being more open to the

sea breezes which prevail from the W. and S.W., is comparatively temperate. The climate in the Upper Ward is unusually severe.

In the Middle Ward the orchards formerly yielded fruit to the value of 8000*l.* a year, but have fallen off in latter years, partly because the ground is more profitably employed in producing vegetables for the Glasgow market, and partly because the facilities now afforded by steam navigation introduce large supplies of fruit from all producing districts both at home and abroad. For some miles below Lanark and the Falls of the Clyde, the river offers a picturesque succession of towns, villages, and plantations. Husbandry, though improving, is backward. The manufactures comprise cotton and muslins (which in prosperous times employ 40,000 to 50,000 hands), woollen, flax and silk goods, glass, paper, engines, ships, chemicals, and other articles, of which Glasgow is the great centre; with iron, at Glasgow, Shotts, Coatbridge, Wishaw, Lesmahagow, Monkland, Airdrie, &c.

The Forth and Clyde Canal, which connects these two rivers, throws branches into both Edinburgh and Glasgow. The Monkland Canal passes through the royalty of Glasgow, and affords a cheap communication between that city and the collieries and iron-works in the neighbourhood of Airdrie. The Ardrossan Canal, originally projected to connect Glasgow with Ardrossan, was never carried further than Johnston. Railways intersect the county in every direction.

Under the Reform Act of 1868 the county returns two members to Parliament, the city of Glasgow three, and the Falkirk district—including the boroughs of Lanark, Hamilton, Falkirk, Linlithgow, and Airdrie—one. The number of voters on the county register in 1869 was 7927—5134 in the north and 2793 in the south. Lanarkshire is divided into fifty-two parishes, and three presbyteries in the synod of Glasgow and Ayr.

The following are the principal places, with the population of each in 1861:—

Airdrie is a well-built town, 10 miles S.E. from Glasgow. It is contributory to the Falkirk parliamentary district. Population, 12,922. Registered electors, 439. It was created a borough by the Reform Act of 1832, and is governed by a provost, three bailies, and twelve councillors. It is a modern town, standing in the centre of the most productive beds of coal and ironstone in Scotland (from which its prosperity chiefly arises); and is surrounded by the Calder and other large iron-works. The chief public buildings are three churches, four chapels, prison, town-hall, gas-works, grammar-school, mechanics' institute, and four banks.

Blantyre is 8 miles S.E. of Glasgow, and has cotton-spinning and dye-works. Population of the parish, 3092. David Livingstone, the African traveller, was born here in 1817. It gives a barony to the Stewart family, who have a noble mansion at Erskine, on the bank of the Clyde. Ruins of an ancient priory are situated within the demesne.

Bothwell is a populous and extensive parish on the Clyde, 8½ miles S.E. of Glasgow. The inhabitants within the parish, which comprises altogether 13,774 acres, and includes the town of Bellshill (2945 population), number 17,903; within the little village of Bothwell itself, only 1057. In the parish are collieries, iron-works, and freestone quarries. Bothwell

Bridge, on the river, was the scene of an action between the covenanters and the royal forces in 1679, which Scott has depicted with graphic power in 'Old Mortality.' The castle is now a ruin, picturesquely situated on a wooded bluff above the river; the surrounding grounds forming a favourite resort for the Glasgow citizens. The church includes portions of the ancient Norman structure; the tower is 120 feet high. The manse was the birthplace of Joanna Baillie, the poetess.

Carlisle, a municipal borough, parish, and town, has manufactures of cotton, coal, iron, and lime-works. Population of parish (which comprises 15,410 acres), 6176; of town, 3111.

Coatbridge, a town in the parish of Old Monkland, 9½ miles E. of Glasgow, with which it is connected by two lines of railway and the Monkland Canal. It is surrounded by extensive iron-works and collieries; and contains several foundries and machine shops, with manufactories of tubes, tin plates, confectionery, shale oil, &c. The town is rapidly rising in importance, from its central position among the large neighbouring fields of coal and ironstone. Population, 10,501.

Glasgow. [GLASGOW.]

Govan, a rising town and parish to the S. and W. of Glasgow, of which it forms an extensive suburb, has extensive iron-shipbuilding yards and foundries. The entire parish (the greater portion of which lies within the parliamentary boundaries of Glasgow) contains 100,716 inhabitants; about one-fourth of it lies in the county of Renfrew. The river Clyde divides the parish at the point where it is joined by the Kelvin. The thriving town of Partick is included in its boundaries. The population of the town proper is 7637.

Hamilton, a handsome town, is pleasantly situated near the confluence of the Avon Water with the river Clyde, 11 miles S.S.E. from Glasgow. It is a parliamentary and municipal borough, and market town, and has a station on the Caledonian Railway. There is a five-arch bridge over the Clyde, and another over the Cadzow. The town is the head of a presbytery in the synod of Glasgow, and also the head-quarters of the county militia. The chief public buildings are two churches, one built by Adams, three chapels, a grammar-school, a trades' hall and new town-hall, market-house and old cross, cavalry and infantry barracks, race-stand, three hospitals, five branch banks, railway station, and one of the county prisons, &c. The borough was created by the Reform Act of 1832, and is municipally governed by a provost, two bailies, and twelve councillors. The whole parish comprises 14,400 acres, with a total population of 14,047. The inhabitants within the borough limits in 1861 numbered 10,688, including 177 military in barracks. The number of parliamentary and municipal voters is about 600. It is included in the Falkirk parliamentary district, which sends one member to the House of Commons. Hamilton was founded by, and derives its name from, the family of the Hamiltons, originally from Hambleton, in Leicestershire, who are now represented by the duke of Hamilton, the premier peer of Scotland, and hereditary keeper of Holyrood Palace. The peerage dates from 1445; the marquise having been created by James VI. in 1599, and the dukedom

in 1643. It has long been understood that to the title also belongs the dukedom of Chatelherault in France, but the claim was only confirmed by decree in 1864. Hamilton Palace, the family seat, is a very handsome Grecian structure, 264 feet long, and contains many valuable paintings and cabinets. The park in which it stands contains a magnificent mausoleum, erected a few years ago by Alexander the tenth duke, of which he became the first occupant, and a picturesque and striking copy of the façade of Chatelherault Castle. Cadzow Forest, which adjoins the park, is famous for its oaks, the last relics of the great Caledonian forest which once extended from sea to sea, as well as for a herd of the aboriginal breed of Caledonian wild cattle which is still preserved in it. The forest likewise contains the ruins of an ancient castle of the same name.

Lanark, the county town of Lanarkshire, is 31 miles S.E. by S. from Glasgow by the Caledonian Railway, and is situated nearly in the centre of the county. It is a place of great antiquity. The appearance of the town has been greatly improved of late years, and at present there are many handsome houses built of freestone. The chief public buildings are two churches, in a niche of one of which stands a colossal statue of the patriot Wallace, who lived here, three chapels, a grammar-school, with twenty-eight scholarships attached, a free school, library, militia barracks, court-house, and gaol; and three banks. This town is the chief polling-place for the county, and the borough is contributory to the Falkirk district. The number of the parliamentary and municipal constituency is about 300. The borough was chartered in 1310; and is governed by a provost, two bailies, and fifteen councillors. It is the head of a presbytery in the synod of Glasgow. The population of the parliamentary borough is 5047; of the royal borough, 5384; of the entire parish (10,560 acres), 7891.

Lanark stands on elevated ground near the east bank of the Clyde; and in its immediate neighbourhood are several Roman and feudal remains, and the celebrated Falls of the Clyde, consisting of Corra Linn, 84 feet high; Stonebyres, 80 feet; and Bonnington, 30 feet; all in the midst of picturesque scenery. Lanark occupies the site of *Colania*, which was built partly on the Watling Street and partly on the bank of the Clyde, now crossed by two bridges. There are also five on the Mouse Water, one of which, 128 feet high, was built by Telford, near Wallace's Cave and the Cartland Crag, which rise 400 feet above the bed of the stream. In 978 Kenneth II. assembled a parliament here.

New Lanark is a well-built village to the south of the town of Lanark, and on the east bank of the Clyde. Population, 1396, who are employed in weaving and cotton spinning. Here Robert Owen founded one of the earliest infant schools in Scotland; and his first attempts to establish a new system of social organization (1815-27) were made in this village, which owed its foundation to his father-in-law, David Dale, in 1783.

Rutherglen, 2½ miles S.E. from Glasgow by railway, is a parliamentary and royal borough, and joins with Kilmarnock and three others in sending one member to the House of Commons. There are about 180 voters in the borough, the population of

which is 8062; of the royal borough, 8071; of the entire parish, 9335. The borough was chartered by David I. in 1126, and is governed by a provost, two bailies, and eighteen councillors. Rutherglen, or 'Ruglen,' as it is called, is situated to the east of Glasgow, on the south bank of the Clyde; and comprises many good modern houses with an ancient parish church, and two other churches, four chapels, and a handsome town hall. It has also extensive print and dye works, collieries, and a paper manufactory. It is very ancient, and was formerly a very important place, Glasgow having been included within its municipal boundaries in the twelfth century; at present it consists chiefly of one well-paved street. Its former trade on the river has been absorbed by Glasgow, and its chief industrial resources are muslin weaving, and print, dye, and chemical works; but what may seem strange, it possesses an extensive and flourishing shipbuilding yard, whence iron steamships are continually issuing.

Shotts is a village and extensive parish (comprising 25,336 acres), 12 miles N.N.W. of Lanark. It has extensive coal and iron works. Population of the parish, 7343; of the village, named Shotts Iron Works, 1335.

Strathaven is a burgh of barony in the parish of Avondale, 14 miles S.E. of Glasgow. The population is 4085, who are mostly employed in weaving.

Wishaw, a town 5 miles N.W. of Carlisle, in the parish of Cambusnethan, having extensive coal-fields and iron works, is situate at the junction of a branch of the Caledonian with the Wishaw and Coltness Railway. Population, 6112.

Lanarkshire was the seat of the Damii, in Valentia. It was afterwards part of the British kingdom of Strath-Clwyd. Glasgow has an ancient cathedral, a building of great beauty, erected by Bishop John Achains, in 1133-36; Blantyre, remains of a priory. There are old churches at Biggar, Hamilton, and Bothwell; and castle ruins at Bothwell, Carnwath, Cadzow, Craignethan, Douglas, and Crawford, all on the Clyde.

LANCASHIRE, a north-western county of England, is bounded N. by Cumberland and Westmoreland, E. by Yorkshire (from which it is separated by the long ridge popularly called the backbone of England), S. by Cheshire, and W. by the Irish Sea. Its form is irregular, the county being narrow at the north, and gradually widening towards the south. The district of Furness, at the north-western extremity of Lancashire, is about 10 miles wide, and is separated from the rest of the county by the Bay of Morecambe, and by a narrow strip of the county of Westmoreland. The greatest length of Lancashire is about 75 miles, and its greatest breadth about 43 miles. The county is comprehended between 53° 20' and 54° 25' N. lat., and between 2° and 3° 15' W. long. The area is 1905 square miles, or 1,219,221 statute acres, of which about 850,000 are estimated to be arable, meadow, and pasture, the rest consisting either of wide ranges of mountains, or of great swamps, known by the name of mosses. The inhabitants in 1861 numbered 1,173,424 males, and 1,256,016 females: total, 2,429,440; being an increase of 398,204, or 20 per cent., over the number in 1851. Since 1801,

when the population was 673,486, the total increase has been 1,755,954, or 267 per cent. In 1868 it was estimated that the population of the county had further increased to 2,738,988.

Surface and Coast Line.—The inland part of Furness is an integral part of the Cumbrian range. Mountains rising to the elevation of between 2000 and 3000 feet are there separated by narrow valleys watered by brawling streams or occupied by lakes. The whole of the eastern side of Lancashire also consists of mountains or lofty hills, and an elevated chain runs through the centre of South Lancashire, rising to the height of more than 1500 feet, and approaching within about 10 miles of the sea. A fertile plain extends along the whole coast of Lancashire from the river Duddon, on the borders of Cumberland, to the estuary of the Mersey. This plain is not more than three or four miles wide at the northern extremity of the county, but it widens greatly in the lower part of the valleys of the Lune, the Wyre, and the Ribble; and in the valley of the Mersey it extends across the whole of South Lancashire. The principal Lancashire mountains are the Old Man or Maun (from an ancient British word, signifying a rock) of Conistone, 2577 feet; Pendle Hill, 1803 feet; Bleasdale Fell, 1709; Boulsworth Hill, 1698; Rivington Pike, 1545 feet. In the southern half of the county there are extensive sandbanks running for many miles along the coast, and visible at low water. Towards the north the coast forms a deep bay, of which Furness on the north and Rossall Point on the south form the extremities. This large bay is divided into the two smaller bays of Morecambe and Lancaster by a tongue of low land projecting near the mouth of the river Lune. Further south the estuaries of the Wyre, the Ribble, and the Mersey run far into the land. A large area of these bays and estuaries becomes dry at low water.

The only islands along the coast are off the southern extremity of Furness. Walney Island, the largest, extends from north-west to south-east about eight miles, in width nowhere more than one. The other islands of the group, Foulney, Pile of Foudrey, Sheep Island, Roe Island, Dora How, and Old Barrow, are all small.

Geological Character.—The uppermost formation is a bed of rich alluvium extending along the coast. This is in general very good land, but is in some places covered with peat moss. Next is the new red sandstone, composed of red or coloured rock, and covered in many places with thick beds of marl and earth. In the hollows of these marl beds there are extensive peat mosses, both in North and South Lancashire. Great quantities of large timber trees, the remains of ancient forests, are found in these mosses. The coal-field of South Lancashire comes next, covering a large portion of that division of the county, and forming the chief natural cause of its manufacturing pre-eminence. It occupies a large irregular tract between the Ribble and the Mersey of 400 square miles, and yields above 14,000,000 tons yearly. The pits are about 800 in number, and are scattered over the whole field, whose richest parts are in the neighbourhood of Manchester, Oldham, St. Helens, and Wigan. The millstone grit forms the heights which skirt the eastern side of the county. The valley of the Ribble and that of the Lune are

chiefly occupied by the carboniferous or mountain limestone, which rises into lofty hills and scaurs in the higher part of those two valleys. Furness is partly occupied by the last-mentioned rocks, and partly by slate-rocks of the Cumbrian system.

The most valuable mineral production of the county is coal. Its iron ores at Furness are amongst the richest in Great Britain, and are very extensively worked. Copper is also found in the neighbourhood of Coniston. Slate, flagstones, freestone, scythestones, brick clay, and furnace sand are also amongst the mineral products of the county.

Rivers and Lakes.—Most of the rivers that water this county have their general course from N.E. or E. to S.W. or S. Those of Furness flow from N. to S. The principal rivers are the Lune in the north, the Wyre and Ribble in the centre, and the Irwell and Mersey in the south.

The Lune rises in Langdale Fells and Shap Fells, in Westmoreland; it enters Lancashire below Kirkby Lonsdale, and flows through a beautiful and fertile valley and a wide estuary into Lancaster Bay. The length of its course is $53\frac{1}{2}$ miles, and it drains a basin or range of country extending over 434 square miles. It receives the Greta, the Wenning, and many small mountain streams, and is navigable for large vessels as high as Lancaster.

The Wyre rises among the fells or moorlands on the borders of Yorkshire, flows across the fertile district of the Fylde, and after passing Fleetwood enters the Irish Sea near Rossall Point through a wide estuary, which, however, narrows at the mouth. Its length is 27 miles.

The Ribble rises in the Yorkshire mountains, a little to the east of Whernside, enters Lancashire near Clitheroe, flows past Preston into a wide shallow estuary, and enters the Irish Sea. The length of its course is 61 miles, and it drains a district extending over 501 square miles. It receives the Hodder, Calder, Darwen, Roddlesworth, and Douglas in its course to the Irish Sea.

The Irwell rises above Bacup, in the highest part of Rossendale Forest, and flows through a most populous valley, abounding in manufacturing establishments, to Manchester. It affords water power to the towns of Bacup, Newchurch, and Bury, and receives the streams that flow through Bolton on one side, and Rochdale on the other. At Manchester the Irwell receives the Irk and the Medlock. There it turns to the west, flowing near Eccles and Barton-on-Irwell, and joins the Mersey at Lower Irlam, about 10 miles below Manchester.

The Mersey rises on the borders of Yorkshire, being formed by the union of the Etherow, which rises near the summit tunnel on the Manchester and Sheffield Railway, and the Goyt, which flows down from the highest part of the Cheshire hills. These two streams unite at a point named Water Meeting, near Cromptall. At Stockport the Mersey receives the waters of the Tame, which flows past Staleybridge and Ashton-under-Lyne to Stockport. The Mersey, which forms the boundary of the two counties of Lancaster and Chester, flows from Stockport through a very fertile country, running about four miles south of Manchester, to Warrington. About half-way between those two places it receives the Bollin on the south and the Irwell on the north. From

Warrington it flows to Runcorn, where the North-Western Railway crosses it by a magnificent bridge. Below Runcorn the Mersey expands into a spacious estuary, and empties its waters into the Irish Sea, three or four miles below Liverpool and Birkenhead. The estuary is 16 miles long, one to three miles wide, and is greatly obstructed by sandbanks in its upper part, though containing a wide expanse of deep water in the lower. Formerly the Mersey abounded in salmon, and was frequented by large shoals of herrings; it still teems with flounders, sparlings, conger-eels, and shrimps. The Mersey and Irwell are navigable from Liverpool to Manchester. Below Runcorn the former river receives the Weaver, a large stream that flows through the salt field of Cheshire. The Mersey is 68 miles in length, and, including the country drained by its numerous tributaries, is the outlet for a wide district, extending over an area of 1706 square miles.

There are several smaller streams in the county or its borders. Amongst these are the Duddon, the Leven, the Keir, the Yarrow, the Alt, and the streams known as Ditton Brook, Sankey Brook, and Grazebrook.

In Furness lie two considerable lakes, Winandermere or Windermere, and Coniston Water. Windermere, which belongs in part to Westmoreland, is about 11 miles long, and varies from 500 to 1700 yards in breadth. It is the largest lake in England, and its greatest depth is rather more than 200 feet. It receives the waters of many mountain streams, including those of the Bratley and Rothay, and also those of Esthwaite Water and a few small lakes and tarns: the united waters flow by the Leven into Morecambe Bay. The shores of this lake are in general beautifully wooded, especially on the western side, where the steep heights of Furness Fell rise from the lake clothed with a forest of larch and fir. In the centre of the lake is a group of small islands, the largest of which comprises 28 acres. Bowness, beautifully situated on the eastern side of Windermere, and Ambleside, at its northern extremity, are two of the most attractive places in the lake district; but the whole of the shores, both on the Lancashire and the Westmoreland sides of Windermere, are covered with beautiful villas and picturesque villages. Among the numerous varieties of fish found in this lake is the char, which is also an inhabitant of Coniston Water, and when potted is highly esteemed as a delicacy. Coniston Water is about six miles long, and rather less than one broad, with a maximum depth of 240 feet. Esthwaite Water is also a very pretty lake, situated amongst the mountains, and there are several other smaller lakes or tarns.

Canals and Railways.—The Sankey Canal was the first formed in Lancashire or in England. It originally extended only from the coal-field near St. Helens to the river Mersey at Sankey Bridge below Warrington, but it has since been carried along the north bank of the river Mersey to Widness Dock, opposite Runcorn, where many manufactories have been established, and a considerable town has grown up. The Bridgewater canals consist of a canal running from the Worsley collieries to Manchester; of a much more extensive one starting from the former, and running down the valley of the Mersey to Runcorn, thus forming, with the

estuary of the Mersey, a complete line of water communication from Manchester to Liverpool; and of a third canal from Worsley to Leigh, continued from Leigh to Wigan. Their whole length is about 36 miles, and they still bear traces of the genius of Brindley, as well as of the perseverance and self-sacrifice of Francis, duke of Bridgewater, who gave up the greater part of his life and nearly the whole of his income to the construction of these noble works. The first of these canals is connected with extensive tunnels and underground coal works at Worsley. The Leeds and Liverpool Canal, about 140 miles in length, extends from the port of Liverpool to the navigable river Aire at Leeds, and not only connects Liverpool and Leeds, but forms the greater part of a line of water communication extending from the Mersey to the Humber, traversing the coal-fields of Lancashire and Yorkshire near the towns of Ormskirk, Wigan, Blackburn, Accrington, Burnley, Colne, Keighley, Bingley, and Bradford. The Preston and Lancaster Canal commences at Preston, and runs northward to Lancaster, from which place it has been continued to Kendal. The Rochdale Canal commences near Manchester, and proceeds by way of Rochdale and Todmorden into the West Riding of Yorkshire, following the line of the river Calder, and joining that river near Halifax, from which point it is navigable to the Humber. The Ashton Canal also commences near Manchester, and runs to Ashton, throwing out branches to Stockport, to the Huddersfield Canal at Dukinfield, and to Oldham. It is also carried through the hills into Yorkshire, passing the town of Huddersfield, and joining the Calder near that town. The Peak Forest Canal connects the limestone quarries of Derbyshire with the manufacturing districts of Lancashire. The Manchester, Bolton, and Bury Canal runs from the river Irwell, up the valley of the Irwell, to Bury.

The first great passenger railway constructed in England was the Liverpool and Manchester, laid down by George Stephenson, and opened in the year 1830. This line now forms part of the immense undertaking of the London and North-Western Railway Company, which extends from London to Scotland, and is connected with Liverpool, Manchester, Warrington, Wigan, Preston, Lancaster, and numerous other important towns. The Lancashire and Yorkshire Railway also extends from Liverpool to Wigan, Bolton, Bury, Rochdale, and crosses into Yorkshire. The Manchester and Sheffield Railway extends from Liverpool, through Manchester, Sheffield, and Retford, to Grimsby, on the German Ocean. The East Lancashire extends from Liverpool to Preston, Blackburn, Burnley, Colne, into Yorkshire, where it unites with the principal Yorkshire lines. The North-Western line runs from Lancaster and Morecambe Bay up the valley of the Lune to Settle, and on to Skipton and Leeds. Recently a branch has been formed which crosses Morecambe Bay, and stretches to Ulverstone, Barrow, Broughton, and so on to Whitehaven and Workington. A line of railway runs from Preston to Fleetwood, with branches to Lytham and Blackpool. Southport is also connected with Liverpool, and with Wigan and Manchester, by the 'iron road.' In fact, there is not a town in Lancashire of any magnitude which is not united with

the whole system of railways throughout the county, and consequently with the railway system of the whole kingdom.

Climate and Agriculture.—The climate of Lancashire is mild in winter and moist in summer, owing to the vicinity of the Atlantic Ocean, but from the same cause it is exposed to frequent winds and occasional storms. The high hills which run along its eastern boundary shelter it from the cold easterly winds, but at the same time arrest the clouds that come from the Atlantic, and produce more abundant rains than occur in the eastern parts of England. The average rainfall is about 45 inches per annum, but in the wet season of 1852 it was very nearly 62 inches. In 1868, which was a remarkably dry season, it was not quite 35 inches.

Near the coast the land is generally level, and the soil consists of a deep alluvial earth, in some places covered with sand brought from the sea-shore by the westerly winds. The soil is very favourable for grass, roots, and garden vegetables. A fair quantity of wheat is grown, but oats are better suited both for the climate and soil. Potatoes are cultivated in the fields as well as in the gardens, and from the lightness of the soils, the abundance of manure, and the moistness of the climate, the crops are very abundant, and of excellent quality. Early potatoes are frequently raised, with crops of turnips after them in the same year. These are succeeded by wheat or barley and grass seeds. In the districts furthest from large towns, a four years' course of two green and two white crops is found to answer, but in the neighbourhood of the towns the land is chiefly in grass, oats, and potatoes. The hilly tracts are almost entirely laid out in grass, owing to the great demand for milk and butter. Most of the farms in the county are under 100 acres, though there are some of much greater extent both in North and South Lancashire. The cultivation of the whole county has greatly improved during the last thirty years. In that period nearly the whole of the land has been thoroughly drained, the fields have been enlarged by the removal of useless fences, and very good farm buildings have been erected on most of the large estates. Market gardening is carried on to a great extent around all the large towns, but especially in the neighbourhood of Liverpool, Manchester, and Warrington, and more than five thousand families are employed in garden cultivation.

The ancient breed of long-horned cattle is almost extinct in Lancashire, having given place, like nearly all the original breeds, to the short-horned or Durham, which gives twice as much milk and fattens in half the time. Comparatively few sheep are kept in the county, except in some of the thinly-peopled districts of the north. There is a great demand for powerful horses in the seaports and manufacturing towns, and much attention has recently been given to the rearing of horses and cattle.

Commerce and Manufactures.—Lancashire is the most important manufacturing county in England, monopolizing nearly the whole of the English cotton trade. Manchester is the capital of the cotton district. That trade is also carried on on a very large scale at Bolton, Blackburn, Preston, Burnley, Accrington, Haslingden, Bacup, Bury, Rochdale, Todmorden, Oldham, Ashton-under-Lyne, and in numerous other

towns and populous villages. The number of persons employed in the cotton trade at the present time is about 400,000, and their united labours are estimated at 80,000,000*l.*, about two-thirds of which are exported. The silk, woollen, and flax manufactures are also carried on, though not on so extensive a scale as that of cotton. Many other branches of industry are pursued in the county. Amongst these are mining, engineering of every description, shipbuilding (both iron and wood), iron and brass manufactures, hat factories, plate-glass, bottle, and pottery works, alkali, soap, and chemical works, pin manufactures, watch-movement manufactures, and the manufacturing of all kinds of tools and implements.

The commerce of Lancashire is as vast as its manufactures. One-half of the merchandise exported from the United Kingdom is shipped from the port of Liverpool. In the year 1867 the aggregate value of British exports amounted to 180,961,923*l.*, to which Liverpool contributed 76,101,118*l.* The exports of Liverpool in 1868 amounted to about 78,000,000*l.* The imports are also on a gigantic scale, cotton, grain, and timber being amongst the most important articles. The value of the cotton imported into Liverpool has for some years varied from 30,000,000*l.* to 50,000,000*l.*, according to the fluctuations in the price of that article. [LIVERPOOL.]

Divisions and Towns.—Lancashire is divided into the six hundreds of West Derby, Salford, Blackburn, Leyland, Amounderness, and Lonsdale. It contains forty-eight towns, the smallest of them containing 2000 inhabitants. In the year 1867, according to the estimate of the registrar-general, the town of Liverpool contained 492,439 inhabitants, that of Manchester 362,823 inhabitants, and that of Salford, which is only separated from Manchester by a narrow stream, 115,013 inhabitants. After London, these are the largest communities in England. The county contains sixty-nine whole parishes, parts of four others, 452 chapelries and townships, twenty-six poor-law unions, and twenty-five county courts. It includes parts of the dioceses of Manchester and Chester, is in the province of York, and in the northern circuit. The assizes for the northern division of the county are held at Lancaster; for the southern division, at Liverpool and Manchester. For parliamentary purposes the county is divided, by the Reform Act of 1867, into North, North-east, South-east, and South-west Lancashire, each division returning two members. Liverpool and Manchester return three members each; Blackburn, Bolton, Oldham, Preston, Salford, and Wigan two each; and Ashton-under-Lyne, Burnley, Bury, Clitheroe, Rochdale, Staleybridge, and Warrington one each; total, thirty-three. Before the Reform Bill the number was twenty-seven only; the new members are, three to the county, one each to Liverpool and Manchester, and one each to Salford, Burnley, and Staleybridge. Lancaster was disfranchised for bribery at the election of 1865. The places of election are Lancaster, Blackburn, Manchester and Liverpool.

The following are the principal places, with the population of each in 1861:—

Accrington is a town and township 5 miles E. from Blackburn, situated on the Leeds and Liverpool Canal and the East Lancashire Railway. It is in the neighbourhood of numerous coal-pits, and

contains extensive cotton factories. It has a total population in the new and old towns of 13,872.

Ashton-under-Lyne. [ASHTON-UNDER-LYNE.]

Ashton-in-Mackerfield is on the road between Warrington and Wigan, 3 miles N.N.W. from Newton, and about 17 miles N.E. by E. from Liverpool. There are numerous collieries in the parish, which also contains much good land. The population of the parish is 10,181; of the town, 6566.

Bacup, a prosperous town on the Irwell, 15 miles N. of Manchester, containing numerous churches, cotton factories, dye-works, brass and iron foundries, a mechanics' institute, and a beautiful market-hall opened in 1867. It is surrounded by coal mines. Population, 10,935.

Barrow-in-Furness, a rapidly increasing town and municipal borough of 18,500 inhabitants, situated at the extreme point of the promontory of Furness. In 1847 the population was only 325, and its rapid progress is due to the iron-works, where more than 600,000 tons of iron are annually produced. The town obtained a charter of incorporation in 1867, when docks rivaling those of Birkenhead in extent and position were commenced at an estimated cost of 300,000*l.* In this scheme Barrow Island is made available for shipbuilding yards; an outer island, Walney, acting as a natural breakwater. The tide-way between the island and the mainland is inclosed, and converted into floating docks.

Blackburn. [BLACKBURN.]

Blackpool is a much frequented sea-bathing place, situated on a lofty bank on the coast of the Irish Sea, 18 miles W.N.W. from Preston, and 27 miles S.W. from Lancaster. A very handsome pier, which cost 20,000*l.*, was opened in 1868. The town has of late years much increased, and upwards of 100,000 visitors now arrive annually. Population 3506.

Blackrod, an ancient manufacturing town, 7 miles S.S.W. from Bolton. There are numerous coal-pits in the neighbourhood. Population, 2911.

Bolton. [BOLTON.]

Burnley, a municipal and parliamentary borough, 25 miles N. of Manchester, is situated on the banks of the Burn, near the confluence of that river with the Calder. The greater part of the town is of recent erection, and is well built of freestone found in the neighbourhood. Both the cotton and the woollen manufactures are carried on extensively. The Leeds and Liverpool Canal, which nearly surrounds the town, opens a communication for the conveyance of goods through the whole line of country from the German Ocean to the Irish Sea. Coal and slate are abundant. There are also manufactures of machinery, iron and brass foundries, breweries, tanneries, and rope-walks. The industrial prosperity of this town, which is chiefly owing to its water power and the abundant supplies of coal in the vicinity, has been greatly promoted by the Leeds and Liverpool Canal, already noticed, and by the easy railway communication with Blackburn, Bury, Manchester, and Liverpool. The parish church is a mixture of various styles of architecture, having been rebuilt and enlarged several times. A free grammar-school has existed in the town since the Reformation. It is well endowed. Burnley was created a parliamentary borough by the Reform Act of 1867, and the number of voters in 1869 was 5514. Population, 28,700.

Bury. [BURY.]

Cartmel is about 13 miles N.W. from Lancaster, with which it is connected by the railway that now crosses the sands of Morecambe Bay. The town is situated in a narrow vale watered by a small stream, and overhung on the east by the high ridge of Hampsfield Fell. The streets are narrow and irregular. The houses are principally built of stone. The church, which formerly belonged to a priory, was purchased at the dissolution of religious houses, in 1539, by the inhabitants, and afterwards made parochial. It is a large, handsome, cruciform building in the early English style, with a central tower. Cartmel is the chief place of a rich agricultural district. There are cotton mills in the neighbourhood, but the trade is not extensive. Population of the parish, 5108.

Chorley is a market town 9 miles S.E. from Preston, and 11 miles N.W. from Bolton, with both of which it communicates by railway. The town stands on a hill, the base of which is watered by the Chor, a rivulet that flows into the Yarrow about a mile below the town. The streets are wide and well built, and the town is well supplied with water. The chief articles of manufacture are calicoes, muslins, ginghams, and fancy goods. In the neighbourhood are extensive coal mines, with slate and stone quarries, and a little lead. The Leeds and Liverpool Canal passes within a mile E. of the town. The parish church is for the most part of Norman architecture, and there is also a modern Gothic church, as well as a Roman Catholic chapel, and places of worship of various denominations of dissenters, a grammar-school, and union workhouse. The population of the parish is 15,013.

Clitheroe, a market town and municipal and parliamentary borough, 30 miles N.N.W. from Manchester by railway. There is a moot hall (a modern building of the Gothic order), a gaol, and a bank. Clitheroe Castle, built on a steep rock, in 1178, by Robert de Lacy, to whom the honour of Clitheroe, which comprised the whole hundred of Blackburn, was granted, was dismantled by the parliamentary commissioners in 1649, and is now nearly demolished, the keep only remaining. The present church is an ancient structure, with a fine Saxon arch between the nave and choir. There is also a chapel of ease, a Roman Catholic chapel, two other chapels for dissenters, and a free grammar-school, founded by Queen Mary in 1554. There is no coal in the neighbourhood, but the river Ribble and smaller streams furnish water power in abundance. Cotton printing, bleaching, and the cotton manufacture are carried on to a considerable extent. The town is built of stone and the streets are well paved. The municipal borough is governed by four aldermen and twelve councillors. Clitheroe is very pleasantly situated in a grassy vale, and on the banks of the Ribble at the base of Pendle Hill (which rises 1803 feet above the sea), from which there are extensive prospects. It is a clean town, and communicates by railway with extensive limestone quarries at Chadburn, as well as with Whalley, Blackburn, Accrington, Preston, &c. Print, paper, and lime works are established here.

Under the Reform Act of 1832, which deprived it of one of its two members, Clitheroe returns one

representative to Parliament. The number of electors in 1869 was 1595. The population of the parliamentary borough in 1867 was 10,569; of the municipal borough in 1861, 7000.

Cole, a market town 18 miles N.E. from Blackburn, and 31 miles from Manchester. It is a station on the East Lancashire Railway. The town stands on a tongue of land formed by a small stream and the Leeds and Liverpool Canal. The church is an ancient building. There are two chapels of ease, a grammar-school, cloth hall, and manufactures of cotton, calico, mousselines de laine, and wool. The mills are partly turned by water power. The neighbourhood yields coal, slate, and freestone. Population, 7906.

Dalton, a small town in the Furness iron district, is 5 miles S.W. from Ulverstone. The town consists of a principal street, which terminates in a spacious market-place. The church is a small neat building of considerable antiquity. Iron mines, yielding ore of extraordinary richness, are found at many places in the neighbourhood. There is also a considerable trade in malting, the neighbourhood producing excellent barley. Population of the parish, which includes several islands on the coast, 9152; of the town, 2812.

Droylsden, a manufacturing town rising rapidly into importance, and situated on the railway in the neighbourhood of Ashton-under-Lyne, contains 5980 inhabitants.

Farnworth, a rising manufacturing town on the banks of the river Irwell, between Bolton and Manchester, contains 8720 inhabitants.

Fleetwood-on-Wyre, a seaport and watering-place 18 miles N.W. from Preston, with which it is connected by a railway. It stands at the mouth of the estuary of the Wyre. The town, harbour, docks, warehouses, and pier were planned by Sir Hesketh Fleetwood, Bart., about the year 1836, on ground which before that time was little else than a rabbit warren. A large hotel, shore lighthouses, and other buildings have been erected, and docks and additional works constructed with the assistance of the London and North Western, and the Lancashire and Yorkshire Railway companies. It was expected that Fleetwood would attract a large amount of foreign trade, as well as of the traffic to and from Belfast, Londonderry, Drogheda, and other Irish ports, and to and from Glasgow and Ardrossan; but Liverpool still commands nearly all the foreign trade and most of the Irish traffic, while the opening of the Caledonian Railway has seriously interfered with the development of the trade between Fleetwood and the Scottish ports. The population of the township of Thornton, in which Fleetwood is included, is 5084; that of Fleetwood itself, 3834. A school of musketry has recently been established, which promises to make it the Hythe of the north of England. There are several steamers to and from Ireland and Scotland. The total number of entries at the port in 1867 was 717 (176,234 tons), and the clearances 547 (154,976 tons). The customs revenue in 1868 was 935*l*.

Garstang, a market town, is 11 miles S. from Lancaster. It is a station on the Preston and Lancaster Railway. The streets are irregular, but are well paved and lighted. The parish church is about a mile and a half from the town. The Preston and

Lancaster Canal crosses the Wyre by an aqueduct close to the town. There are cotton and worsted mills, and calico printing establishments in the neighbourhood. Population of the township, 714; of the entire parish (which covers 31,403 acres) 7221. Garstang has petty sessions, and is the head of a poor-law union.

Haslingden, a market town and chapelry in the parish of Whalley, on the East Lancashire Railway, is 8 miles N. of Bury, and 18 miles N. by W. from Manchester. It is the highest town in England, being nearly 1000 feet above the level of the sea, and is situate in a wild Alpine district, abounding in coal, stone, and water power. The older part of the town, including the church, lies on the declivity of a hill. The town is prosperous and improving, and contains several new factories and other buildings. Cotton is the staple manufacture, but the woollen manufacture is also carried on extensively. There is a church, and several places of worship for dissenters. Population of the township, 6929; of the entire parish, 10,109.

Hawkshead, a small market town 29 miles N.N.W. from Lancaster, is situate on the west side of Windermere, near Eastwaite Water. The church is an ancient structure, and there is an endowed grammar-school. Population of the township, 1144; of the parish, 2081. This is the capital of Higher Furness.

Heywood, a rising town on the Lancashire and Yorkshire Railway, 8 miles N.W. of Manchester. The inhabitants, who number 12,824, are principally engaged in the cotton manufacture.

Kirkham, a market town in the Fylde, 9 miles W.N.W. from Preston, is the chief place in a rich agricultural district. The Preston and Lancaster Canal passes near it; there is also a branch railway to it from the Preston and Wyre Railway. It is small, but neat and well built. The church was rebuilt in 1822; but the ancient tower of Norman architecture remains. There are a free grammar-school, a Roman Catholic chapel, and several well-endowed charities and schools. Sail-cloth, sacking, cordage, flax, and cotton are manufactured here. Population of the parish, 11,445; of township, 3380.

Lancaster, a municipal and former parliamentary borough, and river port, the capital of the county, was once a Roman station, and a city of great antiquity, is distant 240 miles from London by road, or 232 by the North-Western Railway, and has railway communication with all parts of the kingdom. The town is called *Lancastre* in the Domesday Survey. It is pleasantly situated on rising ground on the south side of the river Lune, about 6 miles from the mouth of the estuary in Lancaster Bay. The Lune is crossed by a handsome bridge on five arches, and by a viaduct and aqueduct for the railway and canal. The houses are built of stone, and in general the streets are narrow; but the new streets towards Skerton are large and handsome, and there are many fine villas in the neighbourhood. The town is paved, lighted, and well supplied with water. On the highest point of land stands the castle, built before the Conquest, but greatly enlarged in the reign of Edward III. The view from John of Gaunt's round tower is magnificent. This castle was the head of a duchy palatine created for John of Gaunt, 'time-honoured Lancaster,' with a separate

court, and jurisdiction over the vast estates which then belonged to the duchy of Lancaster in all parts of England. The other principal public buildings are St. Mary's Gothic church, near the castle, built on the site of an ancient priory; five other churches, including new St. Peter's, with a spire of 245 feet; eight chapels; county courts; shire-hall and county gaol within the castle walls, which stretch about 380 feet by 350, with the statue of George III. in the centre; theatre, town-hall and exchange, market, custom-house, music-hall, Oddfellows' hall, assembly rooms, savings' bank, mechanics' institute, dispensary, barracks, baths; ancient free grammar-schools, rebuilt 1853, blue coat, national, and other schools; Mrs. Ripley's hospital for 300 children, founded in 1853, in the Gothic style; and a union workhouse. There is also an extensive lunatic asylum for the county on the moor above the town, and a beautiful cemetery of 21 acres is laid out in a very fine position. There are several almshouses, and an establishment for promoting the fine arts. The manufactures are of cotton, silk, linen, table baize, worsted yarn, cabinet manufacture, sail-cloth, rope, twine. There are salmon fisheries in the Lune, and ship-building is carried on to some extent. The principal quay and dock are at Glasson, 5 miles below the town, but vessels of moderate size can come up the Lune. Port Morecambe, a terminus of the Midland Railway Company, and a place of embarkation for Belfast, and where a very fine pier has been erected, is also very near to Lancaster. The chief articles imported into Lancaster are sugar, coffee, rum, mahogany, dyewood, &c. The number of vessels that entered the port in 1867 was 1400 (196,467 tons), and the clearances 2093 (266,401 tons). The customs revenue in 1868 amounted to 12,468*l*. The spring and summer assizes for the northern division of Lancashire, and courts of quarter session, are held at Lancaster, which is a polling-place for the northern division of the county, and the seat of a county court. The municipal borough is divided into three wards, and is governed by six aldermen and eighteen councillors. Population, 14,487; and of the entire parish, 27,430. The town returned two members to the House of Commons from 1295 to 1865 when it was disfranchised for bribery.

Leigh is near the Bolton and Liverpool Railway, and on the line from Kenyon Junction to Manchester. The townspeople are engaged in the manufacture of silks, muslins, cambrics, and fustians. There are very extensive collieries and stone quarries in the parish, and a large foundry for agricultural implements. A grammar-school and other charities are supported in the town. Leigh communicates with Manchester by the duke of Bridgewater's Canal, and with the Leeds and Liverpool Canal by a branch to Wigan. Population of the parish, 30,052; of the township, 10,621.

Liverpool. [LIVERPOOL.]

Lytham, a pleasantly situated watering-place, on the north bank of the Ribble, 5½ miles W.S.W. of Kirkham, with a branch railway joining the Preston and Wyre Railway, lies in a remarkably well cultivated district. It is frequented for sea-bathing, and a handsome pier has recently been erected for the accommodation of visitors. Population, 3194; of town, 2556.

Manchester. [MANCHESTER.]

Middleton is $6\frac{1}{2}$ miles N. by E. from Manchester, near the river Irk, which flows into the Irwell at Manchester. This town owes its prosperity to the cotton and silk manufactures. The church is an ancient building, with a carved screen dividing the chancel from the choir. There are several dissenting places of worship and a grammar-school. Population of the parish, 19,635; of the town, 9876. Middleton is on the line of the Rochdale Canal, and the Manchester and Leeds Railway. Coal mines are worked in the neighbourhood.

Newchurch (in Rossendale), is a chapelry in the parish of Whalley, 6 miles S.S.W. of Burnley. It has an endowed school. The inhabitants, who are employed in cotton and woollen factories, coal mines, and quarries, number altogether 24,413; but this includes an extensive district, the population of Newchurch town being only 3115.

Newton in Mackerfield, a pleasantly situated town 5 miles from Warrington, and half-way between Liverpool and Manchester, has a station on the Liverpool and Manchester Railway, and was an ancient parliamentary borough, disfranchised by the Reform Act of 1832. It is still the place of election for the southern division of the county. It consists chiefly of one street, and has an ancient court-house, now used for a school. Valuable beds of coal have been found in the neighbourhood, and manufactures of various kinds are springing up. The town has engine factories, with manufactures of fustian and glass. Population, 5909.

Oldham, a parliamentary and municipal borough, and flourishing manufacturing town, is 6 miles N.E. of Manchester. The town is situated at the foot of the lofty hills leading into Yorkshire, from which a branch of the Medlock flows past the town. Its rapid rise is chiefly attributable to its being in the immediate neighbourhood of extensive coal mines (which give employment to a large portion of the population), and also to the great increase of cotton manufactures. The manufactures of fustians, velvets, cords, cotton, woollen, and silk goods is very extensive. It possesses some of the largest mills in the kingdom—upwards of two hundred altogether. Various improvements have been effected of late years in the town. Oldham has a Gothic parish church, six district churches; twelve Methodist, five Independent, one Unitarian, and one Roman Catholic chapel; a Friends' meeting-house; town-hall, in the Grecian style, including assembly rooms, post office, &c.; gas and water works; public baths, working men's and temperance halls; three banks; public library or lyceum (1856), several literary institutions, a free park, the largest in the county—upwards of 60 acres. The educational establishments comprise Harshaw's blue-coat school (founded in 1807 and opened in 1834), Assheton's free grammar, and many Sunday and other schools. Oldham has a union poorhouse, and two public cemeteries containing 46 acres. Mill machinery is extensively constructed by Messrs. Platt Brothers & Co., at the Hartford works, the largest in the world, employing from 6000 to 7000 hands. Oldham is divided into above town and below town, and is in the parish of Prestwich. It has excellent railway communication with Manchester, Ashton-under-Lyne, Staleybridge, Saddleworth, and Rochdale, and from those places with all

parts of the kingdom. It is a polling-place for the south-eastern division of the county, and petty sessions and county courts are held. It was created a borough by the Reform Act of 1832, and sends two members to the House of Commons; the number of voters in 1869 being 13,454. The municipal borough is divided into eight wards, and governed by a mayor (who is returning officer), eight aldermen, and twenty-four councillors. Population of the parliamentary borough, 110,000, within the municipal limits, 72,333.

Ormskirk is 73 miles N. by E. from Liverpool, near the Leeds and Liverpool Canal, and with a station on the East Lancashire Railway. It has a town-hall, grammar-school, almshouses, and other charities, and consists of four principal streets, which intersect each other at right angles. The church is mostly modern, with a few portions of late perpendicular character. Cotton and linen thread, silks, hats, and rope are manufactured here. In the vicinity are large collieries. Population of the township, 6426; of the parish, 17,049.

Poulton is about 17 miles in a straight line S.S.W. from Lancaster, and is one of the principal towns in the Fylde. The Preston and Wyre Railway passes through it. The town is about a mile from the estuary of the Wyre. Population of the parish, 8665.

Prescot is 8 miles from Liverpool, with which it is connected by a branch of the North-Western Railway. There are extensive collieries in the parish, and a few cotton and flax mills. Among the principal manufactures of the town are small files, and the movements and other parts of watches. The church is ancient and large. Population of the parish, 63,540; of the township, only 6066.

Preston. [PRESTON.]

Rochdale, a parliamentary and municipal borough, 11 miles N.N.E. of Manchester. It is the principal station on the Lancashire and Yorkshire Railway, and has railway communication southward to Manchester, Oldham, and Ashton. The parish is of very great extent, and reaches into the West Riding of Yorkshire. The town is situated on both sides of the river Roche, a tributary of the Irwell, and the different portions of the town are united by three bridges. The streets are for the most part irregularly laid out, but well paved and lighted, and have been considerably improved of late years. The town is abundantly supplied with water. The parish church, a large old edifice, partly in the early English style, has a few remains of Norman character in the interior. The principal public buildings are the vicarage, on an eminence ascended by 123 steps; five other town churches, exclusive of twelve more within the parish bounds; ten chapels; town-hall and market-house; New Bailey prison; news room; theatre; assembly room; barracks; savings' bank; three other banks; 160 mills and factories; Archbishop Parker's free grammar-school; Hardman's and other free schools; and union workhouses. The manufactures are of very great importance; that of wool has existed from very early times, and is said to have been improved by some Flemings who settled there in the time of Edward III. About 10,000 hands are employed in cotton factories and print works; and 6000 in the baize, flannel, carpet, and other woollen factories, which are distributed in every accessible part of the town and on the neighbouring heights.

Hats and machinery are also made here. At Littleborough, by which a Roman way formerly ran, are the tunnels of the railway and the Rochdale Canal, whose summit levels are respectively between 500 and 600 feet above the sea-level. Lines of railway connect Rochdale with Manchester, Bury, Todmorden, Halifax, Leeds, and Burnley. Coal, slates, flagstone, and freestone are found abundantly in this parish, and steam power and water power extensively employed. The Rochdale Canal, which passes near the town, uniting westward with the duke of Bridgewater's Canal, and eastward with the Calder and Ribble navigation, 33 miles in length, cost upwards of 600,000*l.*, and is supplied by large reservoirs, one of which covers 130 acres. Rochdale returns one member to Parliament; the number of voters being 1358. By a charter dated 1856 it was made a municipal borough, under the jurisdiction of a mayor, ten aldermen, and thirty councillors. Petty sessions and county courts are held in Rochdale, which is a polling-place for the southern division of Lancashire, and the head of a poor-law union. The boundaries of the present borough were defined by an Act of 16 & 17 Vict. to comprise a circle of 3 miles' radius from the market-place near the old bridge, and include, beside the town of Rochdale, Castleton, Spotland, Wardleworth, and Wuerdale-with-Wardle. The late Richard Cobden, the 'Free Trade Apostle,' represented Rochdale in Parliament for several years. The population within the municipal limits is 38,114; within the parliamentary bounds 43,668; of the entire parish (comprising a part of Yorkshire), 119,531; of the Lancashire portion of the parish, 100,990. The number of voters in 1869 was 8728.

Salford. [SALFORD.]

St. Helens, one of the most flourishing towns of Lancashire, is 11½ miles from Liverpool by the Liverpool and Manchester Branch of the London and North-Western Railway. It is situated on one of the richest portions of the Lancashire coal-field, and owes its rapid progress chiefly to that circumstance. The Sankey Canal, extending from this town to the river Mersey at Sankey Bridge, near Warrington, has rendered the St. Helens coal-field one principal means of supplying coal to the port of Liverpool, and to the salt-field of Cheshire.

A great impulse was given to the prosperity of St. Helens by the establishment of the British Plate Glass Company's works at Ravenhead, in the adjacent township of Sutton, and of the copper works belonging to the proprietors of Parys Mine, in Anglesea, who brought their ore here to be smelted. Subsequently the Sankey Canal has been greatly improved and extended to Widness Dock, near Runcorn, at the opening of the estuary of the Mersey. Still more recently a line of railway has been formed from St. Helens to Garston, 3 or 4 miles above Liverpool, where a dock large enough to receive first-class vessels has been constructed, and where all the requisites for carrying on an extensive coal trade have been erected. The St. Helens Railway and Canal now form part of the undertaking of the London and North-Western Company, which has obtained permission to construct another dock at Garston. The town of St. Helens is the principal seat of the alkali manufacture, of the plate and bottle glass trade, and of the smelt-

ing of copper and other ores imported at Liverpool. Population of the town, 18,396.

Southport, a handsome new town on the estuary of the Ribble, 19 miles N. of Liverpool. It is much resorted to as a fashionable watering-place, and contains assembly-rooms, libraries, hotels, lodging houses, &c. The pier is about a mile in length, and the sands are excellent. A handsome park or pleasure ground was laid out in 1868, at a cost of 15,000*l.* The environs of the town are very picturesque and interesting. In 1851 the population was only 5391; in 1861, 11,303; and in 1869, 18,000.

Staleybridge. [STALEYBRIDGE.]

Stockport. [STOCKPORT.]

Todmorden, a market town, and a seat of extensive and flourishing manufactures, is 8 miles N.N.E. from Rochdale. It is a station on the Lancashire and Yorkshire, and the Manchester and Leeds Railway, and is also situate on the Rochdale Canal. It stands in the narrow mountain pass through which the river Calder flows down from the Lancashire hills into Yorkshire. The inhabitants are engaged in cotton and woollen manufactures, iron foundries, and in the working of quarries, and coal mines. There are two episcopal chapels, both of modern date, and also several dissenting places of worship. The population of the township, part of which is in the West Riding of Yorkshire, is 11,797.

Ulverstone is a parish and market town 16 miles N.W. of Lancaster. It stands on the north-western side of Morecambe Bay, with which it is connected by a short canal. There are extensive slate quarries in several parts of the parish, and numerous iron mines within a short distance. The town is pleasantly situated on a declivity sloping to the S., about a mile from the sands on the estuary of the Leven. It consists of four principal streets, spacious and clean. The church is a plain neat structure, and there are several places of worship for dissenters. Some manufactures exist of cottons and coarse linens, ropes, hats, and woollen yarn. The canal from the estuary of the Leven in Morecambe Bay enables vessels of 200 tons to come up and discharge their cargoes in a spacious basin close to the town, and regular steamboat communication is maintained with Liverpool. The population of the parish is 11,464; of the township, 6630.

Warrington, a parliamentary and municipal borough, is 18 miles E. from Liverpool, 21 miles by the London and North Western Railway; but a new line is in course of construction from the northern part of Warrington to Liverpool and Manchester, which will shorten both the distance and time of communication with both those places. Warrington is a place of great antiquity, and stands at a point where one of the principal Roman roads crossed the river Mersey. It is described in Domesday Book under the name of Walintune, and was then the chief place of a hundred of the same name that has since been united to the hundred of West Derby. It clusters on the right bank of the river among fertile market gardens, and consists of some modern streets, and several old and narrow ones, which contain many ancient timber houses. Warrington Bridge was for many ages the principal means of communication between Lancashire and Cheshire, and near to it the London and North Western Railway crosses the same

river. The town was made a parliamentary borough by the Reform Act of 1832. A municipal charter was granted in August, 1847, by which the town is divided into five wards, and governed by a mayor, nine aldermen, and twenty-seven councillors. The parliamentary and municipal limits are nearly coterminous; the number of inhabitants comprised within them being (1869) 29,940 and (1861) 26,431 respectively. The area of the borough is about 4000 acres, and comprises, besides the township of Warrington, portions of Latchford and Thelwall, both in Cheshire. Warrington is between Liverpool and Stockport, to which towns, and to Manchester, St. Helens, Newton, Wigan, Preston, Crewe, Chester, &c., lines of railway run. The first stage-coach from Lancashire to London began to run from Warrington in the year 1757, and made the journey in three days and three nights. In this town (which is the head of a deanery, and one of the polling-places for the county), petty sessions and county courts are held. During the civil war, in the time of Charles I., Warrington and the neighbourhood were the scene of many skirmishes between the royal and parliamentary armies. The principal buildings are, St. Elphin's parish church to the east of the town, of Saxon origin, a large, ancient, Decorated-English and cruciform building, of various dates, with three other churches and eight chapels, one of which, called the Wycliffe, is in the Gothic style; sessions house and bridewell, built in 1820; church and mechanics' institute; public museum and library, 1857; baths; savings' bank, and two other banks; diocesan training college for school mistresses; free grammar-school, founded 1526; clergy orphan daughters' school; blue-coat hospital and other schools; almshouses, dispensary, infirmary, lying-in society, and a union poor-house. A new public hall of handsome appearance was opened in 1862. A subscription library was established here in 1758. Besides these buildings there are—a town-hall, a market-house, two cloth halls, now disused, assembly rooms, and a theatre. The principal branches of industry in Warrington are cotton spinning, the manufacture of flint glass and glass bottles, soap, machinery, and millwork, and many branches of iron manufactures. There are steam flour mills, tanneries, malthouses, and several breweries—Warrington being famous for its ale. A cemetery has been laid out for public use at a cost of 11,804*l*. The Mersey is navigable up to Warrington at spring tides for very large vessels, and ships of 800 to 1000 tons have been built there and floated down to Liverpool. The Mersey and Irwell Navigation passes close to Warrington, as well as the Sankey Canal and the duke of Bridgewater's Canal. Warrington returns one member to the House of Commons; the number of registered electors in 1869 having been 1957.

Whalley is a very extensive parish, 30 miles in breadth and 15 in length, covering 105,249 acres. The town is of extreme antiquity, being mentioned by its present name in the Saxon Chronicle. It was afterwards the seat of a most powerful and wealthy monastery, the ruins of which still exist. Within the parish are included the borough of Clitheroe, three market towns, eighteen chapelrys, and thirty-two townships in the county of Lancaster, the small portions of land in the counties of Cheshire and York-

shire, in both of which the abbey of Whalley had considerable possessions. It is now intersected by the Liverpool and Leeds Canal, the East Lancashire and the Bolton and Clitheroe railways. Important manufactures of cotton, wool, and worsted are carried on in various parts of the district, which contains 167,456 inhabitants. Near Whalley is the Roman Catholic College of Stoneyhurst.

Wigan, a market town, and an ancient parliamentary and municipal borough, 18 miles N.N.W. from Manchester, stands on the Douglas, which is crossed by three bridges, and is navigable from Wigan to the estuary of the Ribble. It has a station on the London and North Western Railway, at the intersection of the Lancashire and Yorkshire line. The town is of considerable antiquity, and has enjoyed the right of returning members to Parliament from the time of the first Parliament called by Edward I. The old streets are irregularly built, but the new ones near the river have many good houses. From its situation on the richest part of the Lancashire coal-field, the wealth and population of the borough have increased rapidly with the development of its manufactures of cottons, cotton yarn, and linen. The extensive coal mines give employment to a large number of inhabitants; there are also iron works and foundries for machinery, tools, nails, brass wares, and spades. Cannel coal, chiefly used for the manufacture of gas, is found here in great abundance. The Leeds and Liverpool Canal passes through the town, and conveys the coal of Wigan to Liverpool and the whole intervening country. It is also carried to London in large quantities along the London and North Western Railway. The parish church is a very handsome structure, and the rectory is worth 2230*l*. per annum. Wigan has three other town churches, besides six in the outer parts of the parish, and ten chapels for Roman Catholics and dissenters. There is also a town-hall, built in 1720; cloth hall, in 1816; sessions hall, Moot or Manor Hill, corn exchange, two banks, gaol, barracks, mechanics' institute (1825), corn mills, about twenty cotton factories, a school of mines and industry, free grammar and blue-coat schools, dispensary, workhouse, &c. The main street is a mile and a half long. The municipal borough is divided into five wards, and is governed by a mayor, ten aldermen, and thirty councillors. Population of the borough and township, 37,658. In 1867 the population was estimated at 40,889. The parliamentary borough, which returns two members, is co-extensive with the municipal borough. The number of voters in 1869 was 4170. Petty sessions and county courts are held at Wigan, which is also a polling-place in the southern division of the county. This town supported the royalists in the civil war, and the old manor house, the seat of the Rev. Sir H. G. Gunning, Bart., lord of the manor and late rector, was occupied by Charles Edward in 1745. On the road leading northward from the town is a pillar in memory of Sir John Tyldesley, who was killed at the battle of Wigan Lane, when James earl of Derby was defeated there by Lilburne in 1659.

History and Antiquities.—In the earliest ages, that part of Great Britain which now forms the county of Lancaster, was inhabited by the Brigantes, the most powerful of all the British tribes, whose territory extended from the Mersey and the Humber to

the Tyne and the Solway. They were subdued by Agricola. The town of Ribodunum, now Ribchester, on the banks of the Ribble, is mentioned by Ptolemy, the geographer, as one of their settlements. After the Roman conquest of Britain, the whole territory of the Brigantes, which received the name of *Maxima Cæsariensis*, was covered with magnificent roads, whose course can still be traced in many parts of Lancashire. The most important Roman positions were Manchester, Ribchester, and Lancaster, all of which derive their names from the fact of their having been castra or camps of the Romans. Manchester was the principal, and several Roman roads have been traced, diverging from thence as from a common centre. After the retirement of the Romans from Britain, the Britons formed several states along the western side of the island, some of which long resisted the attacks of the Saxons and Angles, who had landed in the east, and who, after a conflict of 200 or 300 years, succeeded in conquering the more level parts of South Britain. The time at which the Saxons succeeded in establishing themselves in the present Lancashire is very uncertain. According to British accounts the favourite British hero Arthur, amongst many other victories, gained a great battle over the Saxon invaders on the banks of the river Douglas, which is in this county. Saxon chroniclers assert that Egfrid, the son of Oswy, king of the Saxon Northumbrians, conquered a part of this district between the years 670 and 685; but it is uncertain whether Lancashire, as a whole, was brought into entire subjection by the Saxons before the time of Edward the Elder, in 921, who subdued both the Danes and the Cumbrian Britons about that time. At the epoch of the Norman Conquest, the country now known as South Lancashire, was described as the land lying between the Ribble and the Mersey, and that part of the county that lies to the north of the Ribble was described as belonging to Yorkshire. The county of Lancaster is first mentioned by its present name in the reign of Henry II.

The earldom of Lancaster was created by Henry III. in favour of his younger son Edmund, and the duchy by Edward III. in favour of Henry, earl of Lancaster, the grandson of the above Edmund. Lancashire was made a county palatine for John of Gaunt, duke of Lancaster, son of Edward III., who had married Blanche Plantagenet, the daughter and heiress of the said Henry, duke of Lancaster. When Henry of Bolingbroke, the son of John of Gaunt, seized upon the crown of England, the duchy of Lancaster was still retained as a distinct possession, though inseparably connected with the crown of England, which is the case to the present day.

In the wars of York and Lancaster, the house of Stanley rose into great power and influence in Lancashire and Cheshire; and the closing battle of that long and sanguinary war, fought at Bosworth Field, was decided by the attack of the Lancashire men, headed by Thomas Lord Stanley, who was created Earl of Derby as a reward for his services to Henry VII.

In the great civil war, Lancashire, like all the northern counties, was the scene of numerous desperate conflicts; the greater part of the nobility and gentry, including the earl of Derby and Viscount Molyneux, taking the part of the king, whilst most of the towns adopted the part of the Parliament. The most

memorable events of this civil war in this part of England were—the siege of Manchester by the Royalists; the storming of Bolton and Liverpool, also by the Royalists; the defence of Lathom House by the heroic Charlotte, countess of Derby; the defeat of the duke of Hamilton's army by Oliver Cromwell, near Preston; and the defeat of the earl of Derby by Colonel Lilburne, in Wigan Lane.

The most celebrated castles are those of Lancaster and Hornby, both of which are in good preservation. The castles of Thurland and Greenhalgh, Houghton Tower, and the ancient castle of the Stanleys, known as Lathom House, are either in ruins or entirely destroyed; the stronghold of the De Lacy family at Clitheroe is a picturesque relic of antiquity. The castle of Liverpool was destroyed by order of the king in the reign of Charles II., but the foundations can still be traced. Numerous fine manor houses exist in different parts of the county, the most beautiful of which is Speke Hall, near Liverpool.

The monastic ruins are of great interest. Furness Abbey, in the Vale of Deadly Nightshade, near Dalton, in Furness, is one of the finest monastic memorials in England. It is situated in a deep, narrow glen, but surrounded by a fertile, well-cultivated country. Its remains are magnificent; and from the seclusion and picturesque beauty of the neighbouring scenery, produce a vivid impression on the mind of the spectator. The abbey was founded by King Stephen, when earl of Morton and Boulogne. It was magnificently endowed by him and his successors, and was for many ages in the first rank amongst the monastic institutions of England. Its ruins, which are of the Norman and early English character, include portions of the church, chapter house, the cloisters, the school-house, and other buildings. Whalley Abbey, founded by the De Lacys, earls of Lincoln and constables of Chester, is also a noble pile, beautifully situated on the river Calder, near the point where it joins the Ribble. Remains of monastic buildings of smaller importance are found in other parts of the county.

LANCASTER, DUCHY OF. Lancaster was made a county palatine by Edward III., and conferred on Henry, duke of Lancaster, and at his death, on John of Gaunt and his heirs for ever. Henry VI. was, therefore, hereditarily Duke and Count Palatine, and on his attainder, soon after Edward IV.'s accession, the duchy and county were forfeited to the Crown, and confirmed on Edward IV.; and afterwards, in like manner, on Henry VII. and his heirs for ever. The Queen is now duchess and countess palatine of Lancaster. The revenues of the duchy are independent of those granted by the civil list [CIVIL LIST], and the net proceeds are paid over to the privy purse, uncontrolled by Parliament, except that an account must be annually rendered.

The duties of the chancellor of the duchy and county palatine are few and unimportant, as the administration of justice is now assimilated to that of the rest of England. The office is, however, usually conferred on an eminent statesman, frequently a member of the cabinet, whose emoluments are about 2000*l.* per annum. By 17 & 18 Vict. c. 12, the chancellor of the duchy, with the two lords justices of the Court of Appeal form the Palatinate Court of Appeal.

LANCASTER, SIR JAMES, a skilful seaman, who conducted the first voyage undertaken by the East India Company in 1600-3, and established commercial relations with the princes of Acheen in Sumatra, and Bantam in Java. He was a firm believer in a north-west passage; and Lancaster's Sound, a deep inlet in Baffin's Bay, 74° N. lat., was named after him. He died in 1620.

LANCE (Latin, *lancea*, Greek, *logche*), the weapon used by the 5th, 9th, 12th, 16th, and 17th regiments of Dragoons, on that account specially termed *the Lancers*. [CAVALRY.] The lance is a long rod of tough ash, with a steel point, and usually a coloured flag near it. The ancient *lancea* was a general term for javelins or weapons cast by the hand. The lance was held in high esteem both among the Macedonian phalanx and the Roman infantry, and even at the present day is considered a useful weapon for cavalry, though the great improvements effected in fire-arms have diminished its efficiency. In the Middle Ages, the terms *lance* and *man-at-arms* were synonymous.

LANCELET. [BRANCHIOSTOMA.]

LANCEOLA, a genus of Crustaceans established by Mr. Say on a species, *Lanceola pelagica*, two females of which only he appears to have seen taken on the coast of America, in the Gulf Stream. M. Desmarest is of opinion that the genus belongs to the order *Amphipoda*.

LANCERS. [CAVALRY, LANCE.]

LANCET ARCH, in architecture, an arch, the vertical point of which is like the head of a lancet. It is usually applied to long narrow windows, and is the oldest form of arch known in the East. The Gothic style passed from the East, through Italy and France, to England; and the lancet arch is its earliest feature. Bishop de Lucy first introduced the lancet arch, supported by clusters of slender columns, with capitals of foliage, into the Cathedral of Winchester, at the commencement of the thirteenth century. It is a prominent feature of what is called the early English style of ecclesiastical architecture.

LAND, in English law, in its most restricted signification is confined to arable ground. In this sense the term is construed in original writs, and used in all correct and formal pleadings.

By the Statute of Wills, 1 Vict. c. 26, s. 26, a devise of the land of the testator generally, or of the land of the testator in any place or in the occupation of any person mentioned in the will, is to be construed to include customary, copyhold, and leasehold estates, to which the description will extend, as well as freehold estates, unless a contrary intention appear by the will. In its more wide legal signification, land includes meadow, pasture, woods, moors, waters, &c.; but in this wider sense the word generally used is lands: the term land or lands is taken in this larger sense in conveyances and contracts.

A conveyance of land includes all that is attached to the land and all that is under it. Ownership of land and all estates in land, except chattel interests, are included in the term *real property*, in contradistinction to *personal property*, which consists in money, goods, and other movables. Land held for a number of years or other determinate time is a chattel interest, but it is distinguished from other chattels by the name of *Chattels Real*. [CHATTELS.]

Land Derelict, or left dry by the sudden receding of the sea, or of the water of a navigable river, belongs to the king by his prerogative. Land formed by alluvion, that is, by gradual imperceptible receding of any water, or by a gradual deposit on the shore, accrues to the owner of the adjoining land. The rules of English law as to alluvion, as stated in Bracton (folio 9), are chiefly copied from the 'Digest' (41 tit. i. s. 7).

In Scotch law the terms *heritable* and *moveable* are used to express the different classes of property known in English law as *real* and *personal*, these latter phrases being employed to denote certain distinctions in the nature of the right which a person possesses in a subject either heritable or moveable. Generally all rights in or pertaining to land are heritable. Things attached by art or by nature to land, such as machinery and trees, are heritable. Leases, though in their nature merely *personal* contracts, have, by the Act 1449, c. 18, been rendered heritable subjects.

LANDAMMAN, the chief governor or president of the diet of the Swiss republic. In ten of the cantons the head magistrate also bears the same title.

LANDAU, a town in the Bavarian circle of the Rhine, 18 miles N.W. of Carlsruhe, important on account of its fortifications, which were constructed by Vauban, is situated in a beautiful valley on the river Queich, and on a canal, by which provisions, materials for building, &c., are conveyed to it by water. The barracks and casemates are bomb-proof. The town is very regularly built within, has two gates, a large parade, a gymnasium, and manufactures of tobacco, calico, woollens, linen, hats, and fire-arms; copper and iron foundries, &c. The population amounted to 12,244 in 1861. Landau is one of the fortresses of the German Confederation, and is garrisoned by Bavarian troops. The town was held by the French from 1680 to 1815.

LANDAU, the name given to a carriage which may be opened and closed at the top. This species of vehicle was first made at Landau in Germany; hence the name.

LAND-CRAB. [GECARCINUS.]

LANDED ESTATES COURT. [IRELAND.]

LANDED MEN, in Scotch law, where the panel in a criminal trial is a landed proprietor, he is entitled to be tried by a jury consisting for the most part of his peers.

LANDER. [NIGER.]

LANDERNAU. [FINIST'ERE.]

LANDES, a department in the south-west of France, takes its name from the French word *landes*, by which the vast sandy plains that extend between the Garonne and the Adour from the meridian of Greenwich to the Bay of Biscay are designated. It formed part of the old province of Gascogne, and is bounded N. by Gironde, E. by Garonne and Gers, S. by Basses-Pyrénées, and W. by the Bay of Biscay. It extends from $43^{\circ} 30'$ to $44^{\circ} 28'$ N. lat., $0^{\circ} 10'$ E. to $1^{\circ} 31'$ W. long. Its greatest length from E. to W. is 72 miles, and from N. to S. 66 miles. The area is 3599 square miles. The population, by the census of 1866 was 306,693. The department is the most thinly populated and also the most sterile in France.

Aspect, Soil, &c.—The lower slopes of the Pyrenees

enter the south and south-east of the department, furrowed by many brawling rivers, and subsiding into rich plains that extend along the left bank of the Midouze and the Adour, which rivers form the general southern boundary of the landes. To the northward of these rivers, the surface of the ground is covered with a loose ashen-gray sand, overgrown here and there with heath and furze, or covered with pine woods. Numerous flocks of wretched half-starved sheep wander over this desert waste, tended by shepherds who walk on high stilts to enable them to pass dry-footed over the marshes that occur in all directions. Clothed in sheep-skins, perched on his lofty stilts, and seated on a high staff with a flat broad end, the shepherd of the landes watching his sheep, and knitting woollen stockings, his constant occupation, presents to the stranger an extraordinary appearance. Not only the shepherds, but the charcoal burners, and almost all the scanty population of the landes, are accustomed to the use of stilts, on which they walk with astonishing rapidity. The human habitations are of the rudest description, little superior to the huts and wigwams of savage tribes, but the inhabitants are good-natured and hospitable. Maize and barley are grown in favourable situations in this district; but the most important produce of the landes are the pine forests which cover nearly one-fourth of the surface, and which, besides the value of the timber, and the great quantity of rosin the trees are made to yield by tapping, are found to present a most effectual barrier to the sand hills or *dunes* along the west coast, that formerly rolled into the interior under the influence of the western winds, and overwhelmed the villages and crops exposed to their course. The surface of the landes is rather elevated, as is proved by the rapidity of the rivers-streams which flow from them towards the south, west, and north-west: the largest of these is the Leyre, which flows north-west into the Bay of Arcachon. The chief rivers of the department are the ADLOUR, which receives numerous feeders from the Pyrenees on the left bank, and its principal tributary from the right bank, the Midouze. [GERS.]

Along the sea-coast of the department, which extends N. and S. about 70 miles, a marked feature of the country are the sand-hills, which have a width from E. to W. of 5 miles; their height ranges from 120 to 170 feet; they slope towards the sea at an angle of 25°, towards the land at an angle of 50°. The form of these masses of sand is continually varying; sometimes they are arranged in regular chains, at others they present a level surface; and not unfrequently they assume the form of isolated heaps, the openings between them being called *Lettes*. The rate of advance of these moving sands is said to be 65 feet yearly. To landward of them there are in some places rich pasture lands. There are several shallow inlets and some isolated lagoons along the coast; and all through the landes there are numerous marshes, the exhalations from which render the climate foggy in winter, and always more or less unhealthy. The marshes which formerly lined the banks of the Adour have been almost entirely converted into productive land.

Products.—The department contains 2,261,439 acres. The products, most of which are raised in the territory of *Chalosse*, as the country south of the

Adour is called, are wheat, maize, millet, hemp, flax, madder, saffron, &c. About 10,000,000 gallons of wine are produced annually, of which about a third goes to supply the home consumption; the rest is exported, or distilled and sold as Armagnac brandy. Almonds, plums, and fruits of all kinds, are abundant and excellent. Cattle are of inferior breed, ill-fed, and give milk of the poorest quality; the horses are small; sheep are numerous, but their wool is the worst possible; goats, pigs, poultry, and bees are numerous; game and fish are plentiful. Besides the pine, which grows most luxuriantly in the landes, the forest timber consists of oak, cork, chestnut, and beech.

Mines of iron and bitumen are worked; mica, coal, marble, granite, lithographic stone, chalk, ochre, potter's clay of superior quality, crucible earth, &c., are found. Peat fuel is dug. Mineral springs are numerous.

The industrial produce is composed of coarse woollens, pottery, liqueurs, bar iron and ironware, rosin, pitch, tar, glass, paper, leather, brandy, beer, oil, &c. There is also a considerable trade in timber, charcoal, deals, linseed oil, fruits, wool, pork, &c.

Divisions, Chief Towns, &c.—The department is divided into three arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop.in1863.
Mont-de-Marsan, . . .	12	118	107,428
St.-Sever, . . .	8	107	87,293
Dax, . . .	8	106	106,118
Total, . . .	28	331	300,839

Of the arrondissement of Mont-de-Marsan and of the whole department the capital is *Mont-de-Marsan*, which stands in 45° 53' N. lat., 0° 30' W. long., 65 miles S. from Bordeaux, and nearly the same distance N.E. from Bayonne. The town, though small, and with a population of only 5574, presents a thriving appearance, and its situation at the junction of the Midou and the Douze, which form the Midouze, a navigable feeder of the Adour, give it considerable advantages in the way of commerce. The streets are wide and well built, and there are several fine avenues of ancient oaks leading into the town. The principal structures are the prefect's residence, the court-house, prison, the hospital, and barracks. The town is the seat of a tribunal of first instance, and has a college, public library of 12,000 volumes, a theatre, and several warm mineral baths. Cloth, blankets, sail-cloth, and leather are the principal manufactures. Mont-de-Marsan has communication with the Garonne by the Canal des Landes, which at Lavardac joins the Baise, a navigable feeder of the Garonne. The most important commerce of the town consists in the wool and agricultural produce of the surrounding country, and in the transport of the wines and brandies of Armagnac by the Midouze and the Adour for shipment at Bayonne. *Pissos*, near the Leyre, has potteries, iron-works, and 1951 inhabitants. *Roquefort*, at the junction of the Estampon with the Douze, has a population of 1745, who are engaged in the manufacture of earthenwares.

Sabres, a town of 2525 inhabitants, stands on the Leyre in the midst of barren wastes and marshes, and has a very handsome church said to have been built by the Templars. *Sore*, in a good wine district in the middle of the landes N. of Mont-de-Marsan, has potteries, glass-works, and 2006 inhabitants, who also raise vast quantities of turf for fuel.

In the arrondissement of St.-Sever, the chief town, *St.-Sever*, is situated in an extremely fertile country on the left bank of the Adour, 10 miles S. from Mont-de-Marsan, and has a tribunal of first instance, a college, and 4818 inhabitants, who manufacture fine pottery, linseed oil, and leather, and trade in corn, wine, brandy, mineral waters, marble, cut stone, plaster, &c. The town is well built, and contains some handsome buildings; among which must be named the court-house, the hospital, barracks, prison, and a magnificent church, which formerly made part of the Abbey of St.-Sever. *Airé* (*Vicus Julius*), an episcopal and ancient city, stands on the slope of a hill on the left bank of the Adour, which is here crossed by a handsome stone bridge, 17 miles E. from St.-Sever, and contains an ecclesiastical college, a very ancient church, and 5144 inhabitants. The town, which is neat and well built, has manufactures of hats and leather. It is a bishop's see, and was anciently important as the capital of the Visigoths. *Amou*, a pretty little town of 1834 inhabitants, is situated in a very fertile corn and wine country near the junction of the Luy-de-France with the Luy-de-Béarn, and has potteries, brandy distilleries, tile works, and numerous flour, oil, and bark mills. *Hagetmau*, a town of 3029 inhabitants, stands in a district abounding with game, on the Louts, 7 miles S. by W. from St.-Sever, and has manufactures of household linen, pottery, leather, and several oil mills. It has also a good trade in excellent wine, corn, maize, flax, chestnuts, hides, and cattle. Great quantities of oak staves and hoops are despatched to Bordeaux. *Mugron*, situated at the foot of a hill on the left bank of the Adour, has 2150 inhabitants, who trade in brandy, wine, rosin, and silk. *Tartas*, W. by N. from St.-Sever, is a well built ancient town prettily situated on the Midouze, and has 3084 inhabitants, who manufacture linseed oil, vinegar, and leather, and trade largely in corn, wine, brandy, saffron (of which a great deal is grown in the neighbourhood), fruits, game, hams, timber, planks, rosin, &c.

In the arrondissement of Dax, the chief town, *Dax*, situated in a fertile plain on the left bank of the Adour, over which passes a bridge to the suburb of Sablar, is a well built town, surrounded by ramparts and fosses of Roman construction, 30 miles S.W. from Mont-de-Marsan, and has 9856 inhabitants. The town, which is entered by three gates, is defended by a strong castle. The chief buildings are the chamber of commerce, the former episcopal palace, now occupied by the sub-prefect and the mayor, the court-house, the cathedral, and the gaol. Dax has a tribunal of first instance, a college, and a considerable commerce in liqueurs, wine, brandy, corn, hams, onions, timber, deals, rosin, &c. There are manufactures of earthenware, linen thread, linseed oil, vinegar, and leather. It has been famous from the most ancient times for its hot mineral springs (temp. 162° Fahr.), whence its ancient name of *Aquæ*, of which Dax (*d'Acqs*) is a corruption. *Aquæ* or *Aque*

Tarbellicæ was the capital of the Tarbelli, a people of Aquitania. *St.-Esprit*, a seaport in the south-western extremity of the department, and on the right bank of the Adour, here crossed by a long wooden bridge which joins the town to Bayonne, is a large busy town, by far the greater part of whom are descendants of Jewish refugees from Spain. The citadel of St.-Esprit, constructed by Vauban, commands the town of Bayonne, and the approaches to it by land and sea. [BAYONNE.] The Jews have three synagogues here, in one of which a rabbi preaches every Saturday in Spanish. *Peyrehorade*, on the right bank of the Gave-de-Pau, which here becomes navigable, and a few miles lower down enters the Adour, has 2516 inhabitants. It has a fine old castle flanked with towers. Large stores of ship-timber from the forests of the Pyrenees are kept here; there are also important quarries in the neighbourhood. *Soustons*, on the eastern shore of the lagoon of Soustons, 17 miles W. from Dax, has a population of 3285.

The department forms the see of the bishop of Aire, is comprised in the jurisdiction of the Cour Imperiale of Pau, and of the University Academy of Bordeaux, and belongs to the thirteenth military division, of which Bayonne is head-quarters. It returns 23 members to the Chamber of Deputies.

(*Dictionnaire de la France; Annuaire pour l'An* 1866; Malte Brun, *Géographie Universelle*.)

LANDGRAVE (German, *landgraf*), a title assumed by some German counts in the twelfth century as counts of the whole country, and now borne by several German princes.

LANDING-WAITER, formerly an officer of the customs, whose duties consisted in taking an accurate account of the number, weight, measure, or quality of the various descriptions of merchandise landed from foreign countries or colonial possessions. Landing-waiters likewise attended to the shipment of goods. The term landing-waiter was abolished in 1860, and the persons now employed in the above duties are called examining officers.

LANDIVISIAU. [FINISTERE.]

LANDLORD AND TENANT. [TENANT AND LANDLORD.]

LANDMARK, any mark to designate the boundary of land, or any elevated object that serves as a guide to navigation. Among the early Asiatics, Egyptians, and Jews, landmarks were in use for distinguishing the common divisions of lands; and the emphatic language used by Moses, 'Cursed be he that removeth his neighbour's landmark,' is sufficient to show the importance in which these marks were held. Among the Romans they sometimes used boundaries of stones, where figures of the god Terminus were erected. In the Middle Age crosses were usually placed to mark the boundaries of land, and sometimes to indicate the property of the soil.

LONDON, LETITIA ELIZABETH (Mrs. Maclean), an English poetess, known by the signature L.E.L., was born in Hans Place, Chelsea, on the 14th of August, 1802. She began very early to write verses, and Mr. Jordan, the editor of the *Literary Gazette*, published some of her effusions in his journal. In her eighteenth year, Miss Landon gave to the world a volume of poetry, which included 'The Fate of Adelaide,' a romantic tale replete with

poetic talent. Immediately afterwards she began, in the *Literary Gazette*, a series of 'Poetical Sketches,' subscribed by her initials only. In 1824 appeared 'The Improvisatrice,' which met with a triumphant reception. 'The Troubadour,' 'The Golden Violet,' 'The Venetian Bracelet,' followed in due order, and maintained the writer's popularity. She also published three novels—'Ethel Churchill,' 'Francisca Carrara,' and 'Romance and Reality.' From 1831 to 1837 she edited 'Fisher's Scrap Book' with much credit. Her poems are characterized by romantic imagery and passionate sentiment, and tinged with the Byronism of the day. In June, 1838, Miss Landon was married to George Maclean, Esq., governor of Cape Coast Castle, where, having lived happily with her husband for twelve months, she died on the 15th of October, 1839, from an overdose of prussic acid, a medicament she was accustomed to take for the relief of neuralgic pains. In 1841, her friend, Mr. Laman Blanchard, published her 'Life and Literary Remains' in two volumes.

LANDOR, WALTER SAVAGE, a versatile and gifted author, son of Walter Landor and Elizabeth Savage, was born on the 30th of January, 1775, at Ipsley Court, Warwickshire. He was educated at Rugby, and at Trinity College, Oxford. In 1795 he published a small volume of poems. His tragedy of 'Count Julian' led to a life-long friendship with Southey. In 1808 he raised a body of troops at his own expense, joined the Spanish patriots under Blake, and received a colonel's commission in their army. But in 1814, on the restoration of Ferdinand, he resigned his commission, declaring that, 'though willing to aid the Spanish people in the assertion of their liberties against the antagonist of Europe, he would have nothing to do with a perjurer and a traitor.' In 1811 he had married Miss Julia Thuillier, of Bath, and he now resided for some time at Tours, removing to Florence in 1815, where he remained for more than thirty years, occupying himself with the education of his children and literature. In 1820 he published 'Idyllia Heroica' in Latin, and in 1824–29, 'Imaginary Conversations of Literary Men and Statesmen,' his greatest work, exhibiting a wide range of minute literary and biographical knowledge, ancient and modern, and a vigorous, robust, and original style. In 1836 he published 'Letters of a Conservative,' 'A Satire on Satirists,' and 'Pericles and Aspasia.' In 1837 appeared the 'Pentameron,' in which Boccaccio and Petrarca discourse familiarly on things in general and Dante in particular. In 1846 Mr. Landor came to England, and occasionally contributed articles to the *Examiner* and other journals. In 1847 he wrote 'The Hellenics,' in 1848, 'Imaginary Conversations on the Affairs and Prospects of Italy,' in 1851, 'Popery, British and Foreign,' in 1853, 'Last Fruit of an Old Tree,' in 1854, 'Letters of an American,' and in 1858, 'Dry Sticks Faggoted,' a collection of all kinds of poems, from the idyllic to the satirical. The Italian revolution enlisted Mr. Landor's keenest sympathies, and in his ardour he went the length of advocating and instigating something very like tyrannicide. His chief virtue was a warm love of his kind, and a consistency of principle which made it always probable that, whatever side might be vic-

torious, Landor's would be just. He lived to fight in many fierce battles, and to lose many. The ardour of his nature, which was essentially and sometimes outrageously combative, led him into personal and literary warfare, and probably into a contest at the close of his life which was ridiculous and deplorable. But on the side of his taste, which was exquisitely cultured, and his feelings, which were kindly and gentle generally, he was what Emerson described him in 1833. 'I had expected an Achillean wrath, an untameable petulance; instead of that I found courtesy, and the most patient and gentle of hosts. He has a wonderful brain, despotic, inexhaustible; meant for a soldier, but converted to letters, yet with an English appetite remaining for action and heroes. He died at Florence, September 16, 1864.

LANDRECIES. [NORD.]

LANDSBERG. [BRANDENBERG.]

LANDSEER, JOHN, Associate Engraver of the Royal Academy, was born at Lincoln in 1761. His early instructor in the art from which he has obtained so much celebrity, was Mr. W. Byrne, the well-known landscape engraver. In 1795 the name of Landseer first made its appearance on the title-page of twenty views in the south of Scotland, from drawings made by James Moore. In 1806 he delivered a series of lectures on the art of engraving, which he defined as 'a species of sculpture, performed by incision,' and proceeded to illustrate the subject with much ingenuity and learning. In the same year he was elected an Associate Engraver of the Royal Academy; and afterwards entered into some lengthened controversies with the academy on the question of admitting engravers to the rank and title of royal academicians. In 1823 he published a work, under the title of 'Sabaean Researches,' comprising a series of lectures delivered to the Royal Institution on the engraved hieroglyphics of Chaldaea, Egypt, and Canaan. In 1834 Mr. Landseer presented to the world a lively and learned criticism 'On fifty of the earliest Pictures in the National Gallery.' It affords a variety of information, communicated in a very amusing form, and in a way which none but an artist, as well as a scholar, could have imparted. He died in 1852. Two of his sons, Charles and Sir Edwin Landseer, inherited their father's artistic genius, and became members of the Royal Academy. The latter distinguished artist, who is famous for his pictures of animal life, is now engaged in sculpturing the lions intended to adorn the base of Nelson's Column, in Trafalgar Square, London.

LAND'S END, the ancient *Bolerium*, is a celebrated headland forming the western extremity both of Cornwall and of England, and boldly projecting its bluff stern front into the Atlantic. The terminal rocks rise in a perpendicular precipice of 60 feet of granite above a sea which is never calm. About a mile to the westward lies the dangerous Longships Rock, which is 60 feet in height, and covered by a lighthouse 50 feet from base to summit. Lat., 50° 4' 44" N.; long., 5° 44' 44" W. Close by this famous promontory is Cape Cornwall, with Whitesand Bay below it, memorable as the landing-place of King Stephen on his coming to England, of King John on his return from Ireland, and of Perkin Warbeck on his fruitless enterprise against the throne of Henry VII. (Wilkie Collins, *Rambles Beyond*

Railways; Rev. J. A. Johns, *A Week at the Land's End*; Black's *Guide to Dorset, Devon, and Cornwall*; Murray, *Handbook to Devon and Cornwall*, &c.)

LANDSHUT, a pretty town in Bavaria, with 12,135 inhabitants in 1861, is situated on the Isar, which is here crossed by two bridges. The principal portion of the town consists of two long, broad, and straight streets, connected by a number of narrower ones. The houses are well built of brick, and many of them have gardens. The most remarkable buildings are the palace, the house of the provincial assembly, a hospital, and two parish churches, of which St. Martin's is celebrated for its beautiful steeple, 450 feet in height, and commanding a magnificent view over almost the whole plain of Bavaria. On a mountain near the town is the ancient castle of Trausnitz, which was formerly a strong fortress, and the residence of the dukes of Bavaria. In the year 1800 the University of Ingolstadt was transferred to Landshut; but in 1826 it was removed to Munich. There are, however, still a theological college, a gymnasium, a lyceum, and a school of surgery. There are extensive breweries and distilleries in the town, and manufactures of woollen cloths, hosiery, tobacco, paper, cards, and leather, with a trade in corn, cattle, and wool. Landshut is inclosed by old fortifications, and consists of an old and a new town, with a suburb on an island in the Isar.

LANDSLIPS. This term is applied to portions of land which become detached and slide down to a lower level. The phenomenon is produced by various causes. Water is the principal agent, as it percolates through the cracks and fissures of the earth, and gradually widens them until a portion falls away. It also sometimes happens that when the strata are very much inclined, and rest on a bed capable of absorbing moisture, the latter becomes so slippery that the land glides bodily over its foundation.

LAND-TAX. [TAXATION.]

LANDWEHR (Ger. *land*, and *wehr* 'defence'), the militia of Austria and Prussia. In Austria they are a kind of reserve to each regiment of the line, and drilled once a year under the same colonel. In Prussia the military consists of the youth of the kingdom, from twenty to twenty-five years of age; every subject being obliged to enter into the military service at that age. After two or three years' service the soldier can proceed to his own home, but is liable to be called upon to join his regiment at every emergency. At the expiration of five years from the date of enlistment, the men are drafted into the first class or levy of the landwehr, remaining in it until their thirty-second year. In time of war they are liable to be called upon to serve with the regiment of the line of a corresponding number; in fact they form the reserve of that regiment, whence reinforcements are drawn. From their thirty-second to their thirty-ninth year the men belong to the second levy, and are only called out occasionally in time of peace; but in war they garrison fortresses.

LANE END. [STAFFORDSHIRE.]

LANFRANC, archbishop of Canterbury, was born at Pavia in 1005. He spent some years in the study of rhetoric and civil law at Bologna, and he afterwards became prior of the abbey of Bec. William, duke of Normandy, made him one of his counsellors,

employed him in an important embassy to the pope, appointed him in 1062 abbot of his newly erected monastery of St. Stephen at Caen, and eventually procured his election, 15th August, 1070, to the see of Canterbury, the cathedral of which Lanfranc rebuilt. He died May 28, 1089.

His writings consist of commentaries on St. Paul's Epistles, sermons, letters, and his treatise on the Eucharist against Berenger. His works were collected and edited by Lucas d'Achery, at Paris, folio, 1648.

LANGDALE, RIGHT HON. H. BICKERSTETH, LORD, Master of the Rolls, was born at Kirkby Lonsdale, Westmoreland, in 1783. His father was a country surgeon and apothecary. He was educated at the free grammar-school of his native place, and served his apprenticeship to his father. He afterwards entered himself of Caius College, Cambridge, where, in 1808, he graduated as senior wrangler. Having entered himself of the Inner Temple, he was called to the bar in 1811. In 1827 he became King's Counsel, and a Benchler of the Inner Temple, and filled the office of treasurer in 1836. Though of liberal politics, his talents were held in the highest estimation by all parties. In 1836 he was appointed to succeed Lord Cottenham as Master of the Rolls, and at the same time called to the House of Peers. He had thus risen, by an unusual exception, to one of the most honourable and important posts in his profession without having entered the House of Commons, or mingled in party politics. On the resignation of Lord Cottenham the great seal was more than once tendered to him; but which he did not hesitate to decline. He died in the year 1851.

LANGEAIS. [INDRE-ET-LOIRE.]

LANGHOLM. [DUMFRIESSHIRE.]

LANGON. [GIRONDE.]

LANGPORT. [SOMERSET.]

LANGRES, a town in the French department of Haute-Marne, which takes its name from the *Lin-gones*, an ancient Celtic tribe whose capital it was, is situated in 47° 51' 53" N. lat., 5° 19' 55" E. long., at a distance of 158 miles S.E. from Paris, and had, in 1861, 10,132 inhabitants. The town, built on the watershed between the Mediterranean and the Atlantic, near the sources of the Marne, the Meuse, the Amana, and the Vingeanne, occupies a higher site than any other town in France, except Briançon, being 1460 feet high. It is surrounded by old walls, and is pretty well built, with wide streets, and is ornamented with fountains and promenades. The most remarkable structures are—the cathedral, part of which dates from the year 380, the town-hall, and a Roman triumphal arch, which makes part of the town wall. The greatest ornament of the town is the promenade called Blanche-Fontaine, which is formed of an avenue of magnificent limes, nearly a mile in length, and terminates in a majestic vaulted arcade, from the top of which a colossal frog in bronze continually spouts a mass of limpid water that feeds several basins and jets. The public library of 7000 volumes is in the town-hall: there is a museum in the old church of St.-Didier. The chief manufacture of Langres is cutlery; there is also a considerable trade in corn, flour, wine, flax, hemp, wool, &c. The town, which gives title to a bishop,

is the seat of tribunals of first instance and of commerce; it has two ecclesiastical schools, a college, a school of geometry, and three hospitals. A great number of Roman antiquities have been found near Langres.

LANGTON, STEPHEN, was a native of England, and was born in the earlier half of the twelfth century. After finishing his studies at the University of Paris, he rose to the office of its chancellor. Langton was consecrated archbishop of Canterbury by Innocent III. at Viterbo, June 17, 1207. It was he who, at the meeting of the heads of the revolt at London, August 25, 1213, suggested the demand for a renewal of the charter of Henry I. He continued to preside over the church till his death, July 9, 1228.

LANGUAGE. The origin of language, like that of man himself, is unknown, beyond the brief statement in the book of Genesis. That man has the faculty of speech is only another mode of saying that by his nature he is qualified to produce all the sounds which compose spoken language. Whether man gradually formed language, stimulated by his instincts for social life, and guided by his intellectual powers; or whether language, and not the bare faculty of speech, was conferred on him by the same power which called him into being, are questions that cannot be positively answered. But the former theory is the one most generally accepted by those best qualified to speak on the subject, as they consider it is very clearly demonstrated that language is a spontaneous product of human nature—a necessary result of man's physical and mental constitution (including his social instincts), as natural to him as to walk, eat, or sleep, and as independent of his will as his stature or the colour of his hair.

A definition, or rather a description, of what language is may be required at the outset of these remarks: that which we shall give does not aim at such a degree of accuracy as to be above criticism; it is merely such a description as will show what it is that we are speaking about.

Language consists of vocal sounds [LARYNX]. Any sounds, then, are a component part of language which produce in the hearer the counterpart of that mental state of which these sounds are the material and sensible signs. But language presents great varieties; and though all languages have many sounds in common, which are universally significant and intelligible, the greatest part of the sounds composing any given language are only intelligible to those who from long experience have become familiar with them. But this fact does not affect the definition of language. If any two human beings can by vocal sounds mutually convey to each other their desires, thoughts, and conceptions, this possession of a common power and capacity constitutes the possession of a common language. When this power and capacity are common to a considerable number of persons living in a community, the exercise of them constitutes and makes a language.

A language, then, must be viewed as the totality of the vocal sounds by which the members of any given society communicate to one another their ideas. As action or motion of the body and its parts, and the application of the bodily powers to various purposes and ends, are the signs and expression of the

sensations and of the will—the result, as it were, of the moving power within—so language, which is itself in its material character nothing more than a corporeal act, is another mode of expressing the same things. But language is also the expression of our intellectual and judging faculties; and its form is therefore necessarily subordinate to the laws of the human mind.

Thus language can do more than other corporeal acts: they can only express desire, will, purpose, design, but they cannot express many of those things which only exist as conceptions of the mind, or are only modes and forms in which the mind, according to its laws, views things and the relations of things. Language, therefore, in addition to its power of expressing what can be expressed by other corporeal signs, has a peculiar power of conveying from one person to another notions as conceived by the mind, which have no actual existence, or can only be mentally conceived to exist. The degree in which language is capable of doing this depends on the mental cultivation of the people who use it; for without such cultivation language is not wanted for the expression of many notions, and unless preceded by or accompanied by such cultivation, such part of language cannot exist. The language of many nations may be so poor as to convey very little more from one person to another than can be conveyed by other corporeal signs; or a very few sounds and combinations of sounds, aided by the other natural signs, may be sufficient for all the purposes of social existence. But even in the poorest languages many general terms are required to express the meaning of a speaker when the objects referred to are not present, and there is no language which does not contain a considerable number of abstract terms, indicating not only things and qualities which are the objects of a sensuous intuition, but also those which are the objects of a non-sensuous intuition. Every language also must, to some extent, express the mode in which the mind contemplates the relations of things.

The matter, then, of which language consists is vocal sounds expressive of ideas: its form is the relation of those sounds to one another, which is expressed (within certain limits) chiefly by their arrangement. In order that the several sounds may convey the same meaning, the same sounds must be used for the same purposes—that is, the meaning of any single sound must, generally speaking, at least for any given epoch, be fixed. The arrangement of the vocal sounds must also be tolerably well fixed, in order that the same set of sounds may convey the same meaning.

Even in many of the simplest sentences, consisting only of two or three words, every or nearly every language has a definite order for expressing one meaning by such words, and another order for them when they are to express a different meaning. Sometimes the difference of meaning may be conveyed by the greater or less stress laid on a particular sound, or by some change in the intonation of voice, which is in effect a change in the sounds, and therefore all that is necessary to mark a difference. This power which spoken language possesses gives it one advantage over written language, in the use of which we are sometimes obliged to use supplementary signs or marks to express what the voice can more surely effect.

If we analyze the vocal sounds of a language, we can separate them into two chief classes: sounds which of themselves convey a notion, and may therefore be called *notional*, such as 'man,' 'horse,' 'virtue,' 'vice,' 'come,' 'walk;' and sounds which only serve to connect notional words and to indicate the relation between and among them, and may therefore be called *relational*, such as 'from,' 'to,' 'who,' 'which.' Many of these relational words, perhaps all of them, may once have been notional; and their precise meaning and value, in the case of languages no longer spoken, can only be determined by tracing them to their origin, or to such source as we are compelled by want of other evidence to consider as their origin; but this is no objection to our statement of what a language consists as an actual phenomenon. The actual meaning of all the words which compose a language must be determined by their actual use. Their former meaning and their history must be determined by a reference to the language as formerly used, the evidence of which use is the written language.

The various modes of recording language, or the representations or marks by the aid of which sounds can be at any time reproduced equivalent in meaning to those by which the writer would have orally expressed what he has expressed, by signs or marks on paper, or any other durable substance, make what we call Writing. It will be sufficient at present to observe, that the mode in which the sounds of any given language are represented must not be considered as necessarily indicating anything peculiar in the language itself.

It is difficult to conceive that any words at first were more than monosyllabic sounds; at least, so far back as we can trace any known language, such seems to be the only result. By this it is not meant to say that a syllable is one simple sound, but that the monosyllabic sounds here meant are such as in their integrity expressed one notion distinctly and one only, that every part of the sound was a necessary part of the meaning, and that no part of the sound was derived from the union of another sound with it. Thus the whole of a language would consist of vocal sounds, every one of which had its distinct meaning in itself. But spoken language is favourable to the agglutination of sounds, and particularly of those which come into juxtaposition in such a way as to readily unite. Thus, to adopt for the purpose of convenience the names now used, the verb and its pronoun, the word signifying a place or an object, and the word expressing some relation to that place, and other similarly situated words, would respectively form combinations; and thus would arise the phenomenon, which we observe in most languages, of words reducible to various elements, some of which in their simplest form are notional terms, and some which, taken by themselves, convey no meaning at all, but by virtue of their union with the notional term modify and qualify it.

If the language of a nation were committed to writing in a very early state of its progress, it seems probable that the simple elementary forms would be kept much more distinct than in languages which have not been committed to writing except in a more mature form. Thus the mass of the words would be of the monosyllabic class, and the adoption of distinct

symbols for the representation of each sound would seem almost necessary. It must have been in the attempt to represent in writing some of the languages which had been cultivated by longer use, and improved by social and intellectual development, that the discovery of the mode of representing all the sounds of a language by an alphabet originated.

Some languages, as the Greek and the Latin, and, to a considerable extent, the German, express many relations between the various notions contained in any set of words, by means of certain variations in the forms of the words themselves, which variations mainly occur in the terminations of such words. Thus the whole meaning intended to be expressed by the words 'Homo bovem ferit,' may be indicated by any arrangement of these three words. Some languages, of which the English in its present form is an example, have little power of expressing the relation of ideas by any change in the terminations of words; and accordingly they express notions by one set of terms, and relations by another set of words. Such languages are necessarily more limited as to the power of varying the order of their words than languages of the class above referred to.

That part of language which treats of single words and their varieties of form is called Etymology, and is one of the divisions of grammar. Etymology also comprehends the notion of historically tracing the successive forms which the words of a language have had, of separating them into their elementary parts, and then comparing the words, thus reduced to their simplest forms, with the corresponding words and forms in languages known to be related, or in order to establish the relationship, that is, the ultimate identity or unity of words in the languages compared.

That part of language which treats of the arrangement of the words composing a sentence, and of the modifications in form or termination to which such words are subjected in consequence of entering into that combination which constitutes a sentence, is generally called Syntax. As etymology has its general principles, so has syntax; but each language has also its proper syntax.

Within the present century, the study of etymology has been pursued on sound principles and with corresponding success; and the various and apparently capricious sounds of language have been shown to be governed by laws, within limits as strict and invariable as those to which matter in general is subjected. This improvement has been owing in a great measure to the comparison of many languages with each other, instead of confining the field of observation to one or at the most two or three tongues. Nothing has, perhaps, contributed to this improvement more than the study of the Sanscrit, a language which bears so striking a resemblance both in its more important words and in its grammatical forms to the Latin and Greek, the Teutonic and Slavonic languages, as to lead to the conclusion that all must have been derived from a common source. The great similarity of all these languages, and their contrast to the Hebrew, Arabic, and other Semitic tongues, has led to the use of the term 'affinity of languages,' by which is meant that all those languages which employ the same sounds to express the most simple ideas, and adopt the same mode of grammatical inflexion, must originally have been one and the same language, or derived

from some common language. We cannot well suppose that languages which resemble one another in these respects have been derived from any one of those now existing in which these resemblances are obvious: for if we could imagine the Latin to be descended from the Greek, how should we account for the similarity of the Latin and Greek to the Sanscrit and Teutonic tongues? The little intercourse that subsisted between the inhabitants of India and the Western nations precludes the supposition that one nation could have derived its language from the other; and indeed the resemblance is so striking, and descends to such minute particulars, that nothing but a common origin is sufficient to account for their similarity. The error we have been attempting to combat is very general, and nothing is more common than to hear a certain class of etymologists speak of a number of English words as derived from the Latin and Greek, which are in fact the common property of many tongues. Many English words, such as *inspect*, *corporate*, *communicate*, *detriment*, are doubtless derived from the Latin; while others, such as *astronomy*, *geography*, *geology*, have been borrowed directly from the Greek, or manufactured according to settled analogies; but such words as *know*, *lick*, *break*, *yoke*, *sit*, and numerous others, are common to the English, Sanscrit, Latin, Greek, and Slavonic tongues; and it might be said, with as much truth, that the Sanscrit *jñā*, or the Greek *γιν-ω-σκω*, are derived from the English *know*, as that the English word comes from the Latin.

An ingenious writer, a few years ago, put forward some interesting speculations on the various languages in the world. He stated that altogether there are 587 languages and general dialects in Europe, 937 in Asia, 226 in Africa, and 1264 in America, making a total of near 3000. He laid it down as a rule, that in all languages there is one great primary origin. Monosyllables are the primitive sounds, and syllabic compounds the result of interchange with other nations. Hence all the fundamental tongues are monosyllabic as to generic ideas, and compound as to species and varieties. According to his statements, the Chinese, Welsh, Greek, Hebrew, and German, are formed on this principle. The Chinese have 214 radical words and signs to represent these; out of which, by synthesis, other words are formed. He computed that there are 25,000 words in English, 20,000 in Spanish, 25,000 in Latin, 30,000 in French, 45,000 in Italian, 50,000 in Greek, and 80,000 in German. This estimate, however, is open to grave objections.

In the life of Mezzofanti, the great Italian linguist, who is said to have understood seventy-two languages, it is stated that the list of those who have had a knowledge of more than ten languages is a very short one. Mithridates, Pico of Mirandola, Jonadab Alhanse, and Sir William Jones, are stated to have passed the limit of twenty languages; the first two, twenty-two, and the last two, twenty-eight. Müller, Niebuhr, Fulgence, Fresnel, and perhaps Sir John Bowring, are usually set down as knowing twenty languages. For Elihu Burritt and Csoma de Körös their admirers claim eighteen. Renaudot, the controversialist, is said to have known seventeen; Professor Lee, sixteen; and the attainments of the older linguists, as Arias Montanus, Martin del Rio, the

converted Rabbi Libettas Cominetas, and the admirable Crichton, are said to have ranged from fifteen to ten or twelve.

The remarks under the different letters of the alphabet, A, B, C, &c., will show in what manner the forms of words in cognate languages should be compared.

The affinity of languages may be shown by comparing any languages that are related; but the comparison of the languages called Indo-Germanic is the most useful for the purpose. Numerous examples may be found in Bopp's *Vergleichende Grammatik* (Berlin, 1857; and London, 1854); Pott's *Etymologische Forschungen* (2nd edition, 1859); Prichard's *Eastern Origin of the Celtic Nations*, &c. (Oxford, 1831); Grimm's *Teutonic Grammar*; and Winning's *Manual of Comparative Philology*.

The science of language has been most ably pursued in Germany, and also in France. Englishmen were comparatively late in the field. The most recent works on the subject in English are a translation of Diez's *Vergleichende Grammatik der Romanischen Sprachen* (London, Williams and Norgate, 1864); *Philological Essays*, by Garnett (London, 1859); Marsh's *Lectures on the English Language* (New York, 1860); Latham's *Elements of Comparative Philology* (London, 1862); Farrar's *Origin of Language* (London, 1860); and last, though by no means least, Max Müller's *Lectures on the Science of Language* (London, 1861 and 1864.) The researches of the latter gentleman have contributed more, perhaps, than anything else, to popularize the study of the science in Great Britain.

LANGUEDOC, an old province of France, which now forms the departments of AUDE, TARN, HÉRAULT, LOZÈRE, ARDECHE, and GARD, together with the arrondissements of Toulouse and Villefranche in HAUTE-GARONNE, Castel-Sarrasin in TARN-ET-GARONNE, and Puy and Yssengeaux in HAUTE-LOIRE. Under the Romans it formed part of Gallia Narbonensis, and on the decline of their power it had the name of Septimania, from its seven bishoprics—viz., Toulouse, Béziers, Nîmes, Agde, Maguelonne, Lodève, and Uzès. The Emperor Honorius ceded the territory of Languedoc to the Goths, who held it for nearly 200 years, when they were driven out by the Saracens, who in their turn were expelled by Charles Martel. The country thus subjected to the kings of France was governed by feudatory dukes and counts till 1270, when, on the death of the last count of Toulouse, it was united to the crown of France.

The name Languedoc has been transferred to the country from the name given to the language of the inhabitants, who used the word *oc* as an affirmative, and were hence said to speak the *langue d'oc*, as distinguished from the dialect spoken north of the Loire, which expressed the affirmative by *oui*, and was called the *langue d'oui*. The name *Occitania*, sometimes applied to the country, is said to be derived also from *oc*.

The province extended from the Rhône to the Garonne, the most western point reaching the junction of the Tarn with the last-mentioned river. It was bounded N. by Auvergne and Lyonnais, E. by Dauphiné and Provence, S. by Roussillon and the Mediterranean, and W. by Guienne and Gascogne.

It was formerly divided into Haut-Languedoc, Bas-Languedoc, and Cévennes, which had Toulouse, Montpellier, and Alais for their capitals respectively.

LANIADÆ. [SHRIKES.]

LANNES, JEAN, Duke of Montebello and Marshal of France, was born at Lectoure in Guienne, on April 11, 1769. He was born of humble parents, and brought up to the trade of a dyer, which he quitted in 1792 to join a battalion of volunteers raised in the department of Gers, of which he soon became sergeant-major. He rose so rapidly, that at the close of the year 1793 he had attained the rank of chef de brigade. In 1794 he made the acquaintance of Bonaparte, under whom he afterwards served in Italy. After the victories of Montenotte and Millesimo in April, 1796, he was raised to the rank of general, and in 1797 became general of brigade; in which capacity he served till the signing of the treaty of Campo Formio. He afterwards formed part of the expedition to Egypt, where he rose to the rank of a general of division, and maintained his high reputation. He was dangerously wounded at the siege of Acre, and he greatly contributed to the victory gained by the French at Aboukir.

When Bonaparte determined upon leaving Egypt, Lannes returned with him, and rendered him material assistance in the revolution of the 18th Brumaire (November 9), 1799. In the year 1800 he served in the expedition to Italy, and shared the dangers and labour which the French army underwent in crossing the Great St. Bernard. In this campaign he particularly distinguished himself at the battles of Montebello and Marengo.

In 1801 he was sent to Lisbon by the First Consul in the capacity of minister plenipotentiary of France, and he extorted from the feeble Portuguese government every measure that Napoleon required. On his return in 1804, Napoleon, who was now emperor, created him Marshal of the Empire, and afterwards Duke of Montebello. In the Austrian campaign of 1805 Lannes was appointed to the chief command of the left wing of the French army, and in the battle of Austerlitz, December 2, 1805, gave proof of increased skill and judgment.

In the Prussian campaign of 1806 and 1807 he performed many brilliant achievements; and in 1808 he accompanied Napoleon in the Peninsular campaign, and had the command of the third corps of the army, and defeated Castanos (November 23, 1808). Lannes was afterwards appointed to the chief command of the army besieging Saragossa. The details of this remarkable siege are eloquently and graphically described in General Napier's 'History of the Peninsular War,' vol. ii. c. 2.

On the breaking out of the second war with Austria, Lannes had the command of the second corps of Napoleon's army, composed of 50,000 men. In the battle of Essling, while resisting the attack of the Austrians, a cannon-ball carried away the whole of his right leg and the foot and ankle of the left. He lingered for nine days in great agony, and died May 31, 1809.

LANNION. [CÔTES-DU-NORD.]

LANSDOWNE, HENRY PETTY-FITZMAURICE, third MARQUIS OF, an English statesman, was born at Lansdowne House, London, in 1780. He received his early education at Westminster School.

Like the late Lord Palmerston, and his successor Earl Russell, Lord Henry Petty was sent for a period to Edinburgh, and placed under the tuition of the celebrated philosopher Dugald Stewart. Edinburgh was then a nursery of intellectual and political Liberalism. Lord Henry afterwards proceeded to Trinity College, Cambridge, where he graduated M.A. in 1801, and in the following year entered Parliament as M.P. for Calne. He turned his attention to finance, and on Pitt's death, in January, 1806, he became chancellor of the exchequer in the administration of Lord Grenville. At this time he represented Cambridge University, and from 1807 till his succession to the marquise in 1809 he sat in the House of Commons as member for Camelford. He was one of the leaders of the Whig opposition in the House of Lords till 1830, when he accepted office under Lord Grey as Lord President of the Council, which office he held in both the ministries of Lord Melbourne, and again under Lord Russell from 1846 to 1852. He then resigned office, and also the leadership of the House of Lords, which he had held since 1841; but consented to hold a seat without office in the Aberdeen cabinet, and again in the first administration of Lord Palmerston.

During his long political career the marquis of Lansdowne consistently advocated those various measures of progress and reform which he lived to see triumphant. He was a liberal patron of literature, science, and art. The poet Moore, in recognition of long kindness, dedicated to him the collected edition of his works. Lord Lansdowne died at Bowood, on January 31, 1863. He left a splendid library, and one of the finest collections of pictures and statuary in the kingdom. Had he been ambitious, he might have been prime minister more than once, and he is known to have refused a ducal coronet.

LA'NSIUM, a genus of the natural family of *Meliaceæ*, which produces one of the highly esteemed fruits peculiar to the Malayan Archipelago, though unnoticed in many works where we might expect to find it fully described. The fruit is of an agreeable taste, according to Marsden, though the skin contains a colouring juice, extremely bitter, and which is apt to taint it if not opened with care.

LANTANA, a genus of plants of the natural family of *Verbenaceæ*. It has often been stated that they are confined to America; but one species is found in Arabia, and two in India. Piso states that three species, which are confounded together in Brazil under the name of *Camara*, are there used for making medicated baths for diseases of the skin. *L. macrophylla* is employed in infusions as a stimulant, and *L. pseudo Thea* as a substitute for tea.

LANTERN, in Architecture. [SKYLIGHT.]

LANTERN FLY (*Fulgora lateraria*), a species of homopterous insect, belonging to the family *Fulgoridæ*. It was long believed that this fly emitted a brilliant light in the dark; but this does not seem to be the case. The lantern flies are closely related to the *Cicadas*. In most the forehead is prolonged into a narrow snout; the antennæ are placed under the eyes, and the ocelli are two. The Chinese lantern fly (*Fulgora candelaria*) is a well-known form; few cases of insects reach Britain from China in which it does not form a part.

LANTERN, MAGIC. [MAGIC LANTERN.]

LAOCOON, according to ancient fable, was the son of Priam (according to others, of Antenor), and a priest of Apollo during the Trojan war. While offering, in the exercise of his office, a bullock to render Neptune propitious to the Trojans, two enormous serpents issued from the sea, and having first destroyed his two sons, whom he vainly endeavoured to save, attacked Laocoon himself, and, winding themselves round his body, crushed him to death in their folds. This dreadful punishment was inflicted by the goddess Minerva for the part Laocoon had taken in endeavouring to dissuade the Trojans from admitting into Troy the fatal wooden horse, which the Greeks had consecrated to Minerva.

An enduring celebrity has been gained for this story from its forming the subject of one of the most remarkable groups in sculpture which time has spared to us. It represents the agonized father and his youthful sons, one on each side of him, writhing and expiring in the complicated folds of the serpents. The figures are naked, the drapery that is introduced being only used to support and fill up the composition. This superb work of art originally decorated the baths of Titus, among the ruins of which it was found in the year 1506. The names of the sculptors who executed it are also recorded. They are Agesander, Polydorus, and Athenodorus, natives of Rhodes. (Pliny, xxxvi. v.)

With respect to the date of the work, the most careful consideration seems to fix these sculptors as late as the early emperors; and Lessing, whose work on the Laocoon deserves the attention of all who take an interest in the philosophy and capabilities of art, believes they lived in the reign of Titus.

This group is justly considered, by all competent judges, to be a masterpiece of art. Intense mental suffering is portrayed in the countenances, while the physical strength of all the three figures is evidently sinking under the irresistible power of the huge reptiles wreathed around their exhausted limbs. One son, in whose side a serpent has fixed his deadly fangs, seems to be fainting; the other, not yet bitten, tries to disengage one foot from the serpent's embrace. The father, Laocoon himself, is mighty in his suffering: every muscle is in extreme action, and his hands and feet are convulsed with painful energy. Yet there is nothing frightful, disgusting, or contrary to beauty in the countenance. The whole of this figure displays the most intimate knowledge of anatomy and of outward form. The youths are of a smaller standard than the proportion of the father; a liberty hardly justifiable, but taken probably with the view of heightening the effect of the principal figure. The right arm of the figure of Laocoon is a restoration. The group of Laocoon and his sons is now preserved in the museum of the Vatican at Rome. There are casts of it in almost every European museum.

LAODICEA. [PHRYGIA.]

LAON. [AISNE.]

LAOS comprehends the central portions of the peninsula without the Ganges, lying between 15° and 24° N. lat., and 96° and 103° E. long. It borders on the south on Siam and Cochin China, on the east on the last-mentioned country, on the north on China, on the north-west and west on the Birman empire. The river Saluen divides Laos from Birma;

and the country near it is covered with mountain ranges, which do not attain the snow-line, but rise in some parts to a considerable height. This mountain-region is intersected by wide level tracts and plains along the courses of the rivers, which are of great fertility, but low, and are subject to frequent and extensive inundations. The south-eastern part, traversed by the river Camboja, seems to be more elevated. Along the eastern border of Laos there runs a mountain-range, about 100 miles wide, which separates it from Cochin China and Tonkin. The greatest part of the country is covered with forests and swamps or stagnant waters.

The largest of its numerous rivers are the Saluen [BIRMA], the Mackhaun, or Cambodia, and the Menam, which flows through the centre of the country between the two first-named rivers. It rises on the western declivity of the table-land of Yunnan, in two branches, which unite south of 22° N. lat. From the point of junction to 18° N. lat. the river is called the Maepraen; but from thence to its mouth in the Gulph of Siam it is called the Menam. Its length is 800 miles.

The country produces rice, cotton, tea, silk, gum-lac, and a great variety of fruits and woods. The elephant, rhinoceros, cattle, and buffaloes abound. Gold, silver, copper, tin, iron, and rock salt are the chief mineral productions.

The inhabitants of Laos seem to be the original stock of a nation which is widely dispersed over the peninsula without the Ganges, to the east of the river Saluen. According to Gutzlaff they are mostly inferior in civilization to the Siamese; but yet they have made considerable progress in the various arts of civilized life. They are Buddhists, and their sacred books are written in the Pali language.

Laos is divided into three great portions. The most northern is called Upper Laos; its capital is Kemalatain. South of it lies Lachto, with the capital Changmai. The south-eastern part is called Lanchang, or the country of the Shan. Laos has generally been subject to the neighbouring countries in modern times. The country belongs partly to Birma, Siam, Anam, and China, but it contains tribes which retain independence under their respective chiefs.

Laos carries on an active trade with Siam, Birma, and China.

LAOU-TSZE or LAO-KIUN, an eminent Chinese philosopher, who lived in the sixth century before Christ, was the contemporary of Confucius, and the founder of the Taose or Taou sect, familiar to students of Chinese history as the rivals of the Buddhists. He is said to have lived in solitude, and to have given himself to meditation upon truth and virtue, although he was archivist at the court of the Chinese monarch. It is stated that he left the court and withdrew into some secret place, having, however, first written his celebrated work, 'Tao-tee-King,' or Book of Reason and Virtue. This book has had many commentators, and was translated into French in 1842 by Stanislas Julien.

Laou-tsze died in the twenty-first year of the reign of King Wang of the Chow dynasty, 523 B.C., at the age of one hundred and nineteen. He believed in the existence of a Supreme Being, immaterial, almighty, and exercising universal control; and that man finds

his perfection in identifying himself with this Being, and imitating his eternal and undisturbed quiet. He taught the immortality of the soul, and inculcated the great principles of charity, benevolence, virtue, and the free will, moral agency, and responsibility of man.

The sect still exists in China and Japan, but their moral code has become corrupted by the addition of immoral doctrines and idolatrous practices.

LAPALISSE. [ALLIER.]

LAPIDARY WORK. The work of the lapidary is that of cutting, shaping, grinding, and polishing small hard pieces of stone, especially those which go by the name of gems or precious stones. Such stones require different modes of treatment according to their hardness. The diamond, sapphire, ruby, chrysoberyl, and zircon rank among the very hardest; the agate, amethyst, bloodstone, cornelian, carbuncle, cat's eye, crystal, emerald, felspar, granite, jasper, lapis-lazuli, onyx, opal, sardonyx, serpentine, and topaz, though differing much among themselves in hardness, may be considered as occupying a sort of medium rank; while a softer class is that which includes alabaster, coral, glass, jet, lava, malachite, mother-of-pearl, steatite, &c. It is by means of small revolving wheels that these are cut and polished by the lapidary. The wheels are of iron, lead, wood, and other substances. For cutting, the edge of the wheel is sharp, and is touched with moistened diamond-powder or emery-powder, and then acts like an exquisitely fine saw, which works its way through the hardest gems when applied to it. The grinding is performed on a horizontal lead wheel, charged on its upper surface with emery-powder; the stone to be ground being pressed against it with the hand until it is smooth enough for polishing. In polishing, a tin wheel, or sometimes a wooden one, covered with leather, is used, the polishing material being rottenstone.

One of the most delicate examples of lapidary-work ever executed was the shaping of the world-renowned KOH-I-NOOR; a small steam-engine and a revolving apparatus were made expressly for the purpose, and the great duke of Wellington cut the first facet, as an amateur who took great interest in the matter, a few months before his death in 1852. Elaborate as the arrangements were, the lapidary-work was essentially the same in this as in other instances—the friction of a rapidly-revolving metal wheel moistened with diamond-powder and oil. [CAMEO; GLASS MANUFACTURE; KOH-I-NOOR.]

LAPIS LAZULI. [LAZULITE.]

LA'PITHÆ. [CENTAUR.]

LAPLACE, PIERRE SIMON, was born in March, 1749, at Beaumont-en-Auge, near Honfleur, and was the son of a farmer. He received a good education, and appears at first to have turned his attention to theology; but as early as the age of eighteen he went to Paris, having previously taught mathematics at his native place. He had letters of introduction to D'Alembert; but finding that they procured him no notice from that philosopher, he wrote him a letter on some elementary points of mechanics, with which D'Alembert was so much pleased that he sent for Laplace the same day, telling him that he had found a better way of calling attention to his claims than by letters of introduction. Very shortly after-

towards the recommendation of D'Alembert procured for Laplace a chair of mathematics at the military school of Paris. This took place in 1768 or 1769. In 1772 Laplace showed his powers in a paper on integration of equations of finite differences in the 'Mémoires' of the Academy of Turin; and from that time his scientific life was one achievement after another, until he attained a reputation almost Newtonian with the world at large, and of the highest extent and character among mathematicians, who, though they cannot even compare walks of so different a kind as those of Newton and Laplace, feel that the latter must be named next after Lagrange, and the two together above all the followers of the first.

The political life of Laplace was not so favourably distinguished. In 1799 the First Consul made him minister of the interior. With the views which Napoleon always professed with respect to science, it is not wonderful that he should have made the experiment of trying to strengthen his administration by the assistance of a philosopher whose rising fame made the French expect to claim a name which should rival that of Newton. But the experiment was not successful; and after a very short period the First Consul removed Laplace to the head of the *Sénat Conservateur*. The subsequent account given by Napoleon of his minister will be a part of the biography of Laplace in all time to come. 'A mathematician of the highest rank, he lost not a moment in showing himself below mediocrity as a minister. In his very first attempt at business, the consuls saw that they had made a mistake. Laplace looked at no question in its true point of view. He was always searching after subtleties, all his ideas were problems, and he carried the spirit of the infinitesimal calculus into the management of business.' This pointed satire is not, we suspect, one of which the force will be always admitted; first, because it is so very like what a satirist ought to say of a mathematician; secondly, because the character of Laplace's mathematical writings is signally and ridiculously the opposite of all the preceding. That Laplace was an incompetent minister is probable; but this is not the worst.

In 1814 he voted for the deposition of his benefactor—a step which might have been justifiable on public grounds; but nothing can excuse the suppression of the dedication to Napoleon, which stood at the front of his 'Théorie des Probabilités' during the prosperity of his benefactor, and no longer. Laplace, who had been created a count by Napoleon, and a *marquis* by Louis XVIII. immediately after the Restoration, did not appear at court during the short restoration of the former. Of his political conduct during the Revolution we have no account, except that he was at one time under the suspicion of the authorities, and was removed from the commission of weights and measures.

After the final Restoration, Laplace's only public employments were of a scientific character, and he died on the 5th of May, 1827. His last words were, 'Ce que nous connaissons est peu de chose; ce que nous ignorons est immense.'

The author of the 'Mécanique Céleste,' to use a common synonym for Laplace, must be an object of the admiration of posterity as long as any record of the eighteenth century exists. With the exception

of some experiments made in conjunction with Lavoisier, to determine the quantity of heat in different bodies, we do not find that Laplace was employed in actual experiment. But for many years he was the head though not the hand of European astronomy; and most of the labours of observation were made in directions pointed out by him, or for the furtherance of his discoveries in the consequences of the law of gravitation.

The first two volumes of the 'Mécanique Céleste' appeared in 1799, and may have been the inducement of the First Consul to make Laplace a member of the government. The third volume appeared in 1802, the fourth in 1805, and the fifth in 1825. One posthumous supplement has appeared. Its bulk is about 2000 quarto pages. If all this work had been collected by one man, even from the writings of others, we should have called him the Delambre of the theory of gravitation, and should have prized his writings for their extent, their faithful representation of the state of the science at a particular time, and the diligence displayed in the undertaking. When to the preceding, which is forgotten in the splendour of some of the results, we add that to Laplace is due the discovery of much, the development of more, and that by the employment of his own resources in a manner which takes all the originality and power of the investigator, and the arrangement and combination of the whole, we may begin to see how he has earned his fame.

Laplace explained his discoveries in a work entitled 'Exposition du Système du Monde,' of which the fifth edition bears the date 1824. The account here given is in style and clearness of a superior kind, somewhat too egotistical, and partaking of the disposition to suppress all notice of his predecessors common to the French school of mathematical writers. A similar companion to the 'Theory of Probabilities' was published (fifth edition, 1825) under the title of 'Essai Philosophique sur les Probabilités.' A little treatise, published in 1821, called 'Précis de l'Histoire de l'Astronomie,' afterwards was made the fifth book of the fifth edition of the 'Système du Monde.' His lectures on the elementary branches of mathematics are in the 'Leçons de l'Ecole Normale.'

Of the 'Théorie des Probabilités' we must speak precisely as of the 'Mécanique Céleste,' adding perhaps that there is no part of the latter in which more original power is displayed than in the former. The subject being somewhat isolated, its results are little known; they have, however, been extensively applied to astronomy, both by Laplace himself, and particularly by the German writers.

LAPLAND, the country of the Laplanders, comprehends the northern and north-eastern part of the Scandinavian peninsula from 64° to 71° N. lat., and from the White Sea to the Atlantic.

Lapland probably comprises an area of about 150,000 square miles, of which about two-thirds are subject to Russia, and the other third to Sweden and Norway. Russian Lapland is separated from Swedish Lapland by the river Muonio and the Tornea Elf, and from Norwegian Lapland by the Tana Elf. Russian Lapland is divided between the two governments of Archangel and Uleaborg; in the former it constitutes the district of Kola, and in the second that of Tornea. Swedish Lapland is divided between

the two districts (laens) of Pitea and Umea. Norwegian Lapland is called Finnmarken.

Along the Norwegian coast lies the mountain-range of the Kiölen, which rises in some places to a height of 6000 feet; and nearly the whole distance from thence to the Gulf of Bothnia is bare and sterile. Russian Lapland is an extensive plain, generally covered with sand, but some isolated hills rise on the plain to an elevation of several hundred feet. It has many small lakes and rivers, and forests of stunted trees.

The climate is very cold. Three-fourths of the year the country is covered with snow, and the frost between November and March is very intense. A few days of intensely hot weather occur in July and August.

Four nations inhabit Lapland—the Laplanders, Swedes and Norwegians, Finlanders, and Russians. The original inhabitants, the Laplanders, are mostly located in the sterile districts northward of the polar circle. They are divided into the fisher Lapps of the sea-coast, and the nomade Lapps of the interior. The fishing Laplanders are dispersed among the lakes and along the banks of the rivers, where they live on the produce of their fisheries. The Swedes and Norwegians occupy those tracts which are adapted to agriculture, where they cultivate rye, barley, oats, and potatoes. Barley grows as far north as lat. 70°. But the best pasture grounds and meadows are in possession of the Finlanders. The Russians live in the district of Kola, where they are chiefly occupied as fishermen or as merchants.

Wild animals are numerous, including bears, beavers, wild reindeer, wolves, lynxes, wolverines, foxes, hares, squirrels, martens, otters, and lemmings. Among the birds are eagles, capercaillies, woodcocks, and a variety of sea-birds. The forests, which cover a considerable part of the surface of the country, consist mostly of birch, fir, pine, alder, and aspen.

The estimated population in Norwegian Lapland is 5000; in the Swedish portion, 4000 (Lutherans); in the district belonging to Russia, 8800, who are members of the Greek Church. The Bible has been translated into different dialects of the Lapp language. The country contains only a few scattered villages, the principal, in the Russian portion, being Enontekiis, Enare, and Kola.

The Lapps or Laplanders are physically an ill-developed, diminutive race, with small eyes, low forehead, high cheek-bones, pointed chin, and scanty beard. Men and women dress nearly alike; and in both the straight black hair flows lankly down the back and sides of the head; while the men having little or no beard or whisker, it is hard to distinguish one sex from the other. One half of their time seems spent in killing *ripa* (game) or catching fish, and the other half in eating them, 'their belly being,' according to a recent traveller, 'the only measure.' Many of them are very good marksmen, and regularly supply the large annual markets of Vitangi and Kengis with game and skins, which are sent by Tornea to Stockholm, where they meet with a ready sale. Each man has his house and patch of arable land, a cow or two and a horse, with grass for hay from the river or lake side. Some have a few reindeer, some have none, others three or four hundred, which wander about on the hills, under the charge of a Lapp at the yearly

charge of threepence for each deer. Except in hay-time the men do nothing but fish and shoot, or smoke. Everybody smokes except when eating or sleeping. Their whole life is one of cold, and hunger, and hardship; yet all seem contented. The Lapps wander from place to place in search of pasture for their reindeer, and during these wanderings their sufferings are often very severe. For nearly one-fourth of the year the sun is below the horizon in Lapland, and winter lasts for almost double that time. But in spite of all this, in spite of extreme cold, and, still more, extreme dirt, the Laplander is, as we have just stated, contented. He is dirty, and like most dirty savages fond of finery, and very covetous, but strictly honest. He never takes off his clothes when he sleeps, and never discards his old coat of mangy skin till it drops off, and rarely if ever washes. Yet sickness is almost unknown among the Lapps, and when he takes to his bed it is usually the bed of death. Their dwellings are either conically-shaped mud huts, raised on stakes, and almost impervious to light and air, or hide-covered tents. Their peculiar customs and physical stature keep them completely isolated from the fine-made Norwegian and Swedish peasants.

The most recent work on Lapland is, *A Spring and Summer in Lapland*, by an Old Bushman.

LAPO, ARNOLFO DI, the name by which a very celebrated and one of the earliest of the Italian architects is known. He is so called by Vasari, and is said by him to have been the son of Lapo, a German, whose real name was Jacob. He executed many works in Florence, and died there, according to Vasari, in 1262, aged 68.

LAPPA, a genus of plants belonging to the natural order *Compositæ*, the sub-order *Tubulifloræ*, the tribe *Senectionideæ*, and the sub-tribe *Carduineæ*. *L. minor* has an erect stem, 3 feet or more in height, with many wide-spreading branches. When in flower, the involucre readily breaks from the stalk, and is known in the country by the name of a *Bur*. It adheres to the coats of animals and the hair and clothing of those who pass by, and it is almost impossible to become free from it without breaking the scales asunder and scattering the fruit. It grows in waste places throughout Europe and the west of Asia. *L. major* and *L. tomentosa* are species which are found in Germany and Switzerland.

LAPPS. [LAPLAND.]

LAP'SANA, a genus of plants belonging to the natural order *Compositæ*, the sub-order *Ligulifloræ*, the tribe *Achoraceæ*, and the sub-tribe *Lampsance*. There is only one British species of this genus, the *L. communis*, Nipplewort. It is found in waste uncultivated land, and derives its common name from its reputation in village medicine, as a soothing application to inflamed nipples. *L. fetida* is a species of this genus, which grows in Switzerland and on the Alps.

LAPSE. [ADVOWSON.]

LAPWING. [PLOWERS.]

LARBOARD, a naval term for the left-hand side of a ship, when you stand facing the head. The corresponding term for the right side of the vessel is *starboard*, and from its liability to be confused by the steersman with that word, 'larboard' has been officially abolished in the English navy, and the word *port* substituted.

LARCENY (*Latrocinium*, Latin; *Larcin*, French) is the legal term for theft.

This crime was formerly divided into grand and petty larceny, distinguished by the value of the property taken at the one and the same time. It was grand larceny where the value was more than twelve pence; petty larceny where the value did not exceed that amount: a distinction referable to times in which twelve pence was more than equivalent to as many shillings of the present currency. At common law the punishment of petty larceny was whipping or imprisonment; that of grand larceny was death, unless the offender were in a situation to claim benefit of clergy, of which mode of escaping punishment neither women, nor men who were unable to read, or who had been twice married, or who had married widows, or who, not being actually clergymen, had before taken the benefit of clergy, could avail themselves. [BENEFIT OF CLERGY.] By 4 George I. c. 11, grand and petty larceny were made punishable by transportation. By 7 and 8 George IV. c. 28, the distinction between grand and petty larceny was abolished; and larcenies were then distinguished as Simple Larceny, or Compound Larceny, sometimes called Mixed Larceny.

Larceny at common law is committed by wrongfully taking, against the will of the owner, and carrying away the goods of another, with the fraudulent and felonious intent wholly to deprive him of his property therein.

The taking may be either actual or constructive. It is actual taking against the will of the owner when goods are either taken directly out of the possession of the owner, or out of the keeping of another person who holds them for the owner. Constructive taking against the will of the owner is either where the possession of goods is obtained from the owner with an intention to steal them, in which case the original taking is felonious; or where the owner, without parting with the legal possession, delivers goods into the hands of a person who afterwards converts them to his own use or to some other purpose inconsistent with the continuance of the owner's property in them; in which case such conversion constitutes the felonious taking. The doctrine of constructive taking has given rise to many nice distinctions in the English law, some of which it is not easy to reconcile with the fundamental notion of theft or larceny.

There must not only be a taking, but also a carrying away, technically called asportation; to constitute which the goods stolen must be actually removed from the position which they before occupied. Entire removal, to however slight a distance, is a sufficient asportation. But where a severance is necessary before the thief can have the entire control over the article, the asportation is not complete until such severance is effected; as if goods in a shop are fastened by a string to the counter, or a purse is entangled with keys in the owner's pocket.

The thing taken must be goods; and at common law larceny could be committed only in respect of personal goods. Things real, or things annexed to the soil, technically called the realty, or which are connected with the soil and freehold, were not subjects of larceny at common law. This rule was observed so strictly, that larceny could not be com-

mitted by stealing title-deeds, nor by stealing growing corn, grass, trees, &c., unless severed from the realty by the thief or by the owner, or by a third person, and taken at another time.

The subject-matter of larceny at common law must also have been of things *in possession*, as distinguished from things (technically called *choses in action*, i.e., things which are of no intrinsic value, but are capable of being made available by action or demand, as deeds, bonds, bills, notes, and other securities for money, &c.

The inconvenience arising from these rules, which are adapted to a very different state of society, is remedied by several statutes passed during the last and the present century.

The objection founded upon the connection of the thing stolen with the realty is removed by several provisions of 7 and 8 Geo. IV. c. 29, sec. 23, &c.

The Post-Office Act, 7 Will. IV. and 1 Vict. c. 36, s. 26, makes the stealing and embezzling of post-letters, letter-bags, &c., felony, punishable with a greater or less degree of severity, according to the nature of the offence, and the existence or non-existence of a confidential character in the guilty party.

The goods taken should generally be the goods of another person.

If a man take his own goods, supposing them to be the goods of another, no larceny is committed. But it is larceny if a man takes them for the purpose of fraudulently charging another with the loss; as if a man steal his own goods for the purpose of charging the bailee, or of throwing the supposed loss upon the hundred. If a wife take and convert to her own use the goods of her husband, they being but one person in law, it does not constitute larceny.

The converting of found goods by the finder to his own use does not amount to larceny, unless at the time of the conversion he knows, or has the means of knowing, who is the real owner.

There must be an intent wholly to deprive the owner of the goods stolen of his property therein; which intent constitutes the fraudulent and felonious character of the act.

The statute law relating to larceny was consolidated by the 24 and 25 Vict. c. 96, whereby every larceny is to be deemed of the same nature, and persons convicted of simple larceny are made liable, at the discretion of the court, to be kept in penal servitude for three years, or to be imprisoned for a term not exceeding two years, and if males under sixteen, to public whipping in addition to imprisonment; and the court is empowered to sentence the offenders to be imprisoned and kept to hard labour, and also to direct that they shall be kept in solitary confinement as to the court in its discretion shall seem meet.

As cattle are necessarily left in fields and upon commons and wastes without any person to attend them, the legislature has interfered to protect property of this description by heavier punishments than those inflicted in other cases of larceny.

Stealing from the person of another, whether openly or clandestinely, is a felony punishable by penal servitude for fourteen, or not less than three years, or imprisonment for not more than two years, with or without hard labour. To constitute this offence the thing stolen must be completely removed from the

person of the owner, though such complete removal is not necessary in cases of simple larceny. Robbery from the person with violence or intent to assault is punishable with penal servitude for life, or not less than three years, or imprisonment for two years with or without hard labour.

Breaking and entering any church or chapel (by which is meant a chapel in connection with the established religion) and stealing therein any chattel, or breaking out of any church or chapel after having stolen any chattel therein, is punishable with penal servitude for life, or for not less than three years, or imprisonment not exceeding two years, with or without hard labour and solitary confinement.

Breaking and entering a dwelling-house and stealing therein any chattel, money, or valuable security to any value whatever, is punishable in the same manner. Stealing in a dwelling-house any chattel, money, or valuable security to the value of 5*l.* without a breaking and entering, is now a felony punishable by penal servitude for not more than fourteen or less than three years, or imprisonment not exceeding two years, with or without hard labour. The bailee of any chattel, money, or valuable security, who shall convert it to his own use, is guilty of larceny, and may be convicted thereof upon indictment.

The term larceny is unknown in Scotch law. But in the practice of that country the crime of *theft* may be aggravated by the nature of the circumstances under which it has been committed. [THEFT.] Thus *housebreaking* and *robbery* are both aggravations of theft. [ROBBERY.]

LARCH. [ABIES.]

LARCHER, PIERRE HENRI, born at Dijon in 1726, made himself known by several translations from the Greek classics, the principal of which is his translation of Herodotus, Paris, 1786. In 1774 Larcher published a 'Memoir on the Goddess Venus,' which obtained the prize of the Academy of Inscriptions. He had a controversy with Voltaire, in consequence of some strictures which he wrote on Voltaire's 'Philosophie de l'Histoire.' Larcher was a member of the National Institute. He died at Paris in December, 1812.

LARD. The imports of lard into the United Kingdom in 1865, chiefly from the United States, amounted to 136,898 cwts., value 272,650*l.* The exports in the year 1864 amounted to 33,584 cwts., valued at 75,704*l.* [FATS.]

LARDIZA'BALA, a genus of plants belonging to the natural order *Menispermaceæ*, and named after Michael Lardizala, a Spanish naturalist. This plant is a twining shrub, a native of Chili in woods at Concepcion, also in Peru about Arauco. It has an eatable fruit, which is gathered and sold in the markets of Chili and Peru. The pulp of the fruit is sweet and grateful to the taste.

LARDNER, DR. DIONYSIUS, an industrious scientific writer, was born in Dublin on the 3rd of April, 1793, and died on the 4th of May, 1859. He was educated at Trinity College, Dublin, of which, from 1817 to 1827, he was fellow and tutor; from 1828 to 1840 he was professor of natural philosophy in University College, London. In 1830 he projected a series of manuals of mathematical, mechanical, and physical science, and 134 volumes were published, under the general name of 'Lardner's Cyclopædia,'

between 1830 and 1844, and a second edition in 1853 and following years. Many of the volumes were from his own pen, and these, together with his handbooks of natural philosophy, and a popular exposition of the physical sciences, entitled 'Museum of Science and Art,' are remarkable for their clear style and lucid arrangement.

LARDNER, NATHANIEL, D.D., born 1684, died 1768, was a Presbyterian minister. He studied at Utrecht under Grævius and Burmann, and afterwards at Leyden. He became private chaplain in the family of Lady Treby, who died in 1729, and was a lecturer at the dissenting chapel in the Old Jewry. His 'Credibility of the Gospel History,' the 'Supplement' to it, and his 'Jewish and Heathen Testimonies,' have been considered as the most rational defences of Christianity that had been made up to his time. The most remarkable of his minor publications is his 'Letter on the Logos,' from which it distinctly appears that he was of the Unitarian or Socinian school. The best edition of his works is that by Dr. Andrew Kippis.

LAREDO. [CASTILLA-LA-VIEJA.]

LARES, among the Romans, were household gods; the guardians of their hearths and families. According to Ovid there were generally two, who were sometimes represented with a dog at their feet. Others were clothed in dogs' skins. They usually held a cornucopiæ in their hands as a symbol of good housekeeping. The festival of the Lares was celebrated on the first of May, when they were crowned with garlands, and sacrifices offered to them.

LARGENTIERE. [ARDE' CHE.]

LARGESSE, the money which, in early times, was given to heralds on state occasions for proclaiming the style and title of the sovereign and his nobles. The sums varied from 100*l.* at coronations, to 5*l.* at minor state festivities.

LARGHETTO, a musical term, a diminutive of Largo, slow, but less so than Largo.

LARGO, in music, signifies slow. [ADAGIO.]

LARGS. [AYRSHIRE.]

LA'RIDÆ, the name of a family of birds belonging to the order *Natatores*, and commonly known as Sea-gulls, or Sea-mews.

It is impossible within reasonable limits to follow out the opinions of writers on ornithology relative to the position and genera to be assigned to this family. We can therefore only refer to the writings of Willughby, Ray, Brisson, Lacépède, Meyer, Dumeril, Temminck, De Blainville, Lesson, the Prince of Musignano, Mr. Eyton, and others.

Mr. Vigors (in 'Linnæan Trans.') after commenting on the affinities of the *Laridæ* to other connected families, thus expresses himself with regard to the contents of the family:—

'We enter,' he says, 'the family of *Laridæ* by means of *Sterna*, with which *Rhynchops*, Linn., most intimately accords in habits and external characters, notwithstanding the dissimilitude of the bill. The *Sterna Anglica*, or Gull-billed Tern of Colonel Montagu, conducts us from these genera to the groups which compose the Linnæan *Larus*, now justly subdivided into two genera, the *Lestris*, Ill., and *Larus* of authors. From this group we are led to the genera *Diomedea*, Linn., and *Haladroma*, Ill., which are characterized by the absence of the hind toe, by

means of the species *Larus tridactylus*, Lath., where, though the hind toe is not absolutely deficient, as might be inferred from the specific name, there appears but the rudiment of one, or rather a stump without a nail. The last-mentioned genus, *Haladroma*, originally belonged to the *Procellaria*, Linn., and was separated from it by its tridactyle foot. Even in this character, however, it forms a passage from *Larus* to the groups that compose the genuine *Procellaria*, all of which are distinguished by the singular peculiarity of having no true hind toe, but a nail adhering to the tarsus in its place. We thus arrive at the Petrels, separated into the groups of the *Procellaria*, Auct., *Pachyptila*, Ill., *Puffinus*, Ray, and the section denominated by M. Temminck Les Pétrils Hirondelles. These two latter groups appear to lead us back to the *Terns*, or *Sea-swallows*, from whence we started. The whole of this family, which corresponds with the *Longipennes* of M. Cuvier, is distinctively characterized by the strength and expansiveness of their wings, with the aid of which they traverse immeasurable tracts of the ocean in search of their food, and support their flight at considerable distances from land, seldom having recourse to their powers of swimming. We may thus discern the gradual succession by which the characters peculiar to the order descend from the typical groups that swim and dive well and frequently, but make little use of their wings for flight, to the present groups, which are accustomed to fly much, but seldom employ their powers of swimming, and never dive.'

Mr. Swainson regards the *Laridæ* as a sub-family, consisting of the following genera and sub-genera:—*Sterna* (Terns), including *Sterna*, Linn.; *Thalasites*, Sw.; *Phaeton*, Linn.; *Rhynchops*, Linn.; *Gavia*, Brisson; *Larus*, Linn.; *Lestris*, Ill.; Petrels, including *Procellaria*; *Diomedea*, Linn. [ALBATROSS]; *Haldroma*; *Thalassidroma* (Stormy Petrels); *Pachyptila*; and *Dromas*. For ourselves we do not regard the Petrels and Albatrosses as belonging to the family *Laridæ*. One authority places the Albatross, Petrels, Shearwater, &c., all with nostrils more or less tubular, in a family termed *Procellaridæ*, while his *Laridæ* consist of the True Gulls, the Parasitic Gulls, the Terns, and the Skimmer of the Sea (*Rhynchops*).

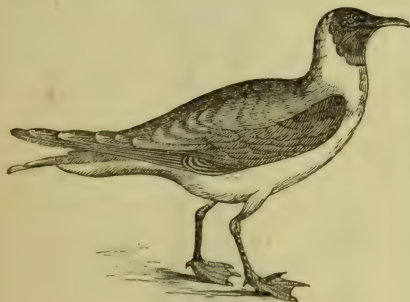
In the present article we shall confine ourselves to the Gulls only, including in that term *Xema* of Leach, *Larus* of Linnæus, and *Lestris* of Temminck. The other groups will be noticed under their respective titles.

The Gulls are powerful on the wing, and easy and graceful in their aerial movements; they often rest floating on the water, but they do not dive; yet they skim off floating substances, as dead or living fish, and the putrescent exuvie of the sea, with great address. Some are predatory in their habits, and, like the Sea-eagle, force the more feeble fishers to disgorge their booty. In most species, the plumage undergoes a decided change of colour on the approach of winter, by a process which Mr. Yarrell has proved to be different from that of moulting ('Trans. Zoological Society'). The young differ from their parents, and do not acquire their perfect colouring until the second or third year. The gulls breed in large companies, and in various situations, according to the habits of the species, some selecting the ledges

of cliffs, others choosing flat and exposed rocky islands, while others seek the marshes and pools of the more inland parts, and form their nests among aquatic herbage. These birds have a very wide geographical distribution, and are found in every part of the world, and under a great variety of climate; many, especially of the larger species, are inhabitants of the higher latitudes.

Genus *Xema*.—Bill short, slender, straight, laterally compressed, its tip bent down, the lower mandible somewhat angulated beneath; nostrils lineal; tibiae naked on the lower part; tail forked. In the genus *Xema*, the head becomes entirely or partly of a dark colour, as the season of reproduction approaches, being white during the rest of the year. In the genus *Larus* the head is of an unsullied white during summer, becoming streaked and varied with blackish gray in winter.

Example.—The Black-headed Gull (*Xema ridibundus*), the Laughing Gull of Rennie, the Red-legged Gull of Shaw.



Laughing Gull (*Xema ridibundus*).

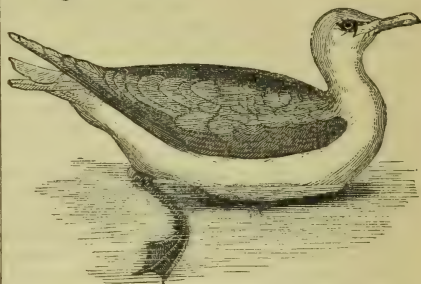
This bird is common in our islands, retiring in summer from the sea to breed in inland marshes, after which it returns in flocks to the coast. Its note is a hoarse cackle. Its food consists of fishes, crustaceæ, and the larvæ of coleopterous insects.

Genus *Larus*.—Bill moderate, strong, straight, cultrated, the upper mandible having the tip incurved; symphysis of the under mandible strongly angulated, and ascending thence to the point; nostrils placed in the middle of the bill, lateral, oblong, narrow; tongue pointed, with the extreme tip cloven; wings long, acuminate; tail even, or slightly forked; legs placed near the centre of the body, of mean length and strength, with the lower part of the tibiae naked; feet of four toes, three before and one behind; the three in front united by a membrane, the hind one short and free.

Examples.—The Common Gull (*Larus canus*), the Kittiwake (*Larus rissa*), the Herring Gull, (*Larus argentatus*), the Great Black-backed Gull (*Larus marinus*), the Lesser Black-backed Gull (*Larus fuscus*), and others.

Genus *Lestris*.—Bill moderate, hard, strong, cylindrical, very compressed, hooked at the point, the upper mandible covered with a cere; the under mandible with an angle on the inferior edge; nostrils approaching the front of the bill, diagonal, narrow, closed on their posterior part, and pervious; tarsi

long, naked above the knee; feet with three toes before, entirely palmated; hind toe very small; nails large and hooked; tail slightly rounded, two middle feathers elongated; wings with the first quill-feather the longest.



Black-backed Gull (*Larus marinus*).

Examples.—The Common Skua (*Lestris cataractes*, Temm.), the Pomarine Skua (*Lestris Pomarinus*, Temm.), the Arctic Skua (*Lestris parasiticus*, Temm.).

The Skuas are bold and ferocious birds, natives of the northern latitudes, breeding on wild heaths and solitary islands. They are the determined enemies of the Gulls, and unceasingly persecute them on the wing, in order to force them to disgorge their recently swallowed food, which is caught before it can reach the water. Their flight is strong and rapid.

LARKS, a sub-family of the *Fringillidæ*, thus defined by Mr. Swainson:—Bill more lengthened than in any of the *Fringillidæ*; the tip entire or absolutely notched. Tertial quills considerably lengthened, pointed, and generally as long as the quills. Claws very slightly curved; the claws of the outer toe always shorter than those of the inner toe; hinder claw considerably lengthened, and either nearly straight or very slightly curved. Typical genus *Alauda*. The other genera are—*Calendula*, *Agrodroma*, *Macronyx*, and *Certhilauda*. [FRINGILLIDÆ.]

LARKSPUR (*Delphinium*), a well known genus of plants belonging to the natural order *Ranunculaceæ*, or ranunculus family. The *Upright Larkspur*, much cultivated in gardens, is a native of Switzerland. It is the *Delphinium Ajacis* of botanists.

LARNE. [ANTRIM.]

LARNIKA. [CYPRUS.]

LA ROCHELLE. [CHARENTE-INFÉRIEURE.]

LARREY, DOMINIQUE-JEAN, BARON, was born at Beaudeau, near Bagnères-de-Bigorre, in France, in July, 1766. He studied the elements of medicine and surgery at the hospital at Toulouse, under the direction of his uncle Alexis Larrey, who practised medicine in that city. In 1787 he went to study his profession in Paris, and obtained the appointment of surgeon to the frigate *Vigilante*, in which he visited North America. He returned to Paris at the commencement of the Revolution, and in 1792 joined the French army which was then carrying on its operations on the Rhine. Here he distinguished himself by the invention of the *ambulances volantes*, by means of which the wounded

being first dressed, were carried off the field of battle, even under the fire of batteries. He was at the siege of Toulon, where he became acquainted with Napoleon Bonaparte, who was then a lieutenant of artillery. In 1796 he was appointed a professor in the school of medicine and military surgery at Val de Grace. In 1798 he accompanied the French army with Napoleon to Egypt, and on his return published an historical and surgical account of the expedition, with the title 'Relation historique et chirurgicale de l'Expédition de l'Armée d'Orient en Egypte et en Syrie, 8vo, Paris, 1803. From this time he was advanced to various honourable positions. After the battle of Wagram he was made a Baron of the empire, and in 1812 appointed surgeon-in-chief of the imperial army. He died at Lyons, July 25, 1841. Larrey was a great favourite with Napoleon, who bequeathed to him at his death 10,000 francs, expressing his conviction that 'Larrey was the most virtuous man he had ever known.'

LARRIDÆ, a family of hymenopterous insects, of the section *Fossores*, containing the following genera: 1, *Palarus*; 2, *Tachytes*; 3, *Larra*; 4, *Dinetus*; 5, *Miscophus*.

LARVA, a term applied to that state in which an insect exists immediately after its exclusion from the egg, and which precedes the pupa state. The animals commonly called *Grubs*, *Maggots*, and *Caterpillars*, are larvæ. Grub appears to be a general term analogous to larva; the term maggot is most generally applied to the larva state of Dipterous insects; and caterpillar, in the most common acceptance of the term, is used to designate the larva state of lepidopterous insects. These three terms, however, are used in a very vague manner.

The most striking difference, perhaps, which exists between the larva and the perfect insect, consists in the superior powers of locomotion and consequently better developed skeleton possessed by the latter.

Though larvæ never possess wings, they vary much as regards the development of the locomotive organs, and as these are more or less perfect, so does the larva resemble or recede from the insect in its imago state. Hence Messrs. Kirby and Spence divide larvæ into two sections: those which, in general form, more or less resemble the perfect insect; and those which are unlike the perfect insect. The larvæ of both sections moult, or cast their skin, several times during their progress to maturity. The number of moults varies according to the species, and the period intervening between the moults depends upon the length of the insect's existence in the larva state. In these moults, not only is the whole external covering of the insect cast, but even the lining of the intestinal canal and of the tubes of the tracheæ is shed.

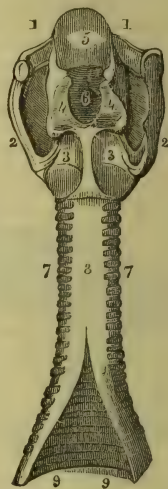
The greater portion of the larvæ of the orders *Orthoptera*, *Hemiptera*, and *Homoptera*, excepting that they have no wings, bear a considerable resemblance to the perfect insect, and hence belong to the first of the sections just mentioned. As, however, the muscles which serve to support and give motion to the wings are attached to the skeleton of the thorax, so, as might be expected, we find this part in the perfect insect more unlike that of the larva perhaps than any other; and again, where (as in the imago state of *Scutellera*) a portion of the

thorax is greatly produced behind and serves to protect the wings when folded, the larva, having no wings, does not possess this peculiarity.

Belonging to the second division, in which the larva does not resemble the perfect insect, are the orders *Hymenoptera*, *Coleoptera*, *Neuroptera*, *Lepidoptera*, and *Diptera*. [INSECTA.]

LARYNX is the organ of the voice. Its framework is composed of five cartilages, which are capable of being moved on each other in various directions by muscles, so as to act upon two elastic bands, on which the voice essentially depends, and which are called the vocal ligaments.

Fig. 1.



1, 1, Os Hyoides; 2, 2, Thyroid Cartilage; 3, 3, Cricoid Cartilage; 4, 4, Arytenoid Cartilages; 5, Epiglottis; 6, Aperture of communication between Glottis and Pharynx; 7, 7, Rings of Trachea; 8, Situation of transverse posterior Muscular Bands; 9, 9, Portion of Trachea cut open from behind.

The first, the thyroid cartilage (2, 2), consists of two plates of dense, tough, fibro-cartilaginous substance, of an irregularly quadrilateral form, united at the lower part of their anterior edges. The prominence of this angular union is felt in the front of the throat, forming what is called the Pomum Adami; at the sides of and behind which the form of the cartilage may be easily traced out with the fingers.

The cricoid cartilage (3, 3) has somewhat the form of a signet-ring. It is inclosed within the angle of the thyroid cartilage, beneath whose lower edge the front and narrowest portion of its ring may be felt, with an interval of about a quarter of an inch between them.

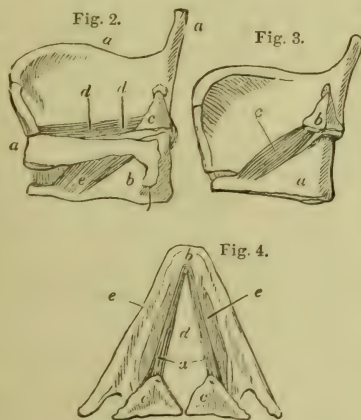
The arytenoid cartilages have each the form of an irregular triangular pyramid (4, 4). They are placed upon the upper edge of the broad part of the cricoid cartilage, just within the most expanded part of the angle formed by the receding plates of the thyroid.

The epiglottis (5) is of a somewhat ovate form. It is attached by its apex to the angle of union of

the plates of the thyroid cartilage, and projects obliquely backwards and upwards over the cricoid and arytenoid cartilages, like a shield, guarding them from the contact of foreign bodies passing from the mouth.

These cartilages are connected chiefly by elastic ligament, which is arranged in bands of varying thickness throughout the whole of the larynx; uniting the upper edge of the thyroid cartilage to the os hyoides, and its lower edge to the cricoid cartilage; passing also from the arytenoid cartilages to the epiglottis, and uniting the rings of the trachea and bronchi; affording to all a firm but yielding connection, and endowing them by its elasticity with the power of resounding in accordance with the vibrations originating in the vocal ligaments.

The vocal ligaments are two narrow bands of highly elastic tissue, stretched between the anterior angle of the thyroid and the anterior surfaces of the arytenoid cartilages. The substance of which they are composed is a yellowish, dense, fibrous tissue, which is placed in those parts of the body where a permanent elasticity is required, as in the spaces between the laminæ of the vertebræ, the coats of arteries, the rings of the trachea, &c. In fig. 2 a profile view of the right vocal ligament is shown:



a, a, a is the outline of the thyroid cartilage, of which part of the left side is removed; *b* is the cricoid cartilage, and *c* the arytenoid cartilage of the right sides; *d, d* is the vocal ligament. In fig. 3 the crico-arytenoidei-laterales (*c*) are shown attached to the cricoid cartilage (*a*), and to the outer angle of the arytenoids (*b*). In fig. 4, the view of the vocal ligaments, *a, a*, is taken as seen from above; they are attached anteriorly to the inside of the thyroid cartilage at *b*, and posteriorly to the front of the arytenoid cartilages *c, c*. Between them is the aperture through which we breathe, the glottis, *d* (fig. 4). It is bounded posteriorly by the inner edges and anterior angles of the arytenoid cartilages; anteriorly by the inner edges of the vocal ligaments. When at rest, as during quiet breathing, the glottis is of a somewhat lanceolate form, but when speaking or singing it is very much narrowed.

The muscles acting on the parts of the larynx

just described are arranged symmetrically, and attached to corresponding points on each side of the larynx; and their names are compounded of those of the cartilages on which they are inserted.

The simplest actions of these muscles in regard to the voice may be thus stated: the crico-thyroid stretch the vocal ligaments; the thyro-arytenoid relax them; the posterior crico-arytenoid open the glottis; the lateral crico-arytenoid and the posterior arytenoid narrow or close it.

Below, the larynx opens into the trachea (fig. 1, 8), which is continued into the chest, and there divides into two branches, the bronchi, whose ramifications and terminations form the air-passages and air-cells of the lungs. The trachea is composed of a series of cartilaginous incomplete rings, which are united behind by muscular fibres, and are connected together by longitudinal elastic bands. It is thus capable of variations both of length, breadth, and tension, and of entering into vibrations with the column of air contained in it, and of assisting in communicating those vibrations through its branches to the walls of the chest.

The larynx has been compared to a variety of musical instruments, and it will be seen that in its different parts it unites the principles of several. In its essential vocal apparatus it most nearly resembles the reed instruments, as the reed-pipes of the organ, the clarinet, &c., or rather a modification of them, in which the vibrating body is not fixed in its dimensions as a metallic tongue, or a reed, but consists of a lamina of elastic membrane, capable of varied degrees of tension, as well as of alterations in its length. No musical instrument has yet been constructed on this principle, unless we consider as such the various kinds of trumpet in which the vibrations are produced by the air impelled against the edges of the lips, rendered more or less tense by the action of their orbicular muscle. The principle has been applied in the formation of artificial larynges by Biot, Cagniard de la Tour, Willis, &c., who have chiefly used caoutchouc membrane; and by Müller and Henle, who have employed besides, either the vocal ligaments themselves or laminæ of the elastic coat of an artery. The most complete examination of the subject is that made by Müller, and published in the first part of the second volume of his, '*Physiologie des Menschen*.'

The notes produced by the glottis are subjected to modifications in timbre, strength, and purity, by the parts connected with the larynx, both above and below the vocal ligaments; but it is difficult to determine the circumstances on which the differences of the timbre of the voice in different persons depend. The difference between the male and female voices is probably owing to the comparative shortness of the vocal ligaments in the latter. According to Müller, their average length in man is $18\frac{1}{4}$ millimètres, in woman only $12\frac{2}{3}$, or nearly as 3 to 2. But to account for the differences of tenor and bass, or of soprano and alto voices, no good evidence has yet been collected. The average compass of the voice is two octaves, but in different parts of the scale in different persons: thus a bass voice commonly has its lowest note four or five notes lower than a tenor, while a tenor has its highest note from four to five notes above the highest note

of the bass voice. A soprano voice again has its lowest note at nearly the same part of the scale as the highest note of a bass voice; and thus the whole compass of the human voice, from the lowest of the bass to the highest of the soprano, would be nearly four octaves. The voices of children resemble very nearly those of women, but in males a remarkable change takes place at puberty, when the voice is said to crack. The change from the shrill treble voice of the boy to the fuller and rounder tone of the man is sometimes perfected almost suddenly; but in most cases it is for some time in progress, wavering between the two extremes, deep and manly during quiet enunciation, but when any exertion is used, suddenly starting up again to the shrill tones of boyhood. In old age, the cartilages of the larynx becoming bony, the ligaments hard and unyielding, and its muscles pale and powerless, the voice completely alters, and it trembles as if there were not sufficient strength in the muscles to maintain a due tension of the vocal ligaments. Besides being subservient to the voice, the larynx fulfils other functions of vital importance to the whole body. In breathing, for example, its exquisite sensibility is immediately excited by the contact of any foreign substance, or of a deleterious gas, and the glottis is firmly closed by the thyro-arytenoid muscles, to prevent the entrance of the noxious body into the lungs. The same action occurs as we swallow each portion of our food, to prevent any of it passing into the lungs; and if a particle by accident touch the glottis, coughing is excited, to insure its speedy removal.

LASCAR, a term signifying 'camp-follower,' but generally applied to those natives of East India who become sailors on board British ships. They make excellent seamen, but are quarrelsome and vindictive, and not to be trusted with management or authority.

LAS CASAS, EMMANUEL AUGUSTIN DIEUDONNÉ, COUNT, a French historian, and one of the companions of Napoleon at St. Helena, was born near Revel, in Languedoc, in 1766. He first entered the navy, and was present at the siege of Gibraltar. At the revolution he fled to England, and served in the expedition to Quiberon. After Napoleon's accession he returned to France, and laboured in the preparation of his admirable 'Historical and Geographical Atlas.' The emperor found out his good qualities, made him his chamberlain, created him a count of the empire, and employed him in inspecting hospitals, prisons, and naval ports. After the battle of Waterloo he begged to be allowed to share Napoleon's exile. While in the island prison, he spared no effort to alleviate the pains of his captive master. At night he jotted down the conversation of the day, and afterwards published the result in eight volumes, entitled 'Memorial de St. Helene,' a work which will always be the chief source of information respecting Napoleon. In 1816 he was sent away from St. Helena, on account of a letter which he contrived to send to Lucien Bonaparte, in which he commented on the treatment of the illustrious exile. After eight months' confinement at the Cape of Good Hope, he came to Europe, and resided in Belgium till Napoleon died, when he returned to France and published his great work; and also memoirs of his own life. Under Louis

Philippe's government he was a member of the Chamber of Deputies for St. Denis. He died 15th May, 1842.

LASER, a highly esteemed gum-resin among the ancients, which had become rare even in the time of Pliny, but which is described by Theophrastus under the name of Silphion. [SILPHIUM.]

LASERPITIUM (the name of the ancient Silphium), a genus of plants belonging to the natural order Umbelliferae. *L. glabrum*, glabrous Laserwort, has roots which are filled with a gum-resin, which is acrid, bitter, and even somewhat caustic. It is said to be a violent purgative. *L. Siler* is a native of the mountains of the middle and south of Europe. The root is extremely bitter, and yields an aromatic resinous substance which has been supposed to be the Silphion or Laser of the ancients. [SILPHIUM.]

LASSO, a rope with a noose at one end, used in South America and other countries for capturing wild horses, &c. It is generally made of a stout thong of hide, and requires much skill in use. Another kind, still more common in South America, is a long cord of skin, with a leaden ball at each end, and is thrown so that when it strikes the leg or neck of the animal, the impetus of the ball causes the lasso to coil round the limb. The lasso has sometimes been used in warfare.

LAST. A last of cod fish, white herrings, meal, and ashes, is twelve barrels; a last of corn is ten quarters, or eighty bushels; of gunpowder, twenty-four barrels; of red herrings, twenty cades; of hides, twelve dozen; of leather, twenty dickers; of wool, twelve sacks; of flax or feathers, 1700 lbs. A last generally is estimated at 4000 lbs.

LASTREA, a genus of Ferns, belonging to the tribe Aspidieae. The following species are British — *L. Thelypteris* (Marsh Fern); *L. Oreopteris* (Sweet Mountain Fern); *L. Filix Mas* (Male Fern); *L. cristata*; *L. rigida*; *L. dilatata*.

LASWARREE, a town of Hindustan, in Delhi, which is celebrated in history as the scene where Lord Lake signally defeated the Mahrattas in November, 1803; when the loss sustained by the British was 800 killed and wounded, and that of the enemy 7000.

LATAKIA. [SYRIA.]

LATANIA, a genus of Palms of the tribe Borasinee of Martius. *L. rubra*, remarkable for its red-coloured leaves, is a native of the Isle of France. *L. rubra* and *L. borbonica* are moderate sized, with all the leaves of a palmate fan shape. The leaves, like those of other palms, are employed by the natives for covering their huts, as well as for making fans and umbrellas. The leaf-stalks are split, and employed for making baskets, sieves, &c.

LATENT HEAT. When a body is exposed to the action of heat so as to change its state, as from a solid to a liquid, it rises to a certain temperature, known as its *melting* or *fusing* point, and remains fixed at that temperature until the whole of that solid shall have been liquefied. The heat applied after the fusing point has been reached does not raise the temperature, but produces the change of state. During this operation a quantity of heat must evidently enter the body in order to produce liquefaction, and as it produces no effect on the thermometer it is said to be *combined* and rendered *latent*,

so that when the body again becomes solid the heat thus *latent* is given off in a sensible form.

A pound of water at 79° Cent. added to a pound of water at 0° Cent. produces of course two pounds of water at 39°·5. But a pound of water at 79° Cent. added to a pound of ice at 0° Cent. produces two pounds of water at 0°. Heat then has disappeared in the production of a change from solidity to fluidity. Since a pound of ice at 0° Cent. absorbs 79° in becoming a pound of water at 0°, it follows that the same quantity of heat is given out or rendered sensible when the water again passes into ice.

The cold of winter is considerably mitigated by the sensible heat which is given out by freezing water, and when the temperature rises with the return of milder weather, a considerable portion of the heat is employed in producing liquefaction.

Similar phenomena accompany the liquefaction of other bodies. When a mass of lead, for example, is put over the fire, it rises to 620° Fahr.; it then begins to fuse, and it remains at that temperature until the whole mass has become liquid; the heat absorbed and rendered latent during the process is called the *latent heat of fusion*. The following table gives the latent heat of certain liquids:—

	Fahr.		Fahr.
Water, ...	142·65	Bismuth, . . .	22·75
Nitrate of soda, .	113·34	Sulphur, . . .	16·85
Nitrate of potash, .	85·26	Lead, ...	9·65
Zinc, ...	50·63	Phosphorus, . .	9·05
Silver, ...	37·92	Mercury, . . .	5·11
Tin, ...	25·65		

It will be seen from the above table that the latent heat of ice is very considerable, while that of lead is very small; hence ice melts slowly, lead rapidly. Ice cannot melt until it has received as much heat as would raise its own weight of water 142·65°, while lead melts with as much heat as would raise its weight of water 9·65°. Did ice melt with the same comparative facility as lead, the first thaw would cause inundations by the sudden melting of the snow and ice of winter.

When a liquid passes into the state of vapour there is a further absorption of heat. During the whole time that water is passing off into the form of steam the thermometer remains fixed; in other words, the steam is of the same temperature as the boiling water. It takes five and a half times as long to convert the water into steam as it does to raise it from 32° to 212°, and therefore the latent heat of steam is $5\frac{1}{2} \times 180 = 990^\circ$. The water has passed through 180° from freezing point to boiling point, and it requires the same heat to be applied to it five and a half times as long as it has already been, in order to convert it into steam, and yet during this time the temperature remains the same.

This enormous quantity of latent heat is again given out when steam condenses into water, and hence steam becomes a powerful source of heat. Indeed, any given weight of water in the form of steam at 212° in being condensed will raise five and a half times its own weight of water from 32° to 212°.

Water furnishes a much larger amount of vapour, bulk for bulk, than any other liquid, a cubic inch of water at 212° expanding to 1696 times its volume, or nearly a cubic foot of steam at the same temperature; whereas a cubic inch of alcohol, boiling at

173°, forms only 528 cubic inches of vapour; ether, boiling at 95°, produces only 298 cubic inches of vapour; and oil of turpentine, boiling at 314°, produces only 193 cubic inches of vapour. Now although the latent heat required to convert such liquids into vapour is much less than that required to convert water into steam, no advantage would be gained in employing them as prime movers, supposing they were as cheap as water, on account of their low expansive force, which must evidently depend on the bulk of vapour produced from a given bulk of liquid.

LATERAN, the name of a church, Basilica Lateranensis, with a palace and other buildings annexed to it, situated at the south-eastern extremity of Rome, near the walls of Aurelian and Honorius. This group of buildings is called 'in Laterano,' from being built on the estate once belonging to Plautius Lateranus. The later emperors had a palace on the spot, and Constantine had a church or chapel annexed to the palace. Constantine, or some of his successors, gave up the palace to the bishops of Rome, and the Lateran, till the beginning of the fourteenth century, was the residence of the popes. The pope, in his quality of bishop of Rome, goes to take solemn possession of it after his election, and he officiates there on certain great festivals, for which reason it is styled the head church in the world, 'Ecclesiarum Urbis et Orbis Mater et Caput.'

A fire broke out in 1808, which consumed the greater part of the palace, as well as the church. The church was restored, but the palace was abandoned, and Gregory XI., when he transferred the papal see to Rome in 1377, fixed his residence in the Vatican palace, which then came to be considered as the residence of the pontiffs till the seventeenth century. Sixtus V., however, in 1586 ordered a new palace (the present structure) to be built, adjoining the Lateran church, and Pope Pius IX. has converted a portion of it into a museum of Christian archaeology. Under a portico on the north side of the church, erected from Fontana's design, stands the *Scala Santa*, or 'Holy Stairs,' consisting of twenty-eight marble steps, which an old tradition states to have belonged to Pilate's house, and to have been the identical ones which Christ descended when he left the judgment seat. They are only allowed to be ascended by penitents on their knees.

LATERITE, in mineralogy, a clayey deposit found in some parts of India and in Ceylon. 'It varies much in colour and composition, but generally consists of a reddish-brown or brick-coloured cellular clay, more or less indurated, and used by the natives as brick, when cut square. It hardens greatly and permanently on exposure, and is well adapted for buildings and fortifications.' Laterite is of Middle Tertiary age.

LATHE. [EARTHENWARE; POTTERY; TURNING.]

LATHE (Sax. *leth*), a part or division of a county, containing three or four hundreds, or wapentakes, according to the laws of Edward the Confessor, as in the counties of Kent and Sussex. *Lathreve* was the name of an Anglo-Saxon officer, who had authority over the third part of the county, according to the number of lathes he governed.

LATHS. In building operations two kinds of laths are in common use. *Slaters' laths* are cut out

of sawn plank, and nailed on to the framework of the roof, for the purpose of receiving the slates or tiles, which are fastened to the laths by nails. *Plasterer's laths* are made by splitting wood, principally Norway spruce fir, in the direction of the grain of the wood. They vary from $\frac{1}{2}$ to $\frac{3}{4}$ an inch in thickness, and are about 3 or 4 feet long. They are nailed upon joists for ceilings, and to the uprights of partition walls, in such manner as to leave a small interval between each lath, into which the plaster may be forced, so as to form a key to support the rest of the work. Upon the Continent oak laths are almost exclusively used.

LATIMER, HUGH, bishop of Worcester, the son of a farmer in Leicestershire, was born about 1472. He took a degree at Cambridge, previous to entering into holy orders. His 'heretical' opinions caused him to be prohibited by the Bishop of Ely from preaching within that diocese, an obstacle which he overcame by gaining the use of a pulpit in a monastery exempt from episcopal jurisdiction. Cromwell, the king's favourite, gave him a benefice in Wiltshire, where he preached reformed doctrines, and recommended him to Anne Boleyn, who appointed him her chaplain, and soon after the bishopric of Worcester was conferred on him (1535). He continued to preach these doctrines for three years, at the expiration of which the Act of the Six Articles was passed, from which he so totally dissented, that he resigned his bishopric.

Accusations were afterwards made against him for his objections to the Six Articles, and he was committed to the Tower. He remained a prisoner for six years; and not until the accession of Edward VI. did he obtain his liberation, when he refused to accept the restoration to his see. Latimer was committed to the Tower soon after the accession of Mary. He steadfastly maintained his opinions, and, October 16, 1555, was led to the stake with Ridley; gunpowder being fastened about his body to hasten his death, it took fire with the first flame, and he died immediately. Latimer published several of his sermons at different times.

LATINI was the name of one of the oldest nations of Italy, who are said to have descended at some remote time, before the building of Rome, from the central Apennines, in the neighbourhood of Reate (the modern Rieti), into the lower country between the Anio, the Tiber, the Alban Mountains, and the sea, which was afterwards called Latium. These Latins appear to have formed their settlements in the lowlands, where they founded many towns—Laurentum, Lanuvium, Lavinium, Aricia, Gabii, Tusculum, Tibur, Præneste, Labicum, Collatia, Cora, and others. That there was a mixture of Grecian blood in the Latin race seems not to be doubted, and a comparison of the elementary parts of the Greek and Latin languages proves at least that those who used these tongues were sprung from or related to a common stock. The Latin communities were united by religious rites.

The Latini are described as a race robust, hardy, frugal, and warlike, and their early union with Rome, great part of whose population was recruited amongst them, contributed mainly to the growth and success of that republic. Their towns were strong, both by their position and their massive walls, traces of which

still exist on the sites of ancient Præneste, Tusculum, and other places of dates anterior to Rome, and are ascribed by some to the Tyrrhenians, who preceded the Latini, and have been confounded with the Pelasgians. The foundation of Alba is involved in great obscurity, but the fact of its being an important town several centuries before the existence of Rome is undoubted. [ALBA LONGA.] Whether Alba was at the head of the Latin Confederation, or was the centre of another confederation distinct from that of the Latins, though connected with it, has been a matter of doubt. Niebuhr adopts the latter supposition. A distinction is made by Livy between the Albans and Latins. The dictator of Alba is not called the dictator of the Latins. The founders of Alba were either emigrants from Lavinium, who built a town and set up an independent state for themselves, according to Livy's story of Ascanius, or they were strangers, probably a tribe from the mountains, who built a new town, which in course of time ruled over part of Latium and sent colonies to Lavinium and other places on the coast which had become deserted. Alba is said to have ruled over thirty colonies, and a like number of thirty towns is mentioned as constituting the Latin Confederation in the Roman period.

Under Tullus Hostilius, the third Roman king, war broke out between Rome and Alba, which ended in the destruction of Alba and the removal of the inhabitants to Rome. In the following reign of Ancus Marcius, the first war of the Latins against Rome is mentioned: the result was that Politorium, Tellene, and Ficana were taken by the Romans, and the inhabitants transferred to Rome, where they were settled on Mount Aventine. Servius Tullius obtained by agreement with the leaders of the Latin cities, what his predecessors could not obtain by force, namely, that the Latins should unite with the Romans in building a temple to Diana on the Aventine, to be common to both people. This was considered as an acknowledgment that Rome was the head of the Latin nation. Tarquinius Superbus, the last of the Roman kings, persuaded the Latins not only to renew the treaty with Rome, but to acknowledge him as their princeps, or chief, and to send their youth to serve no longer as auxiliaries, but mixed with the Romans in the same legion. The history of the Latin cities, after the expulsion of the last king to their subjugation by the Romans, B.C. 337, is a part of the history of Rome. Some of the Latin towns had previously obtained the Roman citizenship, either complete or in a limited degree.

During the second Punic war Hannibal tried to work upon the feeling of dissatisfaction which existed among many of the Latins, as well as other nations of Italy which had been conquered by Rome; and accordingly, after the battles of Trebia and Thrasymene, he separated the Latin and Campanian from the Roman prisoners, and released the Latins without ransom. The Latins, however, unlike the Campanians, Samnites, Hirpini, Lucanians, and others, who went over to Hannibal, remained faithful to Rome, whose armies were repeatedly recruited among them during that long and fearful contest.

The Latins remained for two centuries and a half in the same dependent condition, until the breaking

out of the Social or Italian War. The tribune Livius Drusus proposed that the full Roman citizenship should be extended to them, as well as to the other nations of Italy, which had formed treaties of alliance with Rome. Drusus, however, was murdered, and his motion was dropped for a time. But when the Marsi, Samnites, Peligni, Campanians, and Lucanians rose in arms, and constituted themselves into a confederation, of which they made Corfinium the capital, and after they had defeated several Roman armies, the consul L. Julius Cæsar (B.C. 91) advised and obtained the passing of a law which gave the Roman franchise to all the people of Italy who were allies of Rome and had remained faithful in that emergency. This franchise, or *civitas*, is stated accordingly to have been granted to the 'socii,' or allies, who had furnished their contingents, and to the Latins, who are mentioned distinctly from the rest. By this grant, the freemen of the Latin towns were placed so far on a level with the Roman citizens as to enjoy the full Roman franchise, to be admitted into the Roman rustic tribes, have votes, and be eligible to public offices. Thus the distinction between the Romans and the real or original Latins was obliterated.

LATITAT (Lat. *lateo*, 'to lie concealed'), in Law, the name of a writ calling upon a defendant to answer in personal actions in the Queen's Bench, under the presumption that he is lying hid in some other county.

LATITUDE. [**LONGITUDE** and **LATITUDE**.]

LATITUDINARIAN, in Theology, one who indulges in a latitude of thinking and interpretation in matters of orthodoxy.

LATIUM, the country of the ancient Latins, had at first for its boundaries on the west the Tiber, which divided it from Etruria; on the north, the Anio, which separated it from the Sabini; and on the south, the Tyrrhenian Sea. To the east and south-east its boundaries on the side of the Volsci are not so clear. In the first period of Roman history the Latin territory does not seem to have extended to the eastward beyond the Alban Mount, nor beyond a line drawn from that point to the sea-coast, leaving outside of it Satrium, Corioli, and Antium, which in the earlier ages of the republic appear as Volscian towns. And yet in the first treaty with the Carthaginians, said to have been concluded soon after the expulsion of Tarquinius Superbus, Antium, Circeii, and Tarracina, or Anxur, are reckoned as towns of Latium. Præneste, however, and Tibur appear from the first as Latin towns, the former being the advanced post of Latium on the side of the Hernici, who inhabited the mountainous tract between the Trever (Sacco), the Upper Anio, and the Liris. Tibur, also a town of the Latini, was divided by the Anio from the territory of the Sabini. But the boundary of the Latin territory seems to have crossed the Anio below Tibur, and to have extended across to the Tibur above the influx of the Albia, so as to include the towns of Nomentum and Crustumeria. Within these limits there was a great number of towns, some of which are mentioned in the article **LATINI**.

After the final conquest by Rome of the Volsci, the Hernici, and the Aurunci, the name of Latium was extended to the whole country inhabited by these three peoples, in addition to the country of the old Latins, and this was called Latium Novum.

Under Augustus, Latium and Campania constituted the first of the eleven regions into which Italy was divided by that emperor.

The physical geography of Latium and the actual state of the country are given under **CAMPAGNA DI ROMA**, except the easternmost part of the new Latium, namely, the districts of Gaëta and Sora, which belong to **LAVORO, TERRA DI**.

LATREILLE, PIERRE-ANDRÉ, a distinguished naturalist, was born at Brives, November 29, 1762. He was sent to Paris in 1778, and placed in the college of the Cardinal Lemoine, to be educated for the church. He gained the friendship of Lamarck and other scientific men, and devoted himself particularly to entomological studies. At the Revolution, being an ecclesiastic, he was persecuted and condemned to banishment, but escaped this punishment through the influence of his scientific friends. In 1798 he was named a correspondent of the Institute, and eventually filled the vacant chair of zoology.

Latreille was elected a member of the Academy of Sciences in 1814, and was made in 1821 chevalier of the Legion of Honour. He died at Paris, February 6, 1833.

LATROBITE occurs crystallized and massive. Primary form a doubly oblique prism. The colour is a pale red: the lustre vitreous; and the substance translucent. It consists mainly of silica and alumina.

LATRUNCULI (Lat. *latrunculus*, 'a little thief'), a game among the ancient Romans somewhat similar to our game of chess, which so admirably represented the order and chances of war, that its invention has been attributed to some military officer of distinction. The *latrunculi* were the *latrones* and *calculi*, or chessmen of the game, made of glass or wax, and distinguished by black and white colours. In the Roman classics frequent allusions are made to this game; and a little poem was written upon it, addressed to Piso, which has been attributed to Ovid.

LATTEN. [**BRASS**.]

LAUBAN or **LUBEN**. [**LIEGNITZ**.]

LAUD, WILLIAM, Archbishop of Canterbury, was the son of a clothier at Reading, where he was born, 7th October, 1573. From the free school of his native town he passed, in 1589, to St. John's College, Oxford, where he became first a scholar; then, in 1593, a fellow; somewhat later a reader in grammar; and after he had taken orders, a lecturer in theology. As early as 1601 he revealed his divergence from the theological and ecclesiastical principles which had prevailed in the church of England since the Reformation, by declaring in one of his lectures that the church of Rome had previous to that event been the true visible church of Christ on earth; and in the theses which he defended in 1604 for the degree of bachelor in divinity, he maintained against the Puritans the necessity of baptism as the vehicle of regeneration, and the necessity of the episcopate to the existence of a true church. These views excited great opposition in Oxford, and even drew upon him a formal censure from the university, which was then presided over by George Abbot, afterwards archbishop of Canterbury. In 1608 he was made D.D., and became chaplain to Dr. Neile, bishop of Rochester, who not only gave him several parochial benefices in succession, but introduced him

to the king. James I. had now, from a professed Presbyterian and contemner of the English liturgy, which he had once spoken of to his Scottish subjects as an ill-said mass, become a high Anglican churchman, and Laud was a theologian entirely to his mind. He rose rapidly in royal favour, and though for several years his influence at court was powerfully counteracted by Archbishop Abbot and Lord-Chancellor Ellesmere, this did not hinder his being made, in 1611, a royal chaplain, and in 1616, dean of Gloucester. Nor was Ellesmere, as chancellor of Oxford, more successful in preventing his elevation in the university, for in 1611 he was elected president of St. John's. On his return from Scotland, which he visited in attendance on the king, he was made a prebendary of Westminster, and in 1621, bishop of St. David's. It was now that he began to give full scope to his favourite views. His Visitation Articles of 1622 were a declaration of war against Puritanism; and enforced the restoration in his diocese of all church decorations and arrangements anciently in use, which had not been expressly abolished by ordinance since the Reformation. Pictures, candelabra, rich altar hangings and painted windows, were again to be seen in the churches of South Wales; the communion table was turned into an altar; and the altar was separated by a screen from the less holy parts of the church. It was evident to the nation that the church was now to be deprotestantized both in doctrine and worship, and that much of the work of King Edward's and Queen Elizabeth's divines was to be undone.

On the accession of Charles I., in March, 1625, it soon became evident that Laud was even a greater favourite with the new monarch than he had been with the old. He was chosen to officiate at the coronation in preference to Bishop Williams of Lincoln, whose puritanical tendencies had brought him into disfavour; and soon after he was promoted to see of Bath and Wells, and made dean of the chapel royal and a member of the privy council. When Archbishop Abbot was suspended from his functions, Laud was one of five bishops intrusted with the administration of the primacy; he became the soul of the commission, and as such virtual primate of the realm. Soon after, in July, 1628, he was elected to the see of London. After the assassination of Buckingham he became more indispensable than ever to the king; and along with Wentworth, earl of Strafford, of whose policy of 'thorough' he fully approved, he became the king's chief instrument in his fatal attempt to set up and establish an absolutism both in church and state. In May, 1633, he accompanied Charles to Scotland, where he would have introduced at once the English liturgy and order if he had not been overruled by the Scottish bishops, who, understanding better than he the feeling of the nation, advised that it would be safer to impose upon Scotland a service-book that might in some sense be called her own than the prayer-book, however excellent, of her 'auld enemies of England.' But his resolute will made itself felt in the composition of this new liturgy; if the book must be less English, it should also be less Protestant: the consecration prayer in the communion service was brought as near as possible to the Roman formula; benedictions for the dead and other suspicious features were also

introduced; and blinded by the infatuation which has so often been the ruin of despotism, Laud and his misguided master never doubted that they should be able either to corrupt or to coerce the conscience of a whole nation, which, since the days of Knox, had never abated one jot in its hatred and abhorrence of 'papisty' and all 'popish dregs.' Soon after his return from Scotland, on the 4th August, 1633, Laud was made archbishop of Canterbury, and on the same day, it is said, he had the offer of a cardinal's hat. He declined to become a prince of the church of Rome; but the form of his declination was mild indeed. 'He felt something in him which said no, so long as Rome was not otherwise than she was.' For some years he continued at the height of ecclesiastical power, and did his utmost to repress the free spirit of Puritanism, exciting against himself an amount of hatred which eventually wrought his ruin. The story of his tragic end, however, is well known to every reader of English history, and need not be here dwelt upon. When the Long Parliament assembled in 1640, it was evident to observers that his life was doomed. On the 1st of March, 1641, he was thrown into the Tower, and there he lay for three years before his cause came to a public hearing. On the 12th of March, 1644, proceedings began in the House of Lords, but it was not till 2nd January, 1645, that sentence was finally given against him. On the 10th of the same month he was beheaded on Tower Hill, and he died with a composure and dignity becoming his character as a Christian bishop. His body was removed in 1663 to St. John's College, Oxford. His dying words, to the effect that only his zeal for the church had brought him to the scaffold, need not be denied. But his zeal for the church had been intemperate and fanatical. It had made him a willing instrument of royal despotism, and a chief agent in trampling upon the rights and liberties of the kingdom. It had narrowed his understanding and poisoned his heart. Wither he was a liberal patron of learning and scholars. He was a great benefactor of the University of Oxford; and the sumptuous buildings which he erected there, the Arabic chair which he founded, and the numerous valuable manuscripts which he presented to the Bodleian library, still remain to attest his enlightened and munificent concern for the interests of education and letters.

LAUDANUM. [OPIMUM.]

LAUDI, or LODI, in music, the Italian name given to certain spiritual or sacred songs, and composed in praise of God, or the Virgin Mary, or even the Saints. They were somewhat different from the common hymns. The name *Laudisti*, or *Laudesi*, was applied to the members of a society instituted at Florence during the fourteenth century for the performance of the *Laudi*. (Dr. Busby.)

LAUENBURG, a duchy of the Germanic Confederation, bounded by Lubeck, Mecklenburg Schwerin, Holstein, and the river Elbe. It extends from lat. 52° 21' to 53° 48' N., and from 10° 13' to 11° 3' E. long. On the eastern border are several lakes, the chief of which are the Ratzburg See, and the Schaal See. The principal rivers are the Stocknitz and the Delvenau. The surface is generally flat, sandy in the centre, and marshy in the south. The duchy is divided into three arrats or districts—Ratzburg, Lauenburg, and Schwarzenburg. The

area is stated to be 404 square miles, and the population, 50,147. The town of *Lauenburg*, the capital, is situated on the right bank of the Elbe, at the mouth of the Delvenane or Stocknitz Canal, 27 miles S.E. of Hamburg. It has a custom-house and a large transit trade. Population of town proper, 1200, with suburbs, 3800. [DENMARK; SCHLESWIG.]

LAUGHARNE. [CAERMARTHENSHIRE.]

LAUGHTER, as physically defined, is an emotion entirely confined to the human species. It is a peculiar agitation of the body, an organical titillation, as it were, which, rising suddenly and irresistibly, affects at once the face and throat, the thorax, and the abdomen. In its most limited sense it is a convulsion of the diaphragm. [DIAPHRAGM.] It is usually a pleasant sensation, but occasionally, as in cases of hysteria, it assumes a painful character, and is no longer under the slightest control of the will. While, however, the corporeal phenomenon is so simple, the nature of the mental state, and of the object by which it is produced, is more complicated and debatable. On this subject a great variety of opinion has prevailed. To determine the common characteristic of all those things termed 'ludicrous' has been found a problem of no common difficulty. According to Aristotle the ridiculous is some error in truth or propriety, but at the same time neither painful nor pernicious. Cicero says that the chief, if not the sole object of laughter, is that which, without impropriety, marks out and exposes an impropriety. Among moderns Hobbes is of opinion that the source of laughter is a sudden glory arising from conception of some eminency in ourselves by comparison with the infirmity of others, or with our own formerly. Beattie and Priestley agree in making the ridiculous to arise out of a misrelation or incongruous union of objects; while Lord Kames considers a contrast to be the essence of the laughable. Perhaps nine cases out of every ten of the really ludicrous are cases of the pleasure of degrading something, and we may presume that the remainder are of the same general character, though the fact is disguised by surrounding circumstances. The ridiculous is not any fixed and constant property of certain objects, but it is purely relative and dependent upon the subjective states and conditions of individual minds. The simpleton and the boor laugh heartily at what scarcely provokes a smile in the educated man and the sage, and on the other hand, much will excite a laugh in the latter which would not move a muscle in the face of the former. Such, again, is the effect of a gay or a gloomy temperament, that a Democritus will laugh where a Heraclitus would weep.

LAUMONITE occurs crystallized and massive. Primary form an oblique rhombic prism. The colour is a reddish white, the lustre vitreous. It is translucent; and when heated at the blow-pipe it gives a white enamel, which, by a continued heat, is converted into a transparent glass. It is a compound of silica, alumina, lime, and water.

LAUNCE (*Ammodytes lancea*), the name of a species of fish related to the eels. It is also known as the Sand-launce, or Riggle, and is found abundantly on the British coasts. It has a great power of digging in the sand, and uses this as a refuge from the attacks of larger fishes. Its usual length is from five to seven inches.

LAUNCESTON. [CORNWALL.]

LAUNCESTON, a town in the colony of Tasmania, the second in importance in the island. It is situated at the northern extremity of the county of Cornwall, and at the head of the navigation of the river Tamar, 35 miles above its estuary at Port-Dalrymple, and 98 miles from Hobart Town. The greater part of the agricultural produce of Tasmania is exported from Launceston, and there is an extensive and increasing trade with Australia, it being the nearest port to that continent. The town was made a free port in 1845. The value of the exports and imports is about 500,000*l.* or 600,000*l.* a year. The population in 1861 was 10,359, but it has since been considerably augmented.

LAUNCH is the sliding or movement of a ship from land into water. The vessel is built upon an inclined slip, having one end deep in the water. A row of blocks of oak are placed on the building slip in the direction of the length of the intended ship, so that their upper surfaces may be in a plane, making an angle of about three degrees with the horizon; and on these blocks is laid the keel. The vessel is supported in equilibrium by an outer framework or cradle, the bottoms of which rests on planed timbers leading to the water, called the ways of the slip. When the vessel is ready to be launched these are greased, and everything which holds the ship in place unfastened, and she glides down into the water stern foremost. The cradle goes with it, but the buoyancy of the water soon separates it from the ship, when it is recovered by boats. It is usual during the process of launching for a lady to break a bottle of wine over the bow, and give the vessel its name. The *Great Eastern* was built with its side parallel to the river, and its launching occupied three months.

LAURA'CEÆ, a natural order of apetalous Exogens, consisting entirely of trees and shrubs inhabiting the warmer parts of the world, and in most cases aromatic; on which account several are mentioned in works on officinal plants. The best known species in Europe is *Laurus nobilis*, the Sweet Bay, a beautiful evergreen, whose fragrant leaves are commonly employed to flavour confectionery. [LAURUS.] Other products of the order are—cinnamon, cassia, sassafras, camphor, and other useful substances.

LAUREATE, POET, from the Latin *laurus*, 'the bay,' an officer in the lord chamberlain's department of the royal household. The earliest mention of a poet laureate in England is in the reign of Edward IV. In the reign of Charles I., 1630, the first patent of this office appears to have been granted, which fixed the salary or pension attached to it at 100*l.* a year, with a tierce of canary wine. The succession of poets laureate since the time of Charles II. has been—John Dryden, Nahum Tate, Nicholas Rowe, Laurence Eusden, Colley Cibber, William Whitehead, Thomas Warton, Henry James Pye, Robert Southey, and W. Wordsworth. Alfred Tennyson is the present holder of that distinction. A commutation of 27*l.* for the allowance of wine is now paid. The title seems to have originated from an old custom of the universities to present a laurel wreath to graduates in rhetoric and versification. The king's laureate was then simply a graduated rhetorician employed in his service. It was formerly the office of the laureate to write an ode on the birth-

day of the sovereign, and on other special occasions. The first has been wisely abolished, but the latter duty is still occasionally performed, the present occupant of the office having written odes on the death of the Prince Consort, the opening of the Great Exhibition of 1862, and the marriage of the Prince of Wales.

LAUREL. [LAURUS.]

LAUREL WATER. The leaves of cherry laurel contain a volatile poisonous oil, and the elements of prussic acid; but a sedative narcotic, of great use in allaying neuralgic pains, spasmodic cough, and palpitation of the heart, is made from them by distilling a mixture of bruised cherry laurel leaves and water, after twenty-four hours maceration. It is important to remark that the use of bay leaves in cooking, to flavour puddings, custards, &c., has led in several instances to serious mistakes. In many cases the leaves of the cherry laurel are used by cooks as recklessly as bay leaves, having acquired the name simply of laurel, instead of *cherry laurel*. Even sculptors have encircled the brows of their marble heroes with the wrong leaf.

LAURENCEKIRK. [KINCARDINE.]

LAURENTIAN SYSTEM. [GEOLOGY.]

LAURINE, an acrid and bitter principle contained in the berries of the laurel. Its smell resembles that of laurel oil. It is insoluble in water. When heated, it melts, and volatilizes without leaving any residue. The berries contain only about one per cent. of this substance.

LAURISTINUS (*Viburnum*), a genus of dicotyledonous plants belonging to the natural order *Caprifoliaceæ*, or honeysuckle family. The common Lauristinus (*Viburnum tinus*), which is to be met with in almost every garden, is a native of the south of Europe. Other species which may be named are the Tree Viburnum (*V. lentago*), the Wayfaring tree (*V. lantana*), and the Guelder rose (*V. opulus*), which are all garden favourites. [VIBURNUM.]

LAURUS, a genus of the natural family of *Lauraceæ*, to which indeed it has given its name. It includes as a species one of the most celebrated trees of antiquity, and until recent times some of the most elegant and useful of the vegetable kingdom. They are now, however, placed in distinct genera. [CASSIA; CINNAMOMUM.]

The Laurel, or Sweet Bay, now alone remains in the genus *Laurus*, and is the *L. nobilis* of Linnæus, a native of the north of Africa and south of Europe and of Asia; at least it has been so long naturalized in these countries that it would be difficult to ascertain whence it was originally introduced. The Bay-tree attains a height of twenty or thirty feet, and is cultivated in gardens, not only on account of its elegant appearance, but also for the aromatic fragrance of its leaves, which are evergreen and quite smooth. The fruit is endowed with aromatic properties as well as the leaves, whence both have long been used in medicine as stimulants and carminatives, as well as a fatty oil expressed from the seed.

LAUSANNE, the capital of the Swiss canton of Vaud, is situated near the northern shore of the Lake of Geneva, on three steep hills, which project from Mont Jorat, and are separated by deep ravines. The situation of Lausanne is picturesque; but the interior of the town is far from pleasing, the streets being

narrow, very steep, and ill paved. The cathedral, a vast Gothic structure of the eleventh century, and the handsomest church in Switzerland, is adorned with a lofty tower, and also a spire 200 feet high. The church of St. François is also a very old building. The castle, formerly the residence of the bishop of Lausanne, is now the council-house of the canton. The other remarkable buildings of Lausanne are—the college, which contains a large library and a museum; the penitentiary; the charity schools; cantonal hospital, lunatic asylum, barracks, and theatre. The educational institutions comprise, besides the cantonal college, military, drawing, and other schools, numerous literary societies, and collections of art and science. The town has 20,516 inhabitants. Manufactures of woollen cloths, paper, leather, watches, and jewellery, are carried on. In the town are several public baths, libraries, an English chapel, &c. The environs present very delightful scenery. Steamers from Geneva and other points on the lake put in daily at the suburb of Guchy, which is built on the shore of the lake. The house inhabited by the historian Gibbon is still shown in Lausanne. Madame de Staël had a residence in the vicinity.

LAUSITZ or LUSATIA, was the name of an old division of Germany, with the title of Margravate, now forming the circle of BAUTZEN, in Saxony, and part of the governments of Potsdam, Frankfort, and Liegnitz, in the kingdom of Prussia. The chief towns are Ebersbach, Kameng, Gross-Schönau, Reichenau, Hernhut, and Zittau, in most of which there are extensive linen manufactories.

LAVA, in Geology, the most general designation of the mineral substances which are erupted in a melted state from volcanic vents. Lava, when observed as near as possible to the point from whence it issues, is for the most part a semifluid mass of the consistence of honey, but sometimes so liquid as to penetrate the fibre of wood. It soon cools externally, and therefore exhibits a rough unequal surface, but the internal mass remains liquid long after the portion exposed to the air has become solidified. The temperature at which it continues fluid is considerable enough to melt silver.

According to Von Buch, almost all lavas are to be viewed as a modification of trachyte consisting essentially of felspar, and united with titaniferous iron; they generally contain glassy felspar, and often inclose augite, leucite, hornblende, mica, olivine, specular iron, and many other minerals, developed by crystallization from the fused mass. Basalt, another of the characteristic volcanic rocks, contains, besides much felspar, a considerable admixture of augite or hornblende, and is rich in oxide of iron, sometimes titaniferous. About one-half of the weight of all lavas is silica: the other half consists of earthy and alkaline ingredients varying greatly in proportions.

The certainty with which the mineral ingredients of lava can be identified depends principally on the degree of crystallization which circumstances have permitted. There is in lava every degree of variation, some specimens being of granitic, others of earthy, compact resinous, or vitreous texture. According to conditions of solidification—in water, in air, or in fissures of the earth—the minerals which occur in lava are variously distributed; and the masses appear

compact, porous, cellular, vesicular, cavernous, spongy, or filamentous.

LAVAL, the capital of the French department of Mayenne, is situated in $48^{\circ} 4' N.$ lat., $0^{\circ} 46' W.$ long., 152 miles W. by S. from Paris, and has 28,142 inhabitants. The principal part of the town stands on the slope of a hill, on the right bank of the Mayenne, and consists of irregularly built, narrow, steep, and crooked streets of dark timber-framed houses, each story of which overhangs the one below it, so that a considerable part of the buildings overhang and darken the dreary streets. From the midst of these dismal buildings, and close to the river, rises the extensive old castle of the lords of La Tremouille, surmounted by a lofty round tower, which formed the keep: this castle is now used as a prison. Near the castle an old bridge thrown across the river leads to a new suburb, regularly built with wide straight streets, on the left bank of the river. Another suburb called Avenières is interesting on account of its elegant church, which dates from 1040. The principal buildings in the old town are—the churches of La Trinité, des Cordeliers, and St. Vénérand; two hospitals, founded about the year 800; the public library; town-hall; theatre; a large and handsome linen market. The town has a tribunal of first instance, a tribunal and chamber of commerce, and a college. It is the centre of a large manufacture of table and household linen and linen yarn, for the sale of which there are weekly markets; calico, flannel, cotton handkerchiefs, serge, soap, leather, &c., are also made; and there is a good business done in flax, wine, brandy, clover seed, timber, iron, marble, &c. Laval is a walled town; it was taken by the English in 1466, but recaptured by the French in the following year; and suffered greatly in the Vendéan war at the end of the last century. In 1793 it was held by the Vendéans, who, in October of that year, under the command of Larochejacquin, defeated with terrible slaughter a large army of republicans near the town. The railway from Paris to Brest passes through Laval.

LAVANDULA SPICA, a native of southern Europe, of which there are two varieties, if not distinct species, termed *L. latifolia* and *L. angustifolia*. The former is also called Spike Lavender, and the oil which it yields differs considerably from the oil of *L. angustifolia*, or *L. vera*, and is termed Oil of Spike or foreign Oil of Lavender. This sort is much less fragrant and of a deeper green colour than the oil of the true lavender, and is merely used in painting, or to adulterate the genuine oil, which is so extensively employed in the preparation of perfumes. The flowers of *L. angustifolia* are the parts employed in medicine.

LAVATER, JOHANN KASPAR, was born November 15, 1741, at Zürich, where his father was a physician. He performed the duties of a preacher in his native town. In 1767 he published his admired 'Swiss Songs,' and in the following year his 'Aussichten in die Ewigkeit' ('Prospects of Eternity'). In 1769 he was made deacon of the Orphan-house church at Zürich. His 'Physiognomic Fragments' appeared in 1775, in 4 vols. 4to. It is said that in after-life Lavater had less faith in physiognomy than at first. He regarded the beginning of the French Revolution with satisfaction; but his opinions changed after the decapitation of the king. When, on September 26, 1799, Massena took Zürich, Lavater, who was busied

in the streets exciting the Swiss soldiery and aiding the sufferers, was shot. He suffered a long time from his wound, and died on the 2nd January, 1801.

LAVATERA (in honour of the two Lavaters), a genus of plants belonging to the natural order *Malvaceæ*. *L. arborea* (Tree Mallow) is a native of Italy, Spain, Portugal, the north of Africa, and the Canary Islands, on maritime rocks; also in Britain, in the Isle of Wight, on Portland Island, in Cornwall, and Devonshire. It is the *Μαλάχρη* of Theophrastus ('Hist. Pl.' i. 5; i. 14).

None of the species of Lavatera are of any importance or value, except as ornamental plants. Many of them are hardy, easily cultivated, and well adapted for shrubberies. The greenhouse and frame species will thrive well in a mixture of loam and peat, or any light soil. They may be planted out during the summer against a south wall, and if protected in the winter by a mat, will generally survive throughout the year. The perennial species grow in any kind of soil, and may be propagated either by dividing the plants at the root, or by seeds. The annual and biennial kinds should be sown in the open border during the spring. The species chiefly worth cultivation in gardens are *L. Olbia, flava, unguiculata, Neapolitana, Cretica, Lusitanica*, and *trimestris*.

LAVAUER. [TARN.]

LAVELANET. [ARIE'GE.]

LA VENDÉE. [VENDÉE.]

LAVENDER, the name of hoary, narrow-leaved, fragrant bushes, inhabiting the south of Europe, the Canaries, Barbary, Egypt, Persia, and the west of India, with generally blue flowers. Twelve species are described, of which two only are of general interest, namely, the common Lavender (*Lavandula vera*) and Spike Lavender *L. spica*, both natives of sterile hills in the south of Europe and Barbary.

LAVEN'DULIN (from *lavender*), a translucent mineral, of a vitreous greasy lustre; specific gravity 2.72; constituents, silica, alumina, lime, potash, and oxide of manganese.

LAVER, a substance sometimes used as food, consists of the fronds of marine plants belonging to the genera *Porphyra* and *Ulva*. Common purple laver is furnished by *Porphyra laciniosa* and *P. vulgaris*, two species common on rocks and stones in the sea on many parts of the British coast. They derive their botanical name from their beautiful purple or violet colour.

LAVOISIER, ANTOINE LAURENT, was born at Paris, August 16, 1743. His father spared no expense in his education. When only twenty-one years of age he obtained the prize offered by the government for the best essay on lighting the streets of Paris. In 1768 he was admitted an associate of the French Academy, and in 1769 obtained the appointment of one of the farmers-general of the revenue. He was afterwards appointed to superintend the numerous saltpetre works of France.

During the Reign of Terror he was accused of having, as a farmer-general, mixed water and noxious ingredients with tobacco: he secreted himself for some days; but hearing that his colleagues were imprisoned, he voluntarily surrendered, and was consigned to the guillotine, May 8, 1794.

In a posthumous and incomplete publication, consisting of two octavo volumes, entitled 'Mémoires

de Chimie,' Lavoisier, alluding to the term commonly employed of the *French theory*, claims it entirely as his own. It overturns the *phlogistic* theory of Stahl, which had assumed that a peculiar principle called phlogiston was the cause of all combustibility and all metallization. The modern theory of combustion is mainly due to Lavoisier. His analysis and recombination of atmospheric air were ably conceived and executed. He was one of the chief means of bringing about the reformed nomenclature of chemistry. But Lavoisier made more claims to originality than he was able to support. Professor Brande has justly said of him that, 'though a great architect in the science, he laboured but little in the quarry; his materials were chiefly shaped to his hand, and his skill was displayed in their arrangement and combination.'

LAVORO, TERRA DI, a province of the kingdom of Italy, now called Caserta, corresponding to the greater part of the ancient CAMPANIA, is bounded by the Mediterranean on the south-east, and having landward the provinces of Naples, Avellino, Campobasso, Chieti, Teramo, and Aquila, the Pontifical States being on the north-west. It is between lat. $40^{\circ} 48'$ and $41^{\circ} 48'$ N., long. 13° to 15° E. The surface in the east is covered with ramifications of the Apennines, but elsewhere are many fertile plains; and this is one of the richest parts of the Italian peninsula, though along the coast are marshy and unhealthy tracts. The chief rivers are the Volturno and the Garigliano: the principal inlet of the sea is the Gulf of Gaeta.

The products of the province comprise wheat, oil, silk, fruit, and wines. The province extends between the lower ridge of the Apennines, the Mediterranean, and the mountains which encircle the Bay of Naples. The area is 2,294 square miles, and the population in 1862 was 653,464. It is divided into five districts:—1. The plain of Nola in the south-east, which looks like an immense grove of tall elms and poplars planted in rows to support the vines which grow at their feet, and which twist around them, and hang in festoons from tree to tree. Between the rows corn and pulse are sown. The soil is a rich sandy loam. 2. West of Nola is the district of Caserta, which includes the central part of Campania, and is watered by the Volturno. The plains of Caserta and Capua near the mountains are tolerably healthy, well cultivated, and extremely productive; but the plain of the Volturno, from Capua to the sea, is very unhealthy: it is chiefly occupied by herds of horned cattle. A range of hills, the *Massicus* of the ancients, here divides the basin of the Volturno from that of the Liris or Garigliano. 3. The district of Gaeta, which includes the lower valley of the Liris and the plain of Fondi. The low lands of the Garigliano are unhealthy and desolate; but where the Formian hills stretch near the coast the country is healthy, fruitful, and well cultivated. The plain of Fondi is very unhealthy, owing to a stagnant lake near that town. 4. The district of Piedimonte, which occupies the valley of the Upper Volturno to beyond Venatro, and as far as the great chain of the Apennines of Abruzzo. This part of the country is healthier. The low lands produce wheat and maize, and the lower slopes of the mountains are planted with the olive, while the higher grounds afford pasture or are covered with chestnut trees. 5. The district of Sora, which

embraces the valley of the Upper Liris. This is in great measure a mountainous district, cold in winter, and partaking of the nature and climate of Abruzzo. These five districts are divided into comuni or parishes. Good organzine and sewing silk are made in Caserta; cotton and woollens at Piedimonte; common woollen cloth at Arpino; and there are extensive tanneries at Santa Maria di Capua.

The capital, Caserta, is 17 miles N.E. of Naples, and 6 miles S.E. of Capua; it had, in 1861, 27,728 inhabitants, and is remarkable for the adjoining palace and gardens, which form one of the most magnificent royal residences in Europe. This palace was built by Charles III. The town has also a cathedral, a theatre, churches, convent, hospital, military school, and barracks. Near Caserta is the royal silk factory of St. Leucio. Caserta Vecchia is a fortified place 3 miles to the north-east, with 1200 inhabitants. Nola, a very old town and a bishop's see, with, in 1861, 12,030 inhabitants, contains sixteen churches, convents, extensive barracks, hospitals, a royal college and seminary, cathedral, &c. The town is situated in a wide and fertile plain, 14 miles E.N.E. of Naples. It was anciently one of the largest cities of *Magna Græcia*, besieged by Hannibal after the battle of Cannæ, and was the place where Augustus and M. Agrippa died. Ancient vases and other antiquities are abundant here, and it is said it was the first place where bells were used in churches. Maddaloni, a pretty town at the foot of the mountains, has a royal college and an aqueduct, to convey water to the cascades in the royal gardens. It is 15 miles N.N.E. of Naples, and in 1861 had 20,257 inhabitants. Capua. [CAPUA.] Santa-Maria-di-Capua has 18,000 inhabitants, and a considerable inland trade. It is 3 miles S.E. of Capua, on the site of the ancient city of that name, has civil and criminal tribunals, and many remarkable ruins. Aversa. [AVERSA.] Piedimonte, a modern town N. of Capua, is well built; the inhabitants amounted, in 1862, to 8538. It stands in a fertile plain at the foot of the Apennines, has a royal palace, and manufactures of coarse woollen cloths, caps, paper, cotton, oil, and wine, called Pellagrello. It has very pure water. Cajazzo, an ancient town, 10 miles N.E. of Capua, has a population of 5712. In its vicinity excellent wine is produced. San-Germano, a town with, in 1861, 11,346 inhabitants, is situated on the road leading to Rome by the valley of the Sacco, a feeder of the Liris. The monastery of Monte-Casino, on a steep hill above San-Germano, is the grandest in Europe. Close by are five springs of mineral water, from which this place was anciently called *Casinum Aquinum*. There is a feudal castle, and a magnificent church, still entire. Sora, higher up the Liris, at the foot of the Apennines, is a bishop's see, and has 12,000 inhabitants. It has a cathedral, remains of a Gothic castle, the citadel, and the walls of ancient Sora. Isola-di-Sora, in an island of the Liris, which forms a fine cascade above it, has 4796 inhabitants, who manufacture paper, iron, linen, wire, and cloth. Arpino. [ARPINO.] Aquino. [AQUINO.] Atina, situated among the mountains, has 3935 inhabitants and many antiquities, a cathedral, and a convent. Sessa, on a hill not far from the high road to Rome, with a population in 1862 of 19,419, is an episcopal city,

17 miles N.W. of Capua. It has many benevolent institutions, a cathedral, and numerous churches and convents, and some remains of antiquity. *Teano*, once the capital of the Sidicini, has 4000 inhabitants, a cathedral, and a seminary. *Gaeta*. [GAETA.] *Fondi*, a bishop's see and a frontier town, near the Papal States, in a fertile but unhealthy plain, has 6555 inhabitants, and some remains of Cyclopean walls. The ancient Via Appia, with its old pavement, forms the principal street of the town. *Fondi* is the reputed robber's nest of the frontier.

In the valley of the Liris is the town of *Pontecorvo*, which, with a small territory, surrounded on all sides by the Terra-di-Lavoro, formerly belonged to the pope, but is now part of the kingdom of Italy. It has a population of 9315 inhabitants, a castle, and a cathedral.

LAW. A law (*lex*) has been defined to be a command or rule of the supreme power in a state addressed to all the members of a given community, who owe obedience to such supreme power. To make it efficient there must be some sanction, or penalty, or punishment, or means of enforcing obedience to it. All the laws of any given country may be comprehended under the term the Law of such country; though the term law, as will be presently explained, comprehends more than all the laws (*leges*), properly so called, of any given country; for it comprehends those rules of Law which are not laws or statutes. The law that exists in any given country is called the Positive Law of that country: it is so called simply as being or existing, as placed or fixed.

The word law is used in various senses. The Law of God is the law that he has given to us in the constitution of our nature, and also the Law which he has revealed through Jesus Christ. God's moral government of the world is discoverable by the exercise of our reason and of our moral faculties, the chief and most pre-eminent of which is conscience. We thus learn that man's nature is adapted to certain courses of action, and not to others; by which we mean that some courses of action are contrary to man's nature, when viewed in all its parts, and as governed by the supremacy of conscience, and that other courses of action are conformable to his nature. We learn that perfect happiness is not attainable by man, and that the greatest degree of happiness, if we look at the whole of mankind and not to single instances, is acquired by doing that which we know that we ought to do, or, as it is expressed, by doing our duty. Our duty comprehends our duty to God and our duty towards one another: our duty to one another implies the existence of society, which we cannot conceive as not existing. Society, therefore, is an ordinance of God, and so are the rules by which society is governed; yet not all rules that may exist, for there are many rules in all societies which are contrary to God's law: but rules or laws are one of the modes of God's government of the world.

These rules, in countries where the Christian religion is known and accepted, are the law of God as revealed to us. They do not form a body of rules adapted to all the wants of society, and were not designed to supersede such rules as man can and does frame by virtue of his intellectual and moral activity developed in a social state. But all rules of human

constitution, by which we mean rules not founded directly on revealed religion, are bad rules if they contradict any principle or rule of the Christian religion, which to those nations which accept it is the supreme law, the sanction of which law in this world is the evil consequences to individuals and societies of their violation of it, and in the next world punishment. In countries where the Christian religion has not been received, or in those ages in which it was not known, the rules of morality have been deduced from those principles of reason and that moral sense which all men possess as part of their nature; and the rules of law, or the systems of law in such countries and in such ages, have always had some degree of conformity to natural religion, or that knowledge of our duties which man may attain to without the aid of revelation: they have been admitted to some degree at least as the test and standard of all positive law.

As society exists and must exist, there is a necessity for law, quite independent of religion or of morality; and the true nature of law is only understood when we have formed a clear conception of the several provinces of law and of morality. The object or end of law is sometimes said to be the promotion of the happiness of a community; but this is not true. Law cannot make people happy. If it be said that its object is not to make happiness, but to assist to that end, this is no more than saying that it does something towards enabling people to be happy, if they know how to avail themselves of its advantages. What is really meant by the ill-chosen expression of the greatest happiness being the end of social institutions is, that it is the object of government and of law to secure to all the members of society those things which are means towards the enjoyment of as much happiness as we are capable of, but which things do not of necessity make us either virtuous or happy. They may have just the contrary effect.

The object of law is to secure individual freedom, which is accomplished by the absolute duties which are imposed upon all. The foundation of liberty or freedom is therefore obedience to positive law. Not that obedience will always secure freedom, for the power which exacts obedience may be tyrannical; but without obedience to one power there can be no freedom in a community. The freedom which it is the object of law to secure—which it does secure in some degree in all countries, though often very imperfectly—is the freedom of living such a life as is conformable to the end of our being; to live according to Nature, as this is explained by Marcus Antoninus, Epictetus, and Butler, or in the words of St. Paul, 'to lead a quiet and peaceable life in all godliness and honesty.'

If the Christian rules of life were followed in all their strictness by all mankind, government and law would still be necessary; which consideration further shows that government and law, not particular forms of government and particular forms of law, but government and law generally, are part of God's means by which he governs the world. Man can acquire nothing except by labour; he thus obtains dominion over external things, which he fashions and forms to use: hence the necessity of rules which shall fix the nature of property and the numerous questions that

may arise concerning it. And if we should suppose that a time may come when men shall seek less than they do now the appropriation of things to their several use, we cannot conceive any state of society in which rules as to Ownership shall not be necessary. Man also interchanges the products of his industry, and makes agreements as to the various transactions of life, which are capable of almost infinite diversity both as to form and substance. Accordingly rules are necessary to regulate such agreements, to settle in some way many things which are matters of indifference in themselves, but not matters of indifference so far as they must be settled some way or other, and to determine disputes whenever disputes may arise, as they may do even between people of strict integrity. Thus the matter for a second set of rules is formed, those that relate to Contracts, and also to Obligations which arise otherwise than by contract. The union of male and female for permanent cohabitation in itself requires no determination by law, for the union is founded simply on consent between persons of competent age to live together for life in such form and manner as religion or the morality of the particular country may prescribe. But still rules of law are required to regulate many things in the relation of husband and wife, mainly with reference to property and contracts; and rules of law are also required to regulate the relations between parent and child with respect to property. The different degrees of consanguinity which are the result of marriage have been established for two purposes, to prevent marriages being contracted within certain degrees of consanguinity, and to regulate the distribution of property in cases of intestacy. When a man dies, his personality ceases, and that property which during his lifetime had a distinct character, by being viewed as attached to the owner's personality, would be left without an owner by his death. But rules of law give the owner a power of disposing of this property, in anticipation of death, by a testament, and in case of intestacy they determine the persons to whom it shall go. These four divisions comprehend what the Romans viewed as belonging to the department of *Privatum Jus*, and it is a department of law which exists by the same necessity that society does. It is not directly concerned about morality in any degree; a man may acquire property for immoral purposes or use it immorally. His conduct in the matter is beyond the province of law, so far as simply concerns the use that he makes of his property. Marriage may not be such a union as accomplishes the end of marriage; but it is still regulated by law so far as the regulation of law is necessary and possible, and no further.

Besides the department of Private Law, there is the department that concerns government and administration, the limits of which it is difficult to define; and accordingly this is the department in which the rules of law most frequently extend beyond their proper limits. Criminal Law belongs to this department; and also, properly considered, all judicial procedure.

The origin of law, like that of society, is unknown. The original law of any state exists in the form of immemorial custom, which has long been recognized by the supreme power, or by those to whom the supreme power has delegated the function of declar-

ing what is law. These customs are not called laws, but Customs, Rules of Law, and the like. But there is in all society a constant growth of law produced by new circumstances and new wants; and this is the matter which society furnishes to the judge, and which within certain limits he may declare to be law as the occasion arises. The judge does not make this law: he accepts it, and declares it to be law. In the case of laws properly so called (*leges*), statutes, or acts of Parliament, the judge has to interpret the law; but he adds nothing, if he does his duty—he merely declares the rule of the law-maker or legislator, as well as he is able to ascertain it.

That part of law which is originally declared in writing by the supreme power, or by any persons to whom this power is delegated, is sometimes called Written Law. An Act of Parliament is an example of this kind of law. That law the original of which is not in writing, though writing may be the evidence of its existence, is called Unwritten Law. Such is Customary Law, or law generated by custom.

Law is sometimes divided into Law and Equity, the nature of the opposition of which is explained under EQUITY.

The department of *Jus Privatum* may be distributed into the Law which relates to Persons and the Law which relates to Things; a division established by the Romans. The Law which relates to Persons views them as holding a certain condition or status, independent of their simple personality, and their capacities, incapacities, and duties, simply as living persons. The law which concerns the relations of husband and wife, parent and child, and some others, merely as such relations, is an instance; and this is the only part of *Jus Privatum* which belongs to the law of persons. The Law of Things of necessity concerns persons, but in relations of a different kind. It views persons, not as holding a certain status or condition, but simply as persons who have certain capacities and rights, are subject to certain incapacities, and owe certain duties, the objects of which are material things, either directly or indirectly. It therefore comprehends the Law of Property, of Obligations, of Testaments, and of Intestacy.

The Law of Persons comprehends not only what has been described as included under *Privatum Jus*, but also every other particular status or condition with which persons may be invested, when not considered simply as persons, but as having peculiar powers or rights and duties. Accordingly, the law of persons, thus viewed, comprehends all those who hold public functions of any description, as judges, sheriffs, and all people employed in administration or government. As opposed to this class of persons called Public, all other classes of persons may be called Private.

Law may be, and is sometimes, divided into Civil and Criminal. In the Roman system *Jus Civile* was the peculiar law of Rome, as opposed to all other law; and sometimes when we speak of the Civil Law we mean the Roman law as received in Europe. In the English system the term Civil Law, as opposed to Criminal, is ill-defined. The distinction, in fact, is only made with reference to procedure, and then only in a limited degree. If a man brings an action to recover a piece of land that belongs to him and is held by another, or if he brings an action to recover

a debt, the proceeding is a civil proceeding; but this is not what is meant by the opposition of civil and criminal. If a man sustains an injury from another, by which he acquires a right of action for damages or compensation, a right solely founded on the wrong, his remedy is a civil proceeding. If the proceeding against the wrong-doer is not for compensation or damages, but merely to bring him to punishment, it is a criminal proceeding. There is also a division of law that may be called Penal in the English system, where the proceeding is of a nature to enforce a penalty, part of which may go to the person who brings the action, and part to the Crown. Criminal proceedings are appropriately enough called Pleas of the Crown in the English system, because the proceedings are in the name of the Crown, though private persons may, as a general rule, prefer a bill of indictment.

That law which is now commonly called International Law, or the Law of Nations, is not properly law. The nature of this so called law is explained in the article INTERNATIONAL LAW.

As to the term CODIFICATION, see LEGISLATION.

LAW, CRIMINAL. The professed object of Criminal Law is the prevention of crimes by the terror of punishment. A crime is such an act or omission as makes the person who is guilty of the act or of the omission liable to a punishment or penalty provided by law. If the act or omission is such that some particular person or persons, who are injured by the act or the omission, can legally obtain compensation from the person who has injured them, the act or omission is called a civil injury. Thus the nature and object of the legal procedure make the distinction between Crime and Civil Injury. Viewed as immoral acts, many civil injuries are worse than many crimes. But such acts or omissions for which the law affords redress only have in England been usually denominated civil injuries as contradistinguished from crimes.

Crimes, according to the English law, are divisible into two great classes, which depend upon the mode of proceeding peculiar to each.

1st. Such as are punishable on indictment or information (the Common Law methods of proceeding).

2ndly. Such as are punishable on summary conviction before a justice or justices of the peace or other authorized persons, without the intervention of a jury (a mode of proceeding derived entirely from special Statutory Enactments).

Offences punishable on Indictment or Information.

Indictable offences are distributable into four classes or divisions: Treasons, Præmunires, Felonies, and Misdemeanors. Persons who commit the offences which constitute the last-mentioned division may also be prosecuted by criminal information instead of being indicted.

The distinction between these classes is, for the most part, a merely arbitrary one; the consequence of which is, that offences in their nature wholly undistinguishable are, in many instances, separated and subjected to punishments widely disproportionate, and to forms of procedure widely dissimilar. In fact, the only real distinguishing feature between one class of crimes and another, at the present day, is to be found in certain peculiarities of punishment and procedure incident to each. Formerly, however, the

classes of crimes were marked by distinctive characteristics; but they have subsequently, either by artificial constructions of the courts or by legislative enactment, been made to embrace offences of a very different nature from those originally included within them. For instance, the crime of treason, whether high or petit, implied a violation of the allegiance due from an inferior to a superior. In the case of high treason, so called 'by way of eminent distinction,' it was the violation of the allegiance due from a subject to his liege lord and sovereign; and in case of petit treason, which was limited to the murder of a husband by his wife, a master by his servant, or an ecclesiastic by his inferior, who owed him faith and obedience, it was the breach of the allegiance of private and domestic faith.*

The characteristic above pointed out can no longer be traced in many of the various constructive treasons which have been created by the courts. It will be sufficient here to give a single illustration of the mode in which the law of treason has been stretched to reach cases totally inconsistent with its original design. By one of the clauses of the Statute of Treasons (25 Edw. III. c. 2) it is declared to be treason to *levy war against the king*. A riotous assembly attempting by force to redress a public grievance, as, for example, to pull down *all* inclosures, or to burn *all* meeting-houses, has been held to be a *levying of war* within the meaning of this clause, although there has been no direct intention or design whatever against either the state or the person of the king. This construction is said to depend upon the *generality* of the design. If the intention be to pull down *particular* inclosures or meeting-houses only, the offence is a mere riot, and in quality a simple misdemeanor. Although the generality of the design may be a reason for awarding a higher punishment in the former than in the latter case, there appears to be no reason for construing an offence, which but for such generality would be a misdemeanor only, to amount to the crime of treason in levying war against the king. The Criminal Law Commissioners (4th, 5th, and 6th Reports) have recommended that this offence should no longer be considered to fall within the Statute of Treasons. They propose that the only assemblings or risings of the people which should amount to a levying of war against the king should be such as are against the person of the king, or against any army or force appointed by him, in opposition to his authority, or with intent to do him bodily harm, or impose any restraint upon his person, or to depose him, or to dispossess or deprive him of any portion of his dominions or regal authority, or with intent by force or constraint to compel him to change his measures or counsels or to put any force or constraint upon or to intimidate or overawe both houses or either house of Parliament; and that no assembling or rising of the people should by reason of any illegality or generality of purpose be deemed to be a levying of war against the king, unless it be with one or other of the several intentions before mentioned. Such riotous and tumultuous meetings as have no such intention in view they recommend should be denominated felonies or misdemeanors

* Petit Treason was abolished by the 9 Geo. IV. c. 31, s. 2, and the offences constituting it declared to be murder only

merely, according to the circumstances by which they are attended.

Again, the term 'Præmunire' was originally applied to offences which consisted in the introduction of any foreign jurisdiction, more especially the authority of the See of Rome, into the kingdom, but has subsequently, to use the language of Mr. Serjeant Hawkins ('Pleas of the Crown,' b. 1, c. 19), 'been applied to other heinous crimes, for the most part having relation to the offences originally coming under the notion of præmunire, but in some instances none at all.' The Habeas Corpus Act (31 Car. II. c. 12) contains an instance of the latter mode of application. By the 12th section of that Act it is made a Præmunire to send any inhabitant of England, Wales, or the town of Berwick-upon-Tweed, a prisoner beyond the seas in defiance of its provisions to the contrary.

The term 'Præmunire' was adopted from the first word of the original writ on which the subsequent proceedings were founded: '*Præmunire* (for *præmoneri*) *facias* A. B. quod sit coram nobis, &c. The Criminal Law Commissioners propose to abolish præmunires as a class of crimes. (7th Report.)

The crime of felony had its origin in very remote times, and was founded upon feudal principles. Its incidents were not formerly, as they are now, of a merely arbitrary nature, annexed to certain criminal acts without reference to any principle. The crime originally consisted in a violation of the feudal contract by the misconduct of the lord or of the tenant, and, where committed by the tenant, occasioned as a consequence the forfeiture of his feud to the lord.

Those crimes, therefore, which induced such forfeiture, and, by a small deflection from the original sense, those which induced the forfeiture of goods also, were denominated felonies; and afterwards by long use the term *felony* came to signify the actual crime itself, and not the penal consequence. 'So that, upon the whole,' to use the words of Blackstone (4 'Com.,' p. 95), 'the only adequate definition of felony seems to be that which is before laid down, viz., an offence which occasions a total forfeiture of either lands or goods, or both, at the common law; and to which capital or other punishment may be superadded according to the degree of guilt.' Where the punishment is less than capital, the offender loses his goods only; where capital, his lands as well as his goods. The crimes which occasioned such forfeiture were originally, with one or two exceptions, capital; but at the present day there are offences for which no greater punishment can be inflicted than imprisonment for a term not exceeding three years, which are felonies, and consequently occasion the forfeiture of all the offender's goods and chattels; whilst other crimes, for which the punishment may be transportation for fourteen years, and in one instance *must* be for life, are misdemeanors only, and work no forfeiture. It is apparent from this that the present law is very defective, and that the amount of punishment is no longer the test of distinction between a felony and misdemeanor.

The term 'Misdemeanor' is used in the English system of Criminal Law to denote such indictable offences as are of a lower degree than felony.

We shall now point out the peculiarities of punishment which distinguish one class of crimes from another at the present day. In order to this, the

penal consequences incident to the whole body of offences constituting each class will be first stated, and then in what respects those consequences differ from each other. The classes will be taken in the same order as above.

1. *Treasons*.—Treasons, with one exception mentioned below, are capital; but whether capital or not, the offender, *upon conviction*, forfeits to the Crown the personal estate of every description, whether in action or possession, or settled by way of trust, which the offender has otherwise than as an executor, or a trustee, or a mortgagee (4 & 5 Will. IV. c. 23, s. 3), at the time of conviction; and in the case of capital treasons, *upon attainder by judgment of death or outlawry*, the blood of the offender is corrupted, but not so as to obstruct descents to such offender's posterity, when they are obliged to derive a title through such offender to a remoter ancestor (3 & 4 Will. IV. c. 106, s. 10); and all the freehold lands and tenements of inheritance in fee-simple or fee-tail, and all other hereditaments (except copyholds), whether in possession, reversion, or remainder; and all the rights of entry on freehold lands and tenements which the offender has, otherwise than as a trustee or mortgagee (4 & 5 Will. IV. c. 28, s. 3), at the time of the offence committed, or at any time afterwards, and also the profits of all freehold lands and tenements which the offender has in his or her own right for life, so long as such interest shall subsist, and if the offender be a male, his wife's dower, are forfeited to the Crown; and all the copyhold estates belonging to the offender at the time of the offence committed are forfeited to the lord of the manor. The above penal consequences are general to all capital treasons, unless, as is sometimes the case, the Act which creates the particular treason expressly exempts from some of them. The before-mentioned non-capital treason renders the party guilty of it liable to those only of the above consequences which accrue upon conviction, since the others follow only upon the party being attainted, that is, sentenced to death or outlawed; which latter, in the case of capital treasons and felonies, is of the same effect as being sentenced to death. The existence of this non-capital treason would appear to be the result of inadvertence. By the Forgery Consolidation Act (11 Geo. IV. & 1 Will. IV. c. 66), it was declared to be treason and punishable with death to forge the great and other royal seals and the sign-manual. By the 2 & 3 Will. IV. c. 123, the punishment of death was repealed for forgery in all but the two cases of wills and powers of attorney to transfer stock (it has been since taken away in these cases also by the 7 Will. IV. & 1 Vict. c. 84); but the *quality* of the offences enumerated in the Forgery Consolidation Act was left without alteration; so that to forge the royal seals, &c., would appear to be still treason, though no longer a capital offence.

The judgment of death in the case of treason is that the offender, if a male, be drawn on a hurdle to the place of execution, and be there hanged by the neck until dead; and that afterwards the head be severed from the body of such offender, and the body be divided into four quarters, to be disposed of as her Majesty shall think fit (54 Geo. III. c. 146); and if a female, that the offender be drawn to the place of execution, and be there hanged by the neck

until dead (30 Geo. III. c. 48, s. 1). The queen, however, may, by warrant under her sign-manual, counter-signed by a principal secretary of state, direct, where the offender is a male, that he shall not be drawn, but taken in such manner as in the warrant shall be expressed to the place of execution, and that he shall not be hanged, but be beheaded, whilst alive, instead. (54 Geo. III. c. 146, s. 2.)

2. *Præmunires*.—The penalties of præmunire, as shortly summed up by Sir Edward Coke (1 Inst., 130 a.), are, 'that from the conviction the defendant shall be out of the king's protection, and his lands and tenements' (i.e., in fee-simple or for life, but not in tail, beyond his life interest therein), 'goods and chattels, forfeited to the king; and that his body shall remain in prison at the king's pleasure, or, as other authorities have it, during life.' These penalties were first imposed by the Stat. 16 Rich. II. c. 5 (commonly called the Statute of Præmunire); and it is by reference to that statute that all subsequent præmunires have been made punishable. It was formerly supposed that a person convicted of præmunire, being put out of the king's protection, might be killed with impunity as being the king's enemy; but by the 5 Eliz. c. 1, ss. 21 and 22, it was enacted that it should not be lawful to kill any person attainted in a præmunire, saving such pains of death or other hurt or punishment as theretofore might, without danger of law, be done upon persons sending or bringing into the realm, &c., any process, &c., from the See of Rome. Præmunires, although they occasion a forfeiture of the offender's lands and goods, are not felonies. To constitute a felony, the offence must have worked a forfeiture at the common law; but in the case of præmunire, the forfeiture is made a part of the punishment by statute merely, which is not sufficient.

3. *Felonies*.—All felonies, as stated above, were originally, with one or two exceptions, punishable with death; but the offender, unless the felony was excluded from the benefit of clergy, was entitled, for a first offence, to be discharged from the capital punishment upon praying that benefit. [BENEFIT OF CLERGY.] But now, since the passing of the 7 & 8 Geo. IV. c. 28, no felony is punishable with death unless it was excluded from the benefit of the clergy before or on the 14th November, 1826, or has been or shall be made punishable with death by some statute passed since that day. Where not capital, felonies are punishable either in the manner prescribed by the statute or statutes specially relating to such felonies, or where no punishment has been or may hereafter be specially provided, with transportation for seven years, or imprisonment for any term not exceeding two years. (7 & 8 Geo. IV. c. 28, ss. 7 and 8.) Such confinement must not, however, be for a longer period than one month at a time, or three months in a year. (7 Will. IV. & 1 Vict. c. 90, s. 5.) In the case of *all* felonies, whether capital or not, the offender immediately *on conviction* forfeits to the Crown all the personal estate of every description, whether in action or possession, or settled by way of trust, which he has otherwise than as an executor, or a trustee or mortgagee (4 & 5 Will. IV. c. 23, s. 3), at the time of conviction, and in the case of all capital felonies, *upon attainer by judgment of death or outlawry*, forfeits to the Crown the profits of all

estates of freehold, and of things not lying in tenure, and to the lord of the manor the profits of all estates of copyhold, which the offender has, otherwise than as a trustee or mortgagee (4 & 5 Will. IV. c. 23, s. 3), at the time of the offence committed, during his life; and his blood is corrupted (but not so as to obstruct descents to the posterity of such offender where they are obliged to derive a title through him to a remote ancestor (3 & 4 Will. IV. c. 106, s. 10), and after his death his copyholds which he holds in fee-simple are forfeited to the lord of the manor. And also, in the case of murder, all his freehold lands and tenements in fee-simple escheat (subject to what is called the crown's year, day and waste) to the lord of the fee. (54 Geo. III. c. 145; Co.-Litt. 391 a.; 4 Black. 'Com.' 385.)

The judgment of death in the case of all capital felonies, except murder, is that the offender be hanged by the neck until dead (2 Hale's 'P.C.' 411); and in the case of murder it is the same, with the addition that the offender's body shall be buried within the precincts of the prison in which he shall have been confined after conviction. (2 & 3 Will. IV. c. 75, s. 16; 4 & 5 Will. IV. c. 26.) The court, however, is empowered, if it shall think that the offender is a fit subject to be recommended to the royal mercy, to abstain from pronouncing judgment of death upon him, and to order such judgment to be entered of record instead; and the judgment so recorded has the same effect as if pronounced and the party were reprieved. (4 Geo. IV. c. 48, ss. 1 and 2; 6 & 7 Will. IV. c. 30, s. 2.)*

A bill introduced into Parliament in the present session (1866) proposes to recognize two degrees of murder: the one including cases of premeditated homicide, which will be punishable by death; and the other, murders committed under provocation, which will not be visited with the capital penalty. Executions are no longer to take place in public.

4. *Misdemeanors*.—The punishment in the case of misdemeanors, where none is specially provided by statute, is generally fine and imprisonment.

It thus appears that the circumstance, so far as punishment is concerned, which distinguishes misdemeanors from all the other classes of offences, is the absence of forfeiture as a necessary consequence of conviction. The distinction between præmunires and felonies (which term, it should be remarked, in its largest sense, includes treasons, on account of the forfeiture which that class of crimes occasions) is, that the forfeiture which ensues upon a conviction of the former is, as before observed, in pursuance of statutable provisions; whereas, in the latter case, it is a common law consequence of the offence, and follows as a matter of course whenever a crime is declared to be a felony. There appears to be no distinction as regards punishment, independently of special statutable enactment, between non-capital felonies (the term is used here in its ordinary restricted sense) and the non-capital treason above described; but the difference between felonies and treasons when punishable with death is very considerable. In the case of

* See *R. v. Hogg*, 2 M. & Ro. 381, where it was held that, since the passing of the 6 & 7 Will. IV., c. 30, death may be recorded in the case of murder as well as other capital felonies, notwithstanding the exception contained in the 4 Geo. IV. c. 48.

felonies the offender upon attainer *forfeits* to the Crown the profits only of such freehold and copyhold lands as he had at the time of committing the offence; during his life, and after his death his copyholds in fee-simple are forfeited to the lord of the manor; and, even where attainted of murder, though his freehold estates in fee-simple fail after his death, it is not as a consequence of the law of forfeiture, but because they escheat for want of heirs capable of succeeding to them, owing to his blood being corrupted by the attainer; and it is on account of such estates escheating and not being forfeited that they go to the lord of the fee (that is, subject to the crown's year, day and waste), and not to the Crown, unless there appears to be no intermediate lord between the offender and the Crown, in which event the Crown takes as ultimate lord of the fee. In the case of treason, however, the offender upon attainer, instead of forfeiting to the Crown the profits merely of such freehold lands as he had at the time of committing the offence, during his life, forfeits all freehold estates of inheritance, as well those in fee-tail as those in fee-simple, and not only such as he had at the time of the commission of the offence, but those also which he may acquire at any time afterwards; and instead of forfeiting to the Crown the profits of his copyholds during his life, and to the lord of the manor his copyholds in fee-simple only, he forfeits at once to the lord of the manor *all* the copyholds belonging to him at the time the offence was committed. Where the offender is a male, his wife's dower is also forfeited to the Crown, which is not the case in felony. It is to be observed that the Crown is now empowered (see 59 Geo. III., c. 94) to restore the whole or any part of any lands or hereditaments to which it becomes entitled by escheat or forfeiture to the family of the offender—a provision which has greatly mitigated the harshness of the law of forfeiture. The Criminal Law Commissioners, however, have recommended the entire abolition of the confiscation of property as a necessary incident to convictions for treason or felony.

According to the law of England, all persons above the age of seven years, except such as by reason of unripeness, weakness, unsoundness, disease, or delusion of mind, are incapable of discerning, at the time they do an act, that the act is contrary either to the law of God or the law of the land, are criminally responsible for such act; but temporary incapacity wilfully incurred by intoxication or other means is no excuse. An infant of the age of seven and under fourteen years, however, is to be presumed to be incapable of committing a crime until the contrary be proved. Duress, also, inducing a well-grounded fear of death or grievous bodily harm, will excuse a person acting under such duress in all cases except treason and murder; and a married woman committing any offence, except those last mentioned, if her husband be present at the time, shall be presumed to have acted under his coercion, and be entitled to an acquittal, unless it appear that she did not so act. A married woman also shall not be liable to conviction for receiving her husband or any other person in his presence and by his authority.

The following provisions are of general application. By the Stat. 7 Will. IV. and 1 Vict. c. 90, s. 5, it is enacted that no court shall direct any offender to be kept in solitary confinement for any longer period

than one month at a time or than three months in the space of one year.

By the Stat. 7 Will. IV. and 1 Vict. c. 85, s. 11, power is given to the jury on the trial of any person for any felony whatever, where the crime charged shall include an assault against the person, to acquit of the felony, and to find a verdict of guilty of assault against the person indicted, if the evidence shall warrant such finding; and thereupon the court may imprison the person so found guilty of an assault for any term not exceeding three years, with or without hard labour or solitary confinement, or with both.

By the Stat. 1 Geo. IV. c. 57, s. 3, it is provided that, where the punishment of whipping on *female* offenders formed, before the passing of that Act, the whole or part of the sentence to be pronounced, the court may pass sentence of confinement to hard labour for any time not exceeding six months nor less than one month, or of solitary confinement, in lieu of the sentence of being whipped. In all cases, therefore, where whipping is mentioned to be part of the punishment, without its being restricted to males, the above provision operates.

By the 3 & 4 Vict. c. 111, made perpetual by 5 & 6 Vict. c. 85, members of joint-stock or other banking companies, consisting of more than six persons, committing offences against or with intent to injure or defraud such co-partnerships, are made liable to the same punishments as if they had not been or were not members of such co-partnerships.

The following treasons are punishable with death:—*

1. Compassing the death of the king (which term includes a queen regnant) or of his queen, or their eldest son and heir; violating the king's companion (*i.e.*, his wife) during the coverture, or the king's eldest daughter unmarried, or the wife of the king's eldest son and heir; levying war against the king in his realm, or being adherent to the king's enemies in his realm, giving them aid and comfort in the realm or elsewhere, and being thereof attainted of open deed; or slaying the chancellor, treasurer, or the king's justices of the one bench or the other; justices in eyre or justices of assize, or any other justices assigned to hear and determine, being in their places doing their offices.† (25 Edw. III. st. 5, c. 2.)

2. Endeavouring to prevent the person next in succession to the crown, according to the Acts of Settlement, from succeeding thereto. (1 Anne, st. 2, c. 17, s. 3.)

3. Affirming, by writing or printing, that any other person has a right to the crown otherwise than according to the Acts of Settlement and the Acts for the union of England and Scotland; or that the Crown, with the authority of Parliament, is unable to limit the descent of the crown. (6 Anne, c. 7, s. 1.)

4. Compassing or intending the death or destruction, or any bodily harm tending to death or destruc-

* To conceal or keep secret any treason committed or intended to be committed is termed misprision of treason, and is punishable with loss of the profits of lands during life, forfeiture of goods, and imprisonment for life. (See 1 & 2 Phil. and Mary, c. 10, s. 8.)

† By the 11 Hen. VII. c. 1, it is enacted that no person who attends upon the king for the time being, in his person, and does him true and faithful service of allegiance, or is in other places by his commandment, in his wars, in this land or without, shall for such deed and true allegiance be convicted or attainted of treason.

tion, maim or wounding, imprisonment or restraint, of the person of the king; or to deprive or depose him from the crown; or to levy war against him within the realm, in order to compel him to change his measures or counsels, or in order to overawe the Parliament; or to move any foreigner to invade any of the British dominions; such compassing or intention being expressed by publishing some printing or writing, or by some overt act or deed. (36 Geo. III. c. 7, s. 1, made perpetual by 57 Geo. III. c. 6.)

5. Being married to or being concerned in procuring the marriage of any issue of her present Majesty whilst such issue are under eighteen (in case the crown shall have descended to any such before that age), without the consent in writing of the regent and the assent of both Houses of Parliament. (3 & 4 Vict. c. 52, s. 4.)

6. Knowing any person to have committed any of the before-mentioned capital treasons, receiving, relieving, comforting, or assisting him, or aiding his escape from custody.

Besides the last-mentioned offence, there also existed till quite recently several other capital treasons relating to the See of Rome; but these were repealed by the 7 & 8 Vict. c. 102.

The following treason (the one already alluded to) is punishable with transportation for life or not less than seven years, or with imprisonment for any term not exceeding four nor less than two years, with or without hard labour or solitary confinement, or with both, viz. :—

1. Forgery of the great seal, her Majesty's privy seal, any private signet of her Majesty, the royal sign-manual, the seals appointed to be used in Scotland, and the great and privy seals of Ireland. (24 & 25 Vict. c. 9, s. 1.)

The following are the offences coming under the denomination of *Præmunires* :—

1. Derogating from the queen's courts. (27 Edw. III. stat. 1, c. 1, s. 1.)

2. Deans and chapters omitting to elect a bishop, and archbishops or bishops to consecrate the person so elected, after receiving the queen's *congé d'élire*. (25 Hen. VIII. c. 20, s. 7; repealed by 1 & 2 Philip and Mary, c. 8, and revived by 1 Eliz. c. 7.)

3. Molesting the possessors of abbey-lands contrary to the provisions of 1 & 2 Philip and Mary, c. 8. (1 & 2 Phil. and Mary, c. 8, s. 40.)

4. Obtaining any stay of proceedings, other than by arrest of judgment or writ of error, in suits for monopolies. (21 Jac. I. c. 3, s. 4.)

5. Procuring any stay of proceedings, other than by the authority of the court, in actions brought against persons for making provision or purveyance for the Crown. (12 Car. II. c. 24, s. 14.)

6. Asserting, maliciously and advisedly, by speaking or writing, that both or either House of Parliament has a legislative authority without the Crown. (13 Car. II. c. 1, s. 3.)

7. Sending any subject of the realm a prisoner beyond the seas in defiance of the Habeas Corpus Act. (31 Car. II. c. 2, s. 12.)

8. Asserting, maliciously and directly, by preaching, teaching, or advised speaking, that any person, other than according to the Acts of Settlement and Union, has any right to the throne of these kingdoms, or that the Queen and Parliament cannot

make laws to limit the descent of the crown. (6 Anne, c. 7, s. 2.)

9. Knowingly and wilfully solemnizing, assisting, or being present at, any marriage forbidden by the Royal Marriage Act. (12 Geo. III. c. 11, s. 3.)

The following felonies are punishable with death, viz. :—

1. Destroying ships of war or her Majesty's arsenals, dockyards, naval, military or victualling stores, or other ammunition of war, &c. (12 Geo. III. c. 24, s. 1.)

2. Murder.

3. Unnatural offences.

4. Attempts to murder by administering poison, or by wounding, or by any other means where bodily injury dangerous to life is caused.

5. Burglary, aggravated by striking an inmate.

6. Robbery, aggravated by wounding the person robbed.

7. Piracy, aggravated by endangering the life of any person on board of the vessel in respect of which the piracy is committed. The above offences are provided for by 24 & 25 Vict. c. 100.

8. Setting fire to a dwelling-house, any person being therein. (24 & 25 Vict. c. 97, s. 2.)

9. Destroying vessels with intent to murder, or whereby human life is endangered. (24 & 25 Vict. c. 100, s. 13.)

10. Exhibiting false lights, &c., with intent to bring ships into danger, or unlawfully doing anything tending to the destruction of ships in distress. (24 & 25 Vict. c. 100, s. 47.)

Besides the above offences, that of wilfully and without lawful excuse having or being possessed of any forged stamp used in pursuance of any Act relating to any duties on gold or silver plate made or wrought in Great Britain, for the purpose of marking or stamping such plate, appears to be still punishable with death.

That offence is contained in 55 Geo. III. c. 185, s. 7, by virtue of which enactment it was formerly also a capital crime to forge or utter the stamps provided for marking any such plate, or to fraudulently remove such stamps from one piece of such plate to another, or privately and secretly to use such stamps with intent to defraud the king. The punishment of death for these last-mentioned offences was repealed, however, by 11 Geo. IV. and 1 Wm. IV. c. 66, s. 1 (as to the forging and uttering), and by 4 & 5 Vict. c. 56, s. 1 (as to the removing and fraudulently using); but by some inadvertence (for it is clear that it can never have been intended) the offence of being possessed, without lawful excuse, of forged stamps for making gold or silver plate (the least criminal of all the acts specified in 55 Geo. III. c. 185, s. 7) was still left capital, but by 24 & 25 Vict. c. 98, s. 48, all forgeries which were capital before the 1 Will. IV. c. 66, and are not otherwise punishable under this Act, shall be punished with penal servitude for life, &c.

The punishments of other felonies are penal servitude and imprisonment.

Placing wood, &c., on a railway, with intent to obstruct or overthrow any engine, obstructing engines or carriages, injuries to electric telegraphs, attempts to injure telegraphs, are punishable by 24 & 25 Vict. c. 97.

The whole Criminal Law of England, as regards indictable crimes and their punishments, has been collected and reduced into one body by the Criminal Law Commissioners (see their Seventh Report), and is thus for the first time rendered accessible to the public at large, and is now, with a few exceptions above referred to, contained in 24 & 25 Vict. caps. 94, 95, 97, 98, 99, and 100. Before this reduction the Criminal Law had to be sought for in an immense mass of statutes, reported decisions, records, ancient and modern, and text-books, and on that account could be known but to the few, and those principally engaged in the practice or administration of the law.

The Criminal Law of Scotland differs in many respects from that of England. There is, for instance, no classification of offences under different heads, as we have explained exists in the criminal procedure of the sister kingdom. But perhaps the most important distinction between the two systems is to be found in the fact, that whereas in England no criminal act is punishable as a crime until it has been pronounced to be so by the Legislature, in Scotland every act which is *malum in se*—offensive to public decency and morality—may, at the instance of the public prosecutor, be brought under the cognizance of the High Court of Justiciary [JUSTICIARY COURT]; that tribunal having within certain limits the power of inflicting an arbitrary punishment—that is, one not inferring a capital sentence—for all new and innumerate offences.

The sources of the criminal law of Scotland are ancient custom, the Roman, Canon, and Jewish laws, and the acts of the Scotch legislature (Hume, Commentaries I. 18, *et seq.*); and it is probably to the varied nature of its historical origin that we owe the great discrepancy that exists between the criminal procedure of this country and that of England.

LAW, JOHN, of Lauriston, was born about the year 1681 at Edinburgh, in which city his father was a goldsmith. In early life he was engaged to arrange the revenue accounts of Scotland. After wasting some years in gaming and dissipation on the Continent, Law went to Paris, where he ingratiated himself with the regent duke of Orleans. By the persuasion of Law the first public bank of circulation was established by the regent in 1716, and its management was intrusted to the projector. This bank obtained the privilege for twenty years of issuing notes, which, however, were to be exchangeable on demand for coin. With the view of inducing the public to purchase the bank shares, the Mississippi Company was formed, with a capital of 100 millions of livres, and allied to the bank. Such numbers crowded forward to make investments in the stock of this Company, that the stock rose in price to 2050 per cent., and 150 millions of livres were added to the capital. In the midst of a vast amount of speculation, and the negotiation of large loans to the government, a royal *arrêt* appeared, which suddenly produced an entire revulsion in the public feeling. Under the pretence of a previous depreciation of the value of the coin, it was by this *arrêt* declared necessary to reduce the nominal value of bank-notes to one-half, and of the shares of the India or Mississippi Company from 9000 to 5000 livres. The consequence was that the bank-notes could no longer be circulated at more than one-tenth

of their nominal value, and though the *arrêt* was speedily revoked, the result was that the bank stopped payment. By these proceedings many thousands of families were suddenly reduced to indigence; and Law was obliged to quit France with the wreck of the fortune he might at one time have realized. He resided for some time in different places in Germany, and ultimately settled at Venice, where he died in 1729.

In 'A Discourse upon Money and Trade,' which he wrote and published in Scotland, Law has left a record of the views which led him to his financial schemes.

LAW-MERCHANT. [LEX MERCATORIA.]

LAW TERMS. [TERM.]

LAWES, HENRY, was a native most probably of Salisbury, of which cathedral his father was a vicar-choral, and was born in the year 1600. In 1625 Lawes was appointed one of the gentlemen of the chapel, and afterwards clerk of the cheque to Charles I. In 1633, in conjunction with Simon Ives, he produced the music to a mask presented at Whitehall by the members of the four Inns of Court. About the same time he composed the music to Milton's 'Comus,' which was performed at Ludlow Castle in 1634. A great many of the effusions of the contemporary poets and persons of rank are to be found set to music by him in his three sets of 'Ayres and Dialogues for One, Two, and Three Voices,' published in 1653, 1655, and 1669.

Lawes continued in the service of Charles till the king's death. At the Restoration he resumed his places in the chapel-royal, and composed the anthem for the coronation of Charles II. He died in 1662, and his remains were deposited in Westminster Abbey.

LAWN, a space of ground covered with grass, kept short by mowing, and generally situated in front of a house or mansion.

Previous to laying down, the ground intended for a lawn should be properly trenched and drained, in order that such trees and shrubs as may afterwards be planted upon it should succeed well. After trenching, the soil should be allowed to subside, and the greatest care should be taken to make the surface perfectly even, otherwise a great expense will be afterwards incurred by the loss of time in mowing, which can neither be so quickly nor so well performed where the surface is uneven.

If turf can be readily procured, a lawn is at once produced; and by such means a more uniform distribution of grass may be obtained than by any other means. The surface of a well-fed meadow, or of an old common, closely cropped by sheep and geese, affords the best kind of turf; and if any tall or coarse grasses should be mixed with it, no inconvenience will arise, for everything of this sort will eventually disappear under close mowing; and such only as are dwarf and suited to the soil will ultimately remain. Where a turf is to be produced by sowing, the seeds of such species as are indigenous to the locality, and possess at the same time the property of being dwarf and fine, are to be preferred; but in the event of this method of forming a lawn being adopted, it is always desirable that a narrow slip of good turf should be carried all round the circumference.

Lawns, when once established, require only to be kept neat by the ordinary routine of rolling, mowing, and sweeping, except keeping the surface perfectly even by filling up small hollows with screened mould early in spring.

LAWRENCE, SIR HENRY MONTGOMERY, K.C.B., an eminent Anglo-Indian officer and official, was born at Mattura in Ceylon in 1806, educated at the diocesan school of Londonderry, and afterwards at the Military College, Addiscombe, and entered in 1821 the service of the East India Company as a cadet in the Bengal artillery. He soon acquired a reputation as a very able and intelligent officer. Serving in the Cabul campaign of 1842 with Sir George Pollock, he was made a major, and afterwards filled two important political posts—first as assistant to the political agent in charge of British relations with Lahore, and then as British resident at the court of Nepal. To his experiences in the former capacity we owe the work, at once amusing and instructive, which he published in 1845, 'Adventures of an Officer in the service of Runjeet Singh.' He played a conspicuous part in the campaigns of the Sutlej, and for his services was made a lieutenant-colonel and a military companion of the Bath. In the interval between the first and second Sikh wars he was resident at Lahore, and agent for the governor-general on the north-western frontier, and for his able discharge of his important duties was made a K.C.B. in 1848. On the annexation of the Punjab in 1849, Sir Henry Lawrence was appointed by Lord Dalhousie president of the board for the reduction and government of the newly acquired territory, one of the members of the board being his younger brother, Sir John Lawrence. Great was the success of his measures, civil and military, for the pacification and settlement of the Punjab. The Sikh army was disbanded, an armed police was established, roads were made, and works of irrigation executed on an extensive scale. In 1854 he became a full colonel and honorary aide-de-camp to the queen. At the outbreak of the Indian mutiny Sir Henry had been ordered by his medical attendants to revisit Europe, and was actually on his way to England, but at the pressing request of the Indian government he gave up his European visit, and proceeded to Lucknow as chief-commissioner in Oude. His measures for guarding against mutiny were very judicious. He did all that prudence and foresight could suggest to prevent an outbreak, while he rapidly fortified and provisioned the position which he had selected to defend. These precautions proved the salvation of the English in Lucknow. The mutiny at Lucknow broke out on the 30th of May. On the 1st of July Sir Henry occupied a room in the Residency, very much exposed to the enemy's fire, but which no entreaties would induce him to leave. On the 2nd he was mortally wounded by a shot. In great suffering he lingered on till the morning of the 4th, when he expired. Of his benevolence and sagacity permanent memorials survive in the Lawrence Asylum, and his published writings.

LAWRENCE, SIR THOMAS, P.R.A., was born at Bristol, May 4, 1769. His father was landlord of the Black Bear Inn at Devizes, and he commenced his career by drawing chalk likenesses of his father's customers. So precocious was his ability, that at the early age of ten he set up as a portrait-painter

in crayons at Oxford, and shortly afterwards took a house at Bath, and at once established a good business. His success was extraordinary, and he became after a few years dissatisfied with crayons, and adopted oil-painting instead; yet he was still only a boy of seventeen. In 1787 he settled in London, and in 1791 had so far distinguished himself as a portrait-painter, that, though still under the legal age of twenty-four years, he was elected an associate of the Academy, and in the following year succeeded Sir Joshua Reynolds as painter to the king. He was now the head of his profession at an age at which other painters have generally been labouring in the toils of studentship. He painted the portrait of George III. and Queen Charlotte which Lord Macartney took with him on his embassy to China in 1792. In 1795 he was elected a royal academician, and from this time his career as a portrait painter was unrivalled, and perhaps unprecedented. Yet for the higher qualities of his art his portraits will not bear comparison with the best works of Sir Joshua Reynolds. He seems to have fascinated people much in the same way that Guido Reni did in his early career. There is a certain indescribable sweetness in the execution of both; and Sir Thomas Lawrence's portraits of women and children are often very beautiful. He was so skilful a flatterer of the ladies that he never failed to give satisfaction. With men he was not so successful; his figures are generally out of drawing, the necks being often twice as long as in nature, though this deformity is somewhat disguised by the style of the costume of the time. He was knighted by the prince-regent in 1815, and at the death of West, in 1820, was unanimously elected to succeed him as president of the Academy. He died in London, January 7, 1830. (Williams, *Life and Correspondence of Sir Thomas Lawrence*, 1831.)

LAWRENCE, ST. [CANADA.]

LAWSONIA, a genus of plants of the natural family *Lytharica*, which, consisting of only one or two species, may be found in most Oriental regions in gardens or in field cultivation. *L. inermis* is said by Oriental travellers to be used by the Asiatic women in dyeing their nails and the tips of their fingers, as well as the soles of their feet, of an orange hue. It is also used by the men for dyeing their beards, the orange colour being afterwards converted to a deep black by the application of indigo. The Arabic name of the plant is *Henna*.

LAY (Anglo-Saxon, *ley*, a song), in poetry and music a little pensive song or air, and generally used in that sense by Chaucer, Spenser, Milton, Waller, Dryden, and other classical English poets. The lay was originally formed on the model of the trochaic verses of the Greek and Latin tragedies; but according to Dr. Busby, there were two kinds of lays; the *greater*, which consisted of twelve couplets of verses in different measures; and the *lesser*, which comprehended sixteen or twenty verses.

LAYBACH. [ILLYRIA.]

LAYERING is an operation by which the propagation of plants is effected by laying down or bending the shoots, so that a portion of them can be covered with earth. A shoot so operated on is called a *layer*, and the plant which furnishes the layer bears the name of *stool*.

The part of the shoot intended to form a layer

should be divested of leaves where it is to be covered with the mould, and a slit should be made on the bent part, or the branch should be twisted half round at the bend so as to disarrange the woody tissue, or the bark should be half or three-quarters *ringed*: the shoot is then fixed down by pegs or hooked sticks, cut down to within an inch or so of the ground, and covered with good mould, which must afterwards be kept tolerably moist. In general, roots are emitted in a few weeks, and by the end of a season young plants are obtained quite fit for transplantation. Some plants, however, require to be left for two years on the stools before they are removed, and there are some which can hardly be made to root at all in this manner.

LAZARETTO (in Italian *Lazzeretto*), is the name given to a building or inclosure which is annexed to seaport towns, chiefly in the Mediterranean, for the purpose of keeping confined therein the crews of ships and passengers arriving from places where a contagious disease is known to prevail. The persons thus confined are said to be in *Quarantine*, from the Italian word *quaranta*, 'forty,' because the period of confinement for those arriving from actually infected places is forty days; after which, if no one has fallen ill, they are set at liberty. The name 'lazzaretto' is derived from Lazarus. [QUARANTINE.]

LAZIAN MOUNTAINS. [ANATOLIA.]

LA'ZULITE, *Lapis Lazuli*, occurs crystalline and massive. Primary form of the crystal a cube, but occurs in imbedded rhombic dodecahedrons. Hardness, 5.5 to 6. Colour, azure and different shades of blue; streak, paler blue. Translucent, opaque. Specific gravity, 2.76 to 2.94.

Massive variety amorphous, sometimes in grains, imbedded. Fuses on charcoal, when pure, into a white glass. It is brought from Persia and China, and is employed in the manufacture of *Ultramarine*. It consists of—phosphoric acid, 41.81; alumina, 35.73; magnesia, 9.34; silica, 2.10: protoxide of iron, 2.64; water, 6.06.

LAZZARONI. [NAPLES.]

LAZZI (Germ. *lassig*, 'lazy'), among our Saxon ancestors, a term applied to the third and last class of the people, who were of a servile condition, and born to labour. They could not leave the soil, or quit their servitude, without the permission of the lord; but were in the position of serfs or slaves. The other two classes of society were the *Edhilingi*, or nobles; and the *Frilingi*, or gentry; the latter word signifying to be born free.

LE or LEH, city of. [LADAKH.]

LEA, River. [ESSEX; HERTFORDSHIRE.]

LEAD is a metal of a bluish gray colour, and of considerable brilliancy when fresh surfaces are formed by cutting. If it has not been cooled too rapidly, it is so soft that, even when in pieces of considerable thickness, it may be easily bent. It soils slightly, and leaves on paper or cloth a mark after friction resembling that of plumbago. Its specific gravity is 11.4. The chemical symbol for lead is Pb, and its equivalent is 103.8. Lead may be reduced to thin laminae; but its tenacity is extremely slight, so that a wire about 1-10th of an inch in diameter breaks with a weight of 30 pounds. It fuses at about 612°, and when slowly cooled crystallizes in octohedrons. It is not

a volatile metal, for in close vessels it may be heated to whiteness without subliming. When exposed to the air, it absorbs oxygen and carbonic acid slowly, and acquires a superficial coating of carbonate of lead. If it be exposed to air and water, it is oxidized and converted into carbonate of lead with considerable rapidity; this carbonate has the appearance of minute shining brilliant scales. Though at common temperatures lead is slowly acted upon by the oxygen of the air, it is readily oxidized when the heat is raised.

ORES OF LEAD.—The ores of lead, strictly speaking, are few in number. Indeed the only one which can be properly considered as a working ore is the Sulphuret, but there are various combinations of lead occurring in nature, which we shall notice briefly.

Native Lead.—This is of very rare occurrence; it is found in small globular masses, imbedded in galena, or sulphuret of lead, and a slaggy substance, accompanied with blende and crystals of quartz. *Protoxide of Lead*, *Native Massicot*, occurs in brittle, dull, opaque, yellowish masses, which melt readily by the blow-pipe. *Deutoxide of Lead*, *Native Red Lead*, *Native Minium*, is a dull red earthy substance, which is reduced to the metallic state by the blow-pipe. *Chloride of Lead*, *Columnia*, *Cotunnite*, occurs in small pearly crystals, which are easily fusible and soluble. *Dichloride of Lead*, *Berzelite*, occurs in crystalline masses, with a fibrous and radiated structure, on earthy black ore of manganese. *Sulphuret of Lead*, *Galena*. This almost universally diffused ore occurs in attached *crystals* and *massive*. Primary form the cube. The crystals are opaque and leaden gray. The massive varieties have a granular structure. By the blow-pipe on charcoal the sulphur is first dissipated, and then metallic lead is obtained. In Cornwall and Scotland the veins of this ore traverse primary rocks. In Derbyshire it occurs in veins or beds in transition rocks. It very commonly contains a portion of silver. *Seleniuret of Lead* occurs in granular masses, opaque, and of a bluish lead colour.

Having described the principal native binary compounds of lead, we proceed to notice those which are composed of an *acid* and *oxide of lead*, remarking that the *protoxide* only combines with acids.

Carbonate of Lead occurs crystallized and massive. Primary form a right rhombic prism; brittle; grayish colour; and translucent. It occurs in most lead-mines, and is sometimes used as an ore of lead. *Sulphate of Lead* occurs in right rhombic prisms, variously tinted, and translucent. *Phosphate of Lead*, *Pyromorphite*, commonly occurs in hexagonal prisms, variously coloured, resinous lustre, and translucent. *Arseniate of Lead*, *Gorlandite*, occurs in hexagonal prismatic crystals, yellowish and translucent. *Chromate of Lead* is a rhombic prismatic crystal, reddish coloured, and translucent. *Molybdate of Lead*, or *Carinithite*, is a prismatic crystal of various colours, translucent, and having a resinous lustre. *Tungstate of Lead* is a prismatic crystal, with a conchoidal fracture, a yellowish colour, a resinous lustre, and translucent. *Vanadate of Lead*, or *Johnstonite*, occurs in rhomboidal crystals, brittle, yellowish, and opaque.

We now proceed to mention some artificial compounds and salts of lead, confining our description to such as are most curious in a scientific point of view, or most useful in the arts.

There are four compounds of *Oxygen and Lead*. *Suboxide of Lead* is a dark gray powder, not soluble in acids, but resolved by them into protoxide and metallic lead. It consists of $Pb^2 O$. *Binoxide of Lead* is an insoluble brown powder. It is decomposed by the action of light, by a strong heat, and also by being converted into protoxide by lead and oxygen. In consists of $Pb O^2$. *Protoxide of Lead*, or *Massicot* ($Pb O$); and *Deutoxide of Lead* or *Minium* ($Pb^3 O^4$), is mentioned among the ores of lead.

Chloride of Lead is a colourless, somewhat crystalline powder, which melts by the application of heat, and assumes on cooling a horny appearance, whence it was formerly called Horn Lead. It is sparingly soluble in water, and consists of $Pb Cl$. *Oxichloride of Lead* is used as a pigment by the name of Patent Yellow; it consists of oxide of lead¹⁰, chlorine¹, and is a yellowish crystalline substance. *Sulphuret of Lead* may be formed by melting a mixture of sulphur and lead filings; in appearance it very much resembles lead, and is composed of $Pb S$. *Iodide of Lead* is a yellow powder, sparingly soluble in boiling water, and separates, on cooling, in brilliant flakes. It consists of $Pb I$. *Carbonate of Lead* is very largely employed as a pigment under the name of *White Lead*, or *Ceruse*, from the Latin name *Cerussa*. Various processes are adopted for its preparation; the oldest (which is still preferred by many manufacturers) is that of exposing sheet lead to the action of the vapour of vinegar, in earthen pots, heated by tanners' spent bark. It is a dense white powder, composed of lead¹, carbonic acid¹. *Nitrate of Lead* is a colourless solution, which by evaporation yields colourless octohedral crystals. They decrepitate when heated moderately, and if strongly heated they are decomposed; they consist of oxide of lead¹, acid¹. *Sulphate of Lead* is a dense white substance, insoluble in water; it consists of oxide of lead¹, acid¹. *Phosphate of Lead* is also a white insoluble powder; but unlike the sulphate, it dissolves readily in dilute nitric acid. *Acetate of Lead*, frequently called Sugar of Lead, is very largely employed for various purposes. It is prepared by dissolving litharge in acetic acid, and evaporating the solution to its crystallizing point. The crystals are generally minute and prismatic; they are colourless, nearly inodorous, and have a sweetish astringent taste. They consist of acetic acid¹, oxide of lead¹, water³. When this salt is boiled in water with an equivalent of oxide of lead, diacetate of lead is formed, which is used in medicine under the name of Goulard's Extract of Lead. *Chromate of Lead* is largely employed as a pigment. It is of a beautiful yellow colour.

Of the alloys of lead, three are of some importance. Alloyed with antimony, lead forms *Type metal*; *Pewter* consists of about 80 parts tin and 20 lead. Equal parts of tin and lead form *Plumber's Solder*.

History, Manufacture, and Trade.—Lead was known to and used by the Greeks and Romans for various purposes. Among others it was employed for pipes to convey water, just as it is now. The lead mines of this island were worked by the Romans. The chief of them were in Cornwall, Devonshire, Somersetshire, Derbyshire, Durham, Lancashire, Cumberland, Westmoreland, Shropshire, Flintshire, Denbighshire, Merionethshire, and Montgomeryshire; in Scotland, in Dumfriesshire, Lanarkshire, Ayrshire,

and Argyleshire. Lead is also found in Ireland, in the counties of Armagh, Wexford, Wicklow, Waterford, Clare, and Down.

The ore of lead, when extracted from the mine, is called *Galena*, and is combined with various earthy matters. The first processes subsequent to its extraction are those of crushing or pounding and washing the ore. The ore is then smelted, sometimes in a common smelting furnace and sometimes in a reverberatory furnace; and the melted metal is allowed to run into a large iron pan, from which it is ladled into cast-iron moulds. It then constitutes what is called Pig Lead. In this state lead always contains more or less of silver. The proportion is sometimes exceedingly minute, varying from 1 to 30 ounces in a ton of lead. The extraction of the silver is always performed when it exists in a proportion sufficient to pay the expense of the process, which varies in different localities according to the cost of fuel. The process of extraction, which is called refining, depends upon the well-known circumstance, that lead, when heated to redness, absorbs a large portion of oxygen from the air, and is converted into an oxide, while silver does not undergo any such change, but retains its metallic form at almost any temperature. Mr. Pattinson, of Newcastle, has introduced an improved process, in which the crystallizing properties of melted lead are brought into requisition.

The most extensive use of lead is in the form of sheets, and pipes, or tubes, for the passage of liquids. To make sheet lead, the pigs are brought to a state of fusion in a large pot or cistern, near to which is placed the table on which the sheet is to be cast. This table, which is usually from 18 to 20 feet long and 6 feet wide, is made either of wood or cast iron. The wooden table has its surface protected by a layer of fine sand, which is wetted and spread evenly and firmly over it before the melted lead is poured on. To prevent the lead from running over the sides, a ledge is provided, two or three inches thick, and two inches high, which forms the margin of the table. An instrument called a strike is also provided to regulate the thickness of the sheet, and to spread the melted metal evenly over the table. In casting the sheet the fused metal is taken from the cistern with an iron ladle, and put into a triangular-shaped iron shovel or peel, placed at the head of the table, which peel being raised so as to pour out the lead upon the table, the strike is brought into use to spread it evenly over the whole surface, the surplus, if any, falling into a vessel placed for its reception at the foot of the table. A sheet of lead weighs 9 cwt., so that its length and breadth will be greater in proportion to the diminution of its thickness. The thickness of sheets of lead is frequently reduced by means of heavy rollers worked by steam power. Rolled sheet-lead is made by the repeated compression between steel rollers of a block of lead several inches in thickness.

Lead pipes are sometimes made, when great exactness of shape is not required, by bending a length of sheet lead of the necessary width over a mandril, and soldering the edges together; but the more usual method of manufacture is by casting and drawing. The casting-box employed is an iron cylinder made in two parts, and put together longitudinally with flanges; inside of this cylinder is placed an iron rod

or core, which is so fixed as to be concentric to the cylinder, without touching it; a space is thus left, into which the melted lead is poured. When this is set, the core is removed, and the cylinder opened, so as to withdraw the pipe, which is much thicker than is needed, and must be lengthened, while its substance is reduced, by drawing it through a succession of holes in steel plates, diminishing gradually in diameter.

In the making of lead shot, the lead is alloyed with a small portion of arsenic, and is melted in a furnace. Close to the furnace is placed a large colander, or perforated plate, into which a portion of the scoria produced in melting the metal is placed, and then the metal is ladled into it. Being somewhat detained by the scoria, it is partially cooled and divided into separate portions, which pass through the colander in the form of globules, which follow in such rapid succession as to have the appearance, to a cursory observer, of a continued stream. These globules fall into a tub of water placed on the lower floor of a lofty tower, or at the bottom of a deep pit. The shot thus formed are of various sizes, and a small proportion are imperfect as regards sphericity. Having been perfectly dried by artificial heat, the shot are sorted according to their sizes by means of a series of sieves, the meshes of which have different degrees of fineness; and the imperfect shot are separated from the perfect by allowing the whole to roll down an inclined plane. The spherical shot are propelled into a receptacle more distant from the inclined plane than those of imperfect form are able to reach. The shot thus sorted are then polished by rolling about half a ton together in an iron barrel which that quantity nearly fills.

The countries to which the largest quantities were sent were France, Australia, India, the West Indies, and Brazil.

The exports of lead from the United Kingdom in 1864 were as follows:—

	Tons.	Value.
Ore, ...	174	£3,015
Pig, ...	27,868	593,366
Rolled and sheet, .	4,103	93,780
Piping and tubing, .	1,610	38,501
Shot, ...	2,186	53,527
Litharge of	5,502	12,784
Red, ...	2,874	67,966
White, ...	3,023	83,918

In the same year, different varieties of lead, imported from foreign countries, were re-exported from Great Britain to the amount of 1241 tons; value, 25,008*l*.

The imports of lead in the same year—chiefly from Italy and Spain—consisted of—

	Tons.	Value.
Ore, ...	3,015	£33,532
Pig and sheet, . .	30,616	611,273
Red, ...	8	167
White, ...	64	1,609
Acetate of	86	2,806
Litharge, ...	509	9,763
Manufactures, . .	50	4,579
	34,348	£663,729

Lead mines have been opened and worked at various parts of the United States, especially at Galena, in Illinois.

Action of Lead on the Human System.—In a

purely metallic state, lead produces no action on the human system except such as arises from its mechanical properties; but as soon as it becomes oxidized, it can combine with the contents of the stomach, and produce different effects, according to the nature of the substances it meets with. 'In whatever form lead is habitually applied to the body, it is apt to bring on the train of peculiar symptoms: the inhalation of its fumes, the habitual contact of any of its compounds with the skin, the prolonged use of them internally as medicines, or externally as ointments and lotions, and the accidental introduction of them for a length of time with the food, may, sooner or later, equally induce *Colica Pictorum*, or Painter's Colic. Of all exposures none is more rapid or certain than breathing the vapours or dust of the preparations of lead.' (Christison.) The action of lead on the human frame differs greatly according to the kind of preparation of lead, the quantity employed, the length of time or frequency of exposure to it, and the channel of its introduction into the body. 'One class of symptoms indicates inflammation of the alimentary canal; another, spasm of its muscles; and a third, injury of the nervous system, sometimes apoplexy, more commonly palsy, and that almost always partial and incomplete. Each of these classes of symptoms may exist independently of the other two; but the last two are more commonly combined.' (Christison.) Fatal cases from poisoning by large quantities of the salts of lead are not numerous, as there is in general time to administer antidotes; but death from the slow and insidious introduction of lead into the system is of frequent occurrence. The principal source of these is the use of water or other fluids containing lead in solution, the intermixture of lead, as adulterations or accidentally, with articles of food, or handling preparations of lead in the daily business of artisans, such as painters, plumbers, &c.

The lid or cover of cisterns should never be made of lead, as the vapour which condenses on it possesses all the solvent power of distilled water. It is also unsafe to use water which has flowed over leaden roofs, more particularly in towns, as the surface of the lead is almost invariably coated with some soluble salt.

No kind of adulteration or impregnation with lead, from accident or ignorance, is more common than that of wine or cyder. Even a single shot of lead left by accident in a bottle after cleaning has produced severe colic; and the more extensive use of the salts of lead to *fine* wines, as it is termed, that is, to remove their acid taste and make them sweet, has occasioned most serious consequences.

In small medicinal doses acetate of lead acts as a sedative and astringent. It manifests its sedative effect even when applied externally, and lessens discharges from ulcers, though its application to these is not always safe. Even white lead (carbonate of lead) ointment applied to ulcers has proved fatal.

LEAD, BLACK. [PLUMBAGO.]

LEAD-LINE. Ships are said to be in *soundings* when the sea-bottom can be reached by a weight lowered from a ship, with a line attached. Lead-lines are carried by every ship or vessel afloat, and are either called *hand-lines* or *deep-sea-lines*. The hand-lead weighs about 7 lbs, and its line varies in length from 20 to 40 fathoms. The lower part of

the lead is scooped out and filled with tallow, to which loose substances at the bottom adhere, and show the nature of the bed of the sea; this alone frequently acquaints a mariner with his ship's position. The deep-sea-lead weighs from 25 to 35 lbs., and is attached to a line of far greater length.

LEAF, an expanded part of a plant attached to the axis, and from whose axils leaf-buds are developed. It is usually thin, and traversed with one or more veins composed of woody and vascular tissue; sometimes it is fleshy, and occasionally cylindrical, or nearly so. The veins are held together by a green or coloured parenchyma, which is inclosed in an epidermis pierced by stomates or openings. A leaf is either united to the stem by means of a petiole or stalk, or it is sessile, that is to say, seated on the branch without an intermediate stalk. Through the petiole pass the veins before they can expand into the broad or green part forming the blade of the leaf.

The petiole is usually articulated with the stem, rarely with the blade of the leaf; the latter, however, sometimes happens, as in the orange. It usually loses itself in the parenchyma of the blade, but sometimes passes beyond it, and in compound leaves often forms a tendril or spine. Sometimes, as in the orange and in the *Nepenthes*, and some other plants, it assumes the appearance of the leaf itself.

When leaves have but one blade, they are simple, as in the apple; but when there is more than one blade, each seated on a ramification of the petiole, a leaf is called compound.

The substance of the leaf consists of parenchyma connecting the vascular tissue. It differs greatly in different plants, and appears to be so arranged as to meet the wants of the species in which it is found. Usually the cells of parenchyma belonging to the upper surface are planted perpendicularly upon the epidermis, while those of the under surface are parallel with it; but this varies very much, and it often happens that the arrangement of the parenchyma is alike on both sides of the leaf. All that appears uniform with respect to this substance is, that it contains grains of chlorophyl in abundance, that it is traversed by air cavities in all directions, and that the latter are universally in communication with the stomates. The usual cause of the under side of leaves being paler than the upper is that the parenchyma is more cavernous on that side than the other.

In their position leaves are usually either alternate or opposite, in pairs upon the stems; in some, however, there are more than two leaves placed on the same plane, which are called verticillate.

The function of leaves is to afford an expanded surface for the evaporation of the fluids of the plant, by which means new sap is constantly introduced into the plant. At one time they were supposed to be organs of respiration, digestion, &c., but these views have been exploded since it has been discovered that each individual cell of a plant is self-existent, and produces its own peculiar secretions. (See Plate.)

LEAF-BUD is an important organ of plants. It consists of leaves in a rudimentary state, resembling scales, arranged one over the other, and usually in a spiral manner, around a cellular conical centre, which has the power of growing upon the application of certain stimuli, namely, light and moisture combined with a variable degree of temperature. It is regarded

by physiologists as a miniature plant, having an analogy with the embryo, and although in its natural condition only forming part of a complicated system of organization in connection with other leaf-buds, yet having an independent power of growth, which it is capable of exercising, if separated from the branch or system to which it belongs. This fact is obvious in the common gardening operation of propagation, for which purpose the buds of plants are cut off and made to form new individuals, as in the process called *budding*, in striking from *eyes* (i.e., leaf-buds), grafting, layering, propagation by cuttings, and the like. None of these operations can succeed except through the independent vitality of the leaf-bud. The leaf-bud is always produced in the axil of a leaf. The manner in which the scales of a bud are packed varies very much; and according to the appearance they present when cut through, they have a variety of names, such as duplicate, imbricate, &c.

LEAF INSECT (*Phyllium*), a genus of insects belonging to the order *Orthoptera* and family *Phasmidae*. In some respects they approach the *Mantidae*. The *Phyllium siccifolium* is a native of India. 'Suppose,' says Dr. Duns, 'the top of a sprout of this year's growth be broken from a bay, the leaves stripped off, two of them taken and laid back to back along the sprout to within about a quarter of an inch from the top, you have then the body and head of *Phyllium*. At the end of the bare sprout, two forked, incipient leaves stand out. These will do for the "horns." The midribs of the leaves lying thus along the sprout give, as they taper towards their points, the aspect of the body; while the uncovered projecting part, with its half-formed buds, represents the head and the eyes. The wings will be represented by an oak-leaf cut up the centre of the midribs. These wings bear the most striking resemblance to this leaf thus cut. The regularity of the larger veins, and the distinctness of the smaller ones, are very marked. Then you have the four legs, like fragments of leaflets, joined to the upper part of the body; while two arms, serving the same purpose as the long tentacula of the butterfly, branch off from the shoulder. These, too, are like fragments of a leaf also; but when they are brought together they form an entire leaf, with its base at the head, and its point projecting. When the animal rests among the leaves, its resemblance to them is so great that only an acute observer is likely to detect it; yea, when it flies it looks far liker a stray leaf torn from a branch than a true insect.'

LEAGUE (*Leuca, Leuga, Leuva, Leuweke*, &c.), an itinerary measure, which in modern English means the 20th part of a degree of latitude, or three geographical miles, each of which is the 60th part of a degree. The league of our sailors may be described and easily remembered as 3·456 statute miles of 1760 yards each. The same marine league is used by the French and other nations: besides which, the French have among their itinerary land measures two distinct leagues (or *lieues*; in some of the provinces *lègues*), the first of 2000 toises, or 2·42 English miles, which is the legal posting measure; the second of 25 to the degree, or 2·77 English miles.

The *Leuca* of the ancient English law-writers is necessary to be determined before the rights given by many charters can be defined; but unfortunately the

length of this measure is enveloped in utter confusion. The modern lawyers, we believe, evade the question by setting it down as a mile: thus the legal minimum distance between two markets, which was certainly seven leucæ, is now called seven miles.

By citations in Ducange, Paucton, &c., it appears that Hesychius distinctly describes the *λεῦγη*, and Jerome, Jornandes, &c., the *leuca* (stated by Camden to be derived from the Celtic *leach*, 'a stone'), as a Gaulish measure; and the original Gallic league was set down by the Romans as a mile and a half of their own measure, which was in all probability a rough estimation, first used in the 'Itinerary' of Antoninus. In that work the distances from place to place in Gaul are frequently given in leagues (always in whole numbers), which are in every instance reduced to Roman miles at the rate of a mile and a half to each league. Hence, taking the Roman foot at 11.62 English inches (which is a mean between the most trustworthy measures) and the pace of 5 feet at 58.1 inches, the Roman mile of 1000 paces is 1614 English yards, and the leuca was therefore 2421 yards, subject to the error of the Roman estimation; or 1.376 modern English miles, with the same reservation.

This leuca in all probability was brought by the Normans into England. It is true that the Saxon charters of Ingulphus describe distances in leucæ; but the genuineness of these charters is now considered more than questionable, and perhaps this very circumstance is a presumption against them. But the leuca soon began to vary in length. Ducange cites an old metrologist who speaks of two leucæ, the one legal of 3000 paces, the other common, and varying much in different countries.

The earlier statutes do not define the itinerary measures, confining themselves entirely to those by which land and goods were bought and sold. And the itinerary measures seem to have been on the increase, perhaps for the following reason:—The jurisdiction of towns, monasteries, &c., was usually defined as extending a leuca or a given number of leucæ in every direction from their precincts, so that it became the interest of these powerful bodies to make the leuca as long as possible. The old French term *ban-lieu*, *banni-leuca*, refers to the space over which jurisdiction was granted.

There is sufficient evidence to show, that whatever the mile of a later date may have been, the leuca was generally two miles, though instances occur in which it is still described as 1500 paces.

Bracton (Henry III.) and Fleta (Edward I.) both assert 6 leagues and half a league and the third part of a half (or $6\frac{2}{3}$ leagues) as being the distance between two markets which do not injure each other: because 20 miles is a reasonable day's journey: now (both of them say) if the *dicta*, or day's work, be divided into three parts, the first is for going to the market, the second for business, and the third for returning. This appears to mean that no market should be established within a third of a day's journey of any one who is already within a third of a day's journey of the established market, so as to give him the option of going to either: that is, the two markets must be at least $\frac{2}{3}$ of 20 miles apart, which being further described as $6\frac{2}{3}$ leagues, shows that the leuca is two miles. This quotation is important, as

establishing the meaning which the old law writers attached to the word.

It may then, we think, be confidently asserted, that the league, which began as a mile and a half (Roman), soon became lengthened, until it remained fixed at two of the miles of the day. It appears also that this length of two miles was a settled league at so early a period that it is the measure of our oldest law writers, and of most of the oldest charters. Our conviction is, that the length of the league or leuca was, in the time of the old law writers, equal to $2\frac{2}{3}$ modern statute miles: the old mile being to the modern statute mile in the proportion of 145 to 100.

LEAGUES are confederacies, or political combinations, and the term was very extensively used in the sixteenth and seventeenth centuries. Among the most famous were those of Cambray, Smalkald, Nurnburg, and the Holy League, formed at Péronne in opposition to the Huguenots.

LEAMINGTON. [WARWICKSHIRE.]

LEAP YEAR, the name given to every fourth year of the Julian calendar, in which one additional day (a twenty-ninth day of February) is reckoned. This correction constitutes the distinction of the Julian calendar: the necessity for the Gregorian correction arises from the years being made a very little too long, one with another, by making them consist of $365\frac{1}{4}$ days each, as is done when a day is added to each fourth year. The Gregorian correction is made by omitting three leap years in four centuries, and it is settled that the common years, which would otherwise be leap years, shall be those which terminate centuries in which the first pair of figures is not divisible by four. Thus the years 1800 and 1900 are not leap years, but 2000 is leap year: 2100, 2200, 2300 are not leap years, but 2400 is leap year.

LEASE. A lease, or letting, is sometimes called a Demise (demissio). He who lets land, whether it be for agricultural purposes, or merely a piece of land with a dwelling-house on it, is called the Lessor, and he to whom land is let is called the Lessee. A lease is not properly a conveyance, though it is sometimes called so; it is merely an interest in land for a certain time, and on certain terms. The fact of a lease for years being called an Estate does not alter the nature of the thing. The reservation of a rent is not essential in a lease; but payment of rent is now the chief condition on which lands are let.

To constitute a lease, it is necessary that the lands must be let for a less time than the period for which the lessor has an interest in the lands. If a man parts with all his interest in the lands or tenements, the conveyance is an assignment, and not a lease. The relation that is created by a lease between the lessor and lessee is usually expressed by the phrase landlord and tenant. The lessor has a reversion in the lands which are demised, that is, after the expiration of the lease the land reverts to him. The lessor, by virtue of this reversion, seignory, or lord's title, has the power of distraining on the land for the rent which is agreed on, and for the services which may be due by the terms of the lease; and fealty is always due to the lessor. [FEALTY.] The ordinary lease is that for a term of years, by which lease a rent, generally payable in money, at stated times, is re-

served to the lessor. These stated times are usually quarterly periods.

The words used in a lease for the purpose of conveying that interest in the lands which constitutes a term of years are, 'demise, grant, and to farm let.' These words are derived from the law-Latin expressions 'demisi, concessi, et ad firmam tradidi.' The word 'firma,' farm, is said to signify originally 'provisions,' and 'to farm let' does not properly signify to let to be farmed, in the modern sense of the term, but to let on the condition of a certain rent being paid in farm, that is, in provisions.

The interest which a man acquires in land by a lease for years is a term of years, or an estate for years. The word lease is used in common language also to signify the estate or interest which the lessee acquires by the lease; but the word lease signifies properly the contract by which the lessee acquires the interest in the lands.

The words 'demise,' &c., above mentioned, are the proper words to constitute a lease for years: but any words are sufficient which clearly show 'the intent of the parties that the one shall divest himself of the possession (of the land), and the other come into it for a determinate time.' When the written contract is not intended to be a lease, but an agreement for a future lease, it is often difficult to determine whether the contract is not so expressed as to make it a lease.

At common law, it was necessary for the lessor to enter on the lands in order to make the lease complete, and no writing was necessary. But the Statute of Frauds (29 Ch. II. c. 3, s. 1) enacted, that all leases, estates, interests of freehold or terms of years, created by livery and seisin only, or by parole, and not put in writing and signed by the parties so making the same, or their agents thereunto, lawfully authorized by writing, shall have the force and effect of leases or estates at will only, except leases not exceeding the term of three years from the making thereof, upon which the rent reserved to the landlord during such term shall amount to two-thirds at the least of the full and improved value of the thing demised. A deed is not necessary to constitute the writing a lease, unless the tenement is an incorporeal hereditament or a reversion or remainder. But leases are generally made by deed, because covenants can be made only by deed.

The word 'lands,' which refer to the subject-matter of a lease, comprehends what is upon the lands, as houses and other buildings, though houses and buildings are generally mentioned specifically in the lease.

The law of leases comprehends a great number of rules, which may be conveniently reduced to the following general heads:—

1. The things which may be subjects of leases.
2. The persons who may grant leases, and their powers to grant.
3. The form of leases, and the legal construction of the agreements contained in them.

The examination of these subjects belongs to treatises on Law. A lease may contain any agreements that are lawful. The agreements or covenants in farming-leases ought to be such that the lease may be most beneficial to the landlord and the tenant, and by consequence to the public generally; but this is not generally the case in England at present.

The chief subjects of leases are dwelling-houses and buildings of all kinds, cultivable lands, and mines. Many persons who have not the complete ownership of houses and lands are enabled to grant leases under particular powers; and there are many statutes under which particular classes of persons are enabled or restrained as to the granting of leases, such as bishops, deans and chapters, and others.

In 1845 an Act was passed (8 & 9 Vict. c. 124) entitled, 'An Act to facilitate the granting of certain Leases.' Its object is to substitute abbreviated forms for those previously in use.

Leases in general require either an ad valorem stamp or the common deed-stamp, without which the instrument cannot be given in evidence. Leases for a term determinable on a life or lives not exceeding three, and the leases of all ecclesiastical corporations, whether aggregate or sole, for any term not exceeding twenty-one years, are exempted from the duty. There is also a stamp-duty on agreements for leases.

By the law of Scotland a lease or tack is a 'contract of location, by which the use of land, or any other immovable subject, is let to the lessee or tacksman in consideration of a determinate yearly rent or duty, to be paid or performed to the lessor or landlord either in money, the fruits of the ground, or services.' (Ersk. Inst., ii., 6, 20.)

Leases were originally grants conferred by the superiors of lands upon deserving vassals; but as land increased in value, the conditions inserted in such grants became more stringent and more numerous, till the tack has at last assumed the form of a mutual contract, in the enjoyment of the subjects of which the lessee is protected by law, so long as he fulfils the prestations for which he has become bound by its terms.

At an early period in Scotch law, the legislature interfered to protect the rights of tenants, by converting what had originally been a precarious and uncertain grant, liable to be terminated at any time at the pleasure of the lessor, or by the lands passing into other hands, into a real and indefeasible right in favour of the lessee, passing to his heirs in the event of his death before the *ish* or term of his tack. This was accomplished by the Act 1449, c. 18, which, 'for the safety and favour of the poor people that labours the ground,' provided 'that they and all others that has taken or shall take lands in time to come frae lords, and has terms and years thereof, suppose the lords sell or assailzie that land or lands, the takers shall remain with their tacks until the issue of their terms, whose hands soever the lands come into.' To give a lease the benefit of this Act it is requisite—

- (1) That the lease be in writing;
- (2) That it set forth definitely the name of the parties to it, and describe the subjects let;
- (3) That it specify the rent, either of money or grain, payable by the tenant;
- (4) That it have a determinate *ish* or term of endurance; and
- (5) That it be followed by possession on the part of the lessee.

By 20 & 21 Vict. c. 26, it is competent to make use of a lease as security in payment of borrowed money, or annuities, or provisions to wives and children; that Act providing that leases for thirty-one

years and upwards may be recorded in the register of sasines, and that such recorded leases may be assigned in favour of creditors, the regulation of the assignation being declared effectual to complete the creditor's right under it. Power is also given to the creditor, in default of payment, to enter into possession of the subjects, uplift the rents, sub-let the lands, or to sell the lease.

Leases may either be in writing or verbal. If constituted verbally, a lease cannot endure for more than a single year. Any writing, however informal, if followed by possession, and containing *in gremio* the requisites of the Act 1449, will be as effectual as a formal written lease, not only against the grantor and his heirs, but also against purchasers and other singular successors.

Leases may be renewed from time to time, not only by special agreement, but by tacit relocation; but tacit relocation is not held to be a renewal of the lease for the original term, but only for the current year. Leases terminate either by the landlord removing the tenant for non-payment of rent, or by the tenant's renunciation of the lease, or by the expiry of the term for which the lands have been let. The rules applicable to these proceedings are too numerous to be detailed here.

LEASEHOLD. [LEASE: TENANT.]

LEAST SQUARES, METHOD OF. This is a method which, since its first introduction, has been shown to be the method of finding the most probable truth, when a number of discordant observations have been made upon a phenomenon. The earliest attempt at anything of the sort was made by Cotes, in a tract entitled 'Estimatio Errorum in Mixta Mathesi,' in which he very distinctly recommends a process which is identical with that of the Method of Least Squares. It is remarkable that Cotes proposes his theorem not merely as a mode of finding a convenient mean (as was done by Legendre and Gauss), but as giving positively the most probable result. He even introduces the hypothesis of observations having different weights (though not with perfect correctness), and comes as near as possible to the assertion afterwards proved by Laplace.

Legendre, in his work on Comets (1806), first distinctly proposed the application of the method to any case, and Gauss afterwards stated that he had been in the habit of using it since 1795. Finally, Laplace, in his 'Theory of Probabilities' (1814), and we believe in a previous paper published in the 'Memoirs of the Academy of Sciences,' showed that this method was in all cases the one which the principles of that theory pointed out as giving the result, which, from the observations, has the greatest weight of probability in its favour. It is impossible to give any account of this method in a form brief enough for the present work.

LEATHER. This substance, which is universally employed throughout the civilized world, is prepared from the skins of animals, chemically changed by the process of tanning. This change is effected by means of a substance residing in several vegetable matters, to which the name of *tannin* has been given. When this tannin, which is soluble in water, is applied to the hides of animals from which the hair, epidermis, and any fleshy or fatty parts adhering to them are removed, and which hides then consist wholly of

gelatin, also soluble in water, these two soluble substances so unite chemically as to form the wholly insoluble substance called leather. Of the ox-hides which are converted into leather, those supplied by bulls are thicker, stronger, and coarser in the grain than those of cows; while the hides of bullocks are intermediate between those of the bull and the cow. Such leather is employed for the soles of boots and shoes; for most parts of harness and saddlery; for leather trunks, buckets, hose for fire-engines, and pump-valves; for the thick belts used in military accoutrements; and for the gloves of cavalry. The thick *buff-leather* formerly used as armour, and which was pistol-proof, and would resist the edge of a sword, was made from the hide of the urus, or wild bull. The skins of *calves*, though thinner than those of cows, are thicker than most other kinds of skin which are converted into leather. They are *tawed* or *alumed* for the use of bookbinders, and are tanned and curried for the upper leather of boots and shoes. *Sheep-skins*, when simply tanned, are employed for inferior bookbinding, for leathering bellows, and for various other purposes for which a cheap leather is required. All the *whit-leather*, as it is termed, which is used for whip-lashes, bags, aprons, &c., is of sheep-skin; as are also the cheaper kinds of *wash-leather*, of which gloves, under-waist-coats, and other articles of dress, are made. Mock or imitation morocco, and most of the other coloured and dyed leathers used for women's and children's shoes, carriage-linings, and the covering of stools, chairs, sofas, writing-tables, &c., are also made of sheep-skin. *Lamb-skins* are mostly dressed white or coloured for gloves; and those of *goats* and *kids* supply the best qualities of light leather, the former being the material of the best morocco, while kid leather affords the finest material for gloves and ladies' shoes. Leather from goat-skins, ornamented and sometimes gilt, was formerly used as a hanging or covering for walls. *Deer* and *antelope* skins, shamoied or dressed in oil, are used chiefly for riding breeches. *Horse-hides*, which, considering their size, are thin, are tanned and curried, and are used by the harness-maker, especially for collars; and occasionally, when pared thin, for the upper leather of ladies' walking shoes. *Dog-skins* are thick and tough, and make excellent leather. *Seal-skins* produce a leather similar but inferior to that supplied by dog-skins; and *hog-skins* afford a thin but dense material, which is used mostly for covering the seats of saddles. *Walrus* and *hippopotamus* hides are tanned in considerable numbers for the use of cutlers and other workers in steel goods; 'buffing-wheels' being made of them, often an inch thick, which are of great importance in giving the polish to metal and horn goods. Belts for driving machinery are also made from them.

The manner in which all these skins are tanned and tawed will be found fully described in the article TANNING. We here notice only the finishing processes.

Currying is the general name given to the various operations of dressing leather after the tanning is completed, by which the requisite smoothness, lustre, colour, and suppleness are imparted. The processes of the currier are various. The first is styled *dipping* the leather. It consists in moistening it with

water, and beating upon a trellis-work of wooden spars, with a mallet or mace. After this beating, by which the stiffness of the hide or skin is destroyed, it is laid over an inclined board, and scraped, cleaned, and pared or shaved down on the flesh side, by the careful application of various two-handled knives; and then thrown again into water, and well scoured by rubbing the grain or hair side with pumice-stone, or with a piece of slaty grit, by which means the *bloom*, a whitish matter which is found upon the surface in tanning, is removed. The leather is then rubbed with the *pommel*, a rectangular piece of hard wood, about twelve inches long and five broad, grooved on the under surface, and fastened to the hand. The currier uses several of these instruments, with grooves of various degrees of fineness, and also, for some purposes, pommels of cork which are not grooved at all. The object of this rubbing is to give grain and pliancy to the leather. The leather is then scraped with tools applied nearly perpendicular to its surface, and worked forcibly with both hands, to reduce such parts as may yet be left too thick to a uniform substance. After this, it is dressed with the *round knife*, a singular instrument which pares off the coarser fleshy parts of the skin. In addition to these operations, the currier uses occasionally polishers of smooth wood or glass for rubbing the surface of the leather; and when the leather is intended for the use of the shoemaker, he applies to it some kind of greasy composition called *dubbing* or *stuffing*.

Japanned leather of different kinds is used in coach-making, harness-making, and for various other purposes. 'Patent leather' is covered with a coat of elastic japan, which gives a surface like polished glass, impermeable to water; and hides prepared in a more perfectly elastic mode of japanning, which will permit folding without cracking the surface, are called 'enamelled leather.' Such leather has the japan annealed, something in the same mode as glass: the hides are laid between blankets, and subjected to the heat of an oven at a temperature of 150° Fahr. during several hours.

In making *Russia leather*, the skins are freed from the hair or fleece by steeping them in an ash-lye, then rinsed, fulled, fermented, and cleaned. They are then soaked for forty-eight hours in a bath composed of water mixed with a paste of rye-flour. The skins, when taken out of the bath, are left in tubs for fifteen days, then washed, and immersed in a boiler containing a hot decoction of willow bark, in which they are handled and pressed for half an hour. This manipulation is repeated twice a day for a week, after which the tanning infusion is renewed, and the process is repeated on the same skins for another week. They are then dried, dyed, and curried.

Shagreen, a peculiar kind of leather, or rather of prepared skin, formerly much used for the covers of watch-cases, mathematical-instrument cases, &c., is produced by soaking, scraping, rubbing, softening, salting, and dyeing. The unevenness of surface is produced in a singular way. The grain side of the skin is strewn with the hard round seeds of the Goose-foot or Alabuta. A felt being laid over these, they are trodden deeply into the soft yielding skin; and when dried, the seeds may be shaken out with-

out violence, leaving the skin in a hard horny state, covered with deep indentations.

Leather-splitting machines, by which even very thin skins may be divided into two thicknesses, each of which is capable of being dressed as a perfect skin, have called forth much ingenuity of contrivance. In one machine of this kind, the skin is drawn between two revolving rollers, and presented, as it emerges from their grasp, to the edge of a long and very sharp knife, which is kept continually moving a little backwards and forwards with great velocity.

Leather trade.—The leather manufacture is one of great importance in this kingdom, giving employment in all its branches to more than 350,000 persons, including tanners, curriers, shoemakers, glove-makers, harness-makers, saddlers, &c. It has been computed that the manufactured articles are worth from three to four times as much as the leather itself, and that the total annual value must be at least 20,000,000*l*.

The imports into the United Kingdom of the principal materials used in tanning processes were as follows in the year 1864:—Bark for tanners' use only, 269,124 cwts., value 100,964*l*.; cutch, 59,000 cwts., value 72,851*l*.; divi-divi, 26,360 cwts., value 16,085*l*.; gambier, 228,520 cwts., value 287,022*l*.; sumac, 245,840 cwts., value 168,592*l*.; and valonia, 453,460 cwts., value 328,570*l*. Some idea of the extent of the British leather manufacture may be gained from a consideration of the above large quantities of materials imported in one year, and used simply in the first process of converting skins into leather.

Besides the ox, cow, sheep, horse, and other hides furnished by the home trade, of which no official accounts are kept, vast numbers are imported from South America, Russia, Germany, Australia, and the Cape of Good Hope, and buffalo hides from India.

In 1864 the total value of all kinds of hides and manufactured leather imported into the United Kingdom was 5,047,495*l*.; and of the same materials in a prepared state exported, 3,599,348*l*.

LEAVEN. [BREAD.]

LEBANON. [SYRIA.]

LEBRUN (or LE BRUN), CHARLES, an eminent French painter, was born at Paris in 1619. His merit obtained him the favour of Louis XIV., who appointed him his principal painter, president of the Academy of Painting and Sculpture, and director of the Gobelins manufactory, conferred on him the order of St. Michael, and frequently visited his studio while he was engaged on the battles of Alexander, the best known and most admired of all his works. Lebrun died at Paris in 1690.

LECCE (*Aletium*), a city of South Italy, the capital of a province, with, in 1861, 21,345 inhabitants, is situated 210 miles E. from Naples, and 9 from the coast of the Adriatic. It is a bishop's see, and one of the best built towns in the kingdom, with wide streets, a handsome market-place, several fine churches, a royal college, a cathedral, a castle, convents, founding hospital, and theatre. Considerable trade is carried on here in the agricultural products of the country, the principal of which are oil, tobacco, wool, cotton, and gum. There are also manufactories of lace, woollen, cotton, silk, thread, and snuff. The town is inclosed by walls, and there is a rail-

way from it to Otranto. The area of the province, which was formerly called Terra d'Otranto, is 3292 square miles, and its population in 1862 was 447,982.

LECHLADE. [GLOUCESTERSHIRE.]

LECTERN, or LETTERN (Latin, *lectorium*), is the name given to the movable reading-desk, from which the Scripture lessons are read in our cathedrals, college-chapels, and many churches. They are made of wood or brass. When of the latter material, the upper part, on which the book is supported, is frequently in the form of an eagle with outstretched wings.

LECTOURE. [GERS.]

LECYTHIDA'CEÆ, an important but small natural order of plants with singular fruits, and very large fleshy flowers, inhabiting the woods of South America. They are regarded by De Candolle as a section of *Myrtaceæ*. *Lecythis ollaria*, a tree growing in the forests of Cumana and Brazil, with a hardy woody fruit as large as a child's head, and opening by a lid like that of a jar or urn. It contains numerous large seeds. *L. Zopucajo*, a large Guiana tree, with large handsome-shaped fruit, containing numerous seeds as large as almonds, and quite as agreeable when fresh. They are sometimes seen in the fruiterers' shops in London.

LEDBURY. [HEREFORDSHIRE.]

LEDGER-LINE, tackle used in fishing for barbel or bream; its peculiarity consists in a leaden bullet being fastened to the line about 20 inches above the hook, so that when cast into the water the lead rests upon the bottom, and the hook end of the line swims loosely about. The rod end of the line is kept as tight as possible without lifting the lead off the bottom, till a fish bites at the bait, when a sudden, strong pull brings it to land.

LEDGER-LINES, in music, those lines which are added above or beneath the five lines composing the stave. They consist of such notes as are too high or too low to be placed upon or within the regular stave. The invention of lines is generally attributed to Guido. When first introduced, the spaces between them were not used.

LEDUM, a genus of plants belonging to the natural order *Ericaceæ*. *L. latifolium* is a small evergreen shrub, with an irregularly branched stem. It is a native of the swamps around Hudson's Bay, Labrador, Greenland, and various parts of the United States. This and the other species of *Ledum* have been used as stomachics.

LEE. [KENT.]

LEE, River. [CORK.]

LEE, MRS. HARRIET, one of the authors of 'Canterbury Tales,' was the daughter of Mr. John Lee, a performer at Covent Garden Theatre. Soon after her father's death she commenced a school at Bath, in conjunction with her elder sister Sophia, which they jointly carried on for many years with considerable success. In the meantime they both devoted themselves to the production of works of fiction and the drama. Sophia was the author of 'Chapter of Accidents,' a comedy which was performed on the Haymarket boards, with tolerable success, in 1780; 'Almeida,' a tragedy, in which Mrs. Siddons personated the heroine, in 1796; 'The Hermit's Tale,' a ballad (1787); and 'The Life of a Lover,' a novel in six volumes (1804). Her sister

Harriet entered on the arena of literature a few years afterwards; and in 1786 produced 'The Error of Innocence,' a novel; and the following year 'The New Peerage,' a comedy. In 1797-1805, appeared the 'Canterbury Tales,' of which Harriet was the principal author; the only contribution being the 'Young Lady's Tale and the Clergyman's,' by her sister. Mrs. Harriet's tale of 'Kreutzner,' it is said, suggested to Lord Byron the tragedy of 'Werner.' The noble writer, in his preface, acknowledges that 'the germ of much he had written was discernible in that popular romance.' She was also the author of 'Clara Lennox,' a novel (1797); and 'The Mysterious Marriage,' a play (1798.) She died at Clifton, in 1851, aged 94.

LEE, NATHANIEL, was born in the latter part of the seventeenth century. He was educated at Westminster, and at Trinity College, Cambridge. He wrote thirteen tragedies, of which two, 'Alexander the Great,' and 'Theodosius,' exhibit considerable dramatic power. A derangement of mind led to Lee's temporary confinement in Bedlam. He died in 1691 or 1692, at the age of about thirty-four.

LEE, REV. DR. SAMUEL, Regius Professor of Hebrew in the University of Cambridge, was born at Longnor, co. Salop, in 1783, where he received the first rudiments of his education. At twelve years of age he was apprenticed to a carpenter and joiner. His father dying at an early age, he experienced the greatest hardships. In a communication made to Mr. Scott, of Shrewsbury, he has narrated the early difficulties with which he had to struggle. He there says that at the age of seventeen he formed the determination to learn the Latin language. Out of a small weekly pittance he contrived to obtain possession of Ruddiman's Latin Grammar, Corderius' 'Colloquia,' and Entick's Latin Dictionary. He was soon enabled to read the Latin Bible, Florus, Caesar's Commentaries, Justin, Sallust, Virgil, Horace's Odes, and Cicero's Orations. He afterwards obtained a Greek Grammar and Testament, Schrevelius' Lexicon, and Huntingford's 'Greek Exercises;' and by plodding industry was enabled to master the more difficult Greek classics. In the same manner he acquired a knowledge of Hebrew, Chaldaic, Syriac, and Arabic. At the age of twenty-five he appears to have renounced the further study of languages, as they appeared, in his then humble situation of life, to be entirely useless. He had entered into a matrimonial engagement, and considered his trade as his only means of support. But a fire breaking out in a house he was repairing, all his tools were burnt, and he was thrown upon the world 'without a friend, a shilling, or even the means of subsistence.' While he was thinking of commencing as a country school-master, but had not the means, the Rev. Archdeacon Corbett, who had heard of his attainments, sent for him, and benevolently promoted his interests in various ways. As Lee himself observes, 'It is to his goodness that I am indebted for the situation I at present fill, and several other very valuable benefits, which he thought proper generously to confer.'

For some years Mr. Lee was master of Bowdler's Foundation School in Shrewsbury; which in 1813 he left, on obtaining an engagement with the Church Missionary Society. In the same year he entered at Queen's College, Cambridge, when he rapidly acquired

a knowledge of mathematics, and in 1817 took his degree of B.A. In 1819 he was elected Arabic Professor of the University of Cambridge, and in 1831, Regius Professor of Hebrew, with the accompanying stall in the Bristol Cathedral. In 1833 the degree of D.D. was conferred upon him. His various publications, connected more especially with biblical and oriental literature, tend to show that his acquirements were profound and extensive, and his reading deep and varied. Among other valuable publications may be mentioned his Syriac Versions of the Old and New Testaments (1816); his Hebrew Grammar (1830); Travels of John Batula, translated from the Arabic (1833); the Book of Job, from the original Hebrew (1837); and a Hebrew, Chaldaic, and English Lexicon (1840). He also edited the Malay Scriptures and the Arabic and Coptic Psalter and Gospels, and translated the Book of Genesis into Persian. He likewise superintended the Hindustani Prayer Book, and Morning and Evening Prayers in Persic; and was the author of several miscellaneous pamphlets, sermons, and contributions to the periodical literature of the day. He died in 1853.

LEECH, JOHN, a popular English artist, born in London on the 29th of August, 1817, was educated at the Charterhouse, where his friend Thackeray was his older schoolfellow. The medical profession was chosen for him, but not being congenial to his tastes, he soon abandoned the lancet for the pencil. In August, 1841, in the *fourth* number of *Punch*, he commenced his connection with that popular periodical, and thenceforth his best works appeared in an unbroken series, up to the issue of the 1217th number, in which his last design was published, after his hand had forgotten its cunning for ever. For twenty-three years the genial task of furnishing a weekly supply of pictorial wit and satire for *Punch* was successfully undertaken by Mr. Leech. Several thousand sketches, as full of grace as of humour, furnished the public with food for laughter and meditation, and their popularity is shown by their success when re-issued in folio volumes, each containing some 500 woodcuts, under the title of 'Pictures of Life and Character,' of which several series have been published. The designs for *Punch's Almanac* for many years were chiefly drawn by Mr. Leech. His first separate publication in his own name was 'The Rising Generation,' a series of twelve drawings on stone, 1840. He also illustrated several of the works of Albert Smith and G. A'Becket, as well as Blaine's 'Encyclopædia of Rural Sports.' The chief objects of his satire were the vagaries of male and female attire, the precocity of the young, the pomp of parents, the pride of domestic servants, and the relations existing between the rich and poor. He was equally skilful in depicting feminine beauty and the ragged urchins of the street. As an English gentleman he was kind, manly, and hospitable, and had a large circle of friends. He died on October 29th, 1864, and was buried in Kensal Green Cemetery.

LEECHES (Zoology), *Hirudinidae*, a family of annulose or red-blooded worms, placed by Cuvier in the third order of the *Annelida*, and in the second family of the *Abranches sans Soies*. The classification of MM. Audouin and Milne-Edwards does not differ materially from that of Cuvier.

The ancients appear to have only known the most

common species of leech. Aristotle makes no mention of them, and they do not appear to have been used in medicine in the time of Hippocrates. Pliny describes them very clearly under the names of *Hirudines* and *Sanguisuga*, and the Sea-leech is distinctly mentioned by Belon, Rondelet, and all the writers on natural history since the revival of letters.

The true leeches are all destitute of branchiæ, but there exists a series of small membranous sacs, each of which communicates externally by a minute orifice situated on the ventral aspect of the body. Hence water penetrates into the sacs, and is brought into contact with a mesh of fine vessels ramifying upon them. But though the true leeches are destitute of branchiæ, a sort of worm, usually classed with them from its similarity, is furnished with branchiæ. It is a parasite on the Torpedo, in the Mediterranean and other seas. It is the *Branchelion* of Savigny; *Branchiobdella* of De Blainville; and *Polydora* of Oken.

The true leeches are divided into three sections.

In section 1 the anterior sucker is separated from the body by a distinct strangulation or neck. Genera:—1, *Albione* (Sav.), *Pontobdella* (Leach); 2, *Hæmocharis* (Sav.), *Ichthyobdella* (Blain.).

In section 2 the anterior sucker is very slightly separated from the body. Genera:—1, *Geobdella* (Blain.), *Trochetia* (Dutrochet); 2, *Pseudobdella* (Blain.); 3, *Hæmopsis* (Sav.), *Hypobdella* (Blain.) (the Horse-leech is an example of this genus); 4, *Sanguisuga* (Sav.), *Jatrobdella* (Blain.) (this genus contains the true medicinal Leeches, of which there are several species); 5, *Bdella* (Sav.), from the Nile; 6, *Nephelis* (Sav.), *Erypbdella* (Blain.).

In section 3 the anterior sucker is wanting. Genera:—1, *Clepsina* (Sav.), *Glossopora* (Johnson), *Glossobdella* (Blain.). The two first genera named are parasitic, and attach themselves to fishes. Of many species earth-worms are the favourite prey. (For interesting notices of land leeches, see Sir Emerson Tennent's recent work on Ceylon.)

The imports of leeches into the United Kingdom in 1864 were valued at 9028*l.*, of which amount 7074*l.* came from France, and 1934*l.* from Hamburg.

LEECHES, MEDICAL USE OF. Of the species described in the preceding article it is intended to treat here only of those of the genus *Sanguisuga* (Savigny), as they only can be employed for medical purposes. The *S. medicinalis* is now rare in England, owing to the draining of so many of the ponds and bogs in which it formerly abounded. England derives the very large number required mostly from Sweden, Poland, and Hungary.

The *S. officinalis* has a green body or light blackish green, the back marked with six longitudinal bands of an iron colour, spotted with black spots at their middle portion and edge. The belly is of a yellowish green *without spots*, but broadly bordered with black. The segments of the body are very smooth. It is large, often seven inches long. It lives in pools and rivers. There are three varieties.

S. medicinalis has the body of a deep green, its back marked with six longitudinal bands of an iron colour, pretty clear, spotted with black points, generally triangular. The belly is greenish *spotted*, and broadly bordered with black, and the segments of the

body rough from granular eminences. It inhabits ponds and small lakes.

Leeches are oviparous. The ova remain in the uterus for some time, where they become invested first with a serous membrane, and then with a glutinous fluid, which remains attached to them after their expulsion, and serves as a protecting covering after they are deposited in the clay and holes of the sides of the ponds. The leeches generally deposit the *cocoons* from May to the end of September.

About five years are required before the leech attains a state of maturity; while very young they are quite unfit for medical purposes. They are caught in various ways, by the hand, or by a person wading in the shallow waters during the spring of the year, when they adhere to his naked legs; but in summer, as they have retired to deeper waters, a raft is constructed of twigs and rushes, by which a few are entangled. Baits are deposited, generally pieces of decayed animal matter or liver, to which the leeches resort, and are then caught; but this last method is thought to injure the health of the animal. Many sicken and die on the journey, especially during warm weather. They are conveyed either in bags or small barrels with a canvas cover.

A leech may be known to be in good health if it be active in the water and plump when taken out. Leeches vary in the quantity of blood they can abstract, from one drachm to half an ounce: from one to two drachms is the average. The quantity is often doubled by the expedients resorted to after the leech has been removed, either dry or wet cloths being applied, or in many cases cupping glasses; but cataplasms of linseed meal are most beneficial where they can be applied.

One gray or German leech is deemed equivalent to two green or Hungarian leeches. In applying leeches it should be borne in mind that certain states of the patient hinder or indispose them to bite. Where the skin is very thick, they cannot puncture it, or if the person has been using sulphur, the exhalation of the sulphuretted hydrogen is disagreeable to them; even the fumes of tobacco, vinegar, &c., will prevent them biting; also, if grease, salt, or vinegar, be on the spot to which they are applied, they refuse to attach themselves to it. The existence of hairs on the spot seems to hinder them from biting, and also from forming a vacuum to suck up the fluid, on which account they should be carefully shaved off. The leeches should be taken out of the water, and allowed to creep for some time over a dry warm cloth: various applications are recommended to induce the leech to bite on a particular spot, such as milk, porter, &c.

When the leech has dropped off, it should be seized by the tail and stripped between the finger and thumb, so as to cause it to disgorge most of the blood. It is proper to allow it to retain about a third. This is preferable to applying salt or vinegar to the mouth. It should then be placed in many successive fresh waters, and it may perhaps survive, and after some months be again fit for use.

Should there be any difficulty in stopping the flow of blood when the leech is removed, a weak solution of creasote applied to the part will generally effect it, or felt scraped from a hat, or gum in powder, or flour, or the dust of the puff-ball, or the application

of a compress and bandage, tying a ligature, or touching the wounds with lunar caustic. The patient should at the same time drink a saturated solution of alum, or take dilute sulphuric acid.

The increasing scarcity of leeches renders their preservation and propagation objects of primary importance. The death of a vast number of leeches is occasioned by errors in the method of keeping them. Though aquatic animals, it is not enough that they be supplied with water. They breathe by their entire surface, and are accustomed to change their skin every four or five days. Their body is covered, like that of all animals and plants which inhabit the water, by a slimy or mucilaginous fluid. When present in a limited degree, this mucous secretion is highly serviceable to them; in excess it is destructive. It is impossible for them to diminish it when it has accumulated, or to denude themselves entirely of their old skin, in water only. They must have some resisting body to creep over or through in order to accomplish this object, such as charcoal, sand, pebbles, or moss. The great extent to which the trade in leeches is carried on renders attention to this subject of paramount importance.

LEEDS, a municipal and parliamentary borough, is the principal emporium of the woollen manufactures in the West Riding of Yorkshire. The municipal borough is divided into twelve wards, and is governed by sixteen aldermen and forty-eight councillors. The parliamentary borough returns two members to the House of Commons, the number of electors in 1864 being 7616. The boundaries of the old parish, and the parliamentary and municipal boroughs are the same, being more than seven miles in length and breadth. The population at the last census was 207,165; in 1851 it was 172,270. The town is 22 miles S.W. of York, 189 N.N.W. of London by road, or 192½ by the Great Northern Railway. It is the first in importance in Yorkshire, and the fifth in England.

Leeds is situated on the slope and partly on the summit of a hill which rises from the north bank of the Aire, and from the top declines to the east, west, and north. The northern and southern parts are connected by five bridges, of which one was built before 1376; two others are suspension bridges on the peculiar bow-and-string principle—first introduced by Mr. Leather, of Leeds. Leeds is admirably situated for trade, being placed on the edge of an extensive coal-field, and in the heart of the inland navigation of the county. It communicates with the eastern seas by means of the Aire and Calder Navigation to the Humber, and westward by the Leeds and Liverpool Canal with the Mersey. It is the centre of a system of railways, radiating to all parts of the country.

Cloth is the staple manufacture, but stuffs, steam engines, linen, iron, pottery, thread, silk, carpets, glass, nails, &c., are also manufactured; and there are some coal mines. Most of the cloth is made at home by the hand-loom weavers, and then brought in the rough uncoloured state to the market, to be sold to the finishers. The total number of occupations to which the manufacture gives rise, beginning with pickers, sorters, and washers, and ending with warehousemen and packers, has been estimated at 120. The weavers reside on small dairy farms,

within a distance of ten or eleven miles of Leeds, and usually combine trade with farming. The dye-houses and dressing-shops at Leeds are very extensive. In these establishments both the woollen and worsted goods are finished. The mills at Leeds for the spinning of flax for canvas, linen, sacking, thread, &c., are very extensive; one of the flax mills consists of a single story and a single room, but this extends over nearly two acres of ground, and includes five times as much space as Westminster Hall. There are also large manufactories of glass, leather, earthenware, steam-engines, locomotives, and all kinds of machinery. Indeed, during the last few years the working of iron in Leeds has taken such a stride, as almost to vie in importance with the woollen manufacture; and this circumstance, combined with the fact that so many and such varied works are in full and vigorous operation, has secured for this town a healthy and prosperous progress among the recent vicissitudes and depressions of some of her trades. The manufactures of the town and district are facilitated by the abundant supply of coal produced from the mines in the vicinity of the town.

The principal buildings are St. Peter's church, which will seat nearly 4000 persons, and is a very noble edifice; St. John's, St. George's, St. Saviour's, built in 1843, in the pointed style, with a tall spire; and fourteen other churches in the township, out of more than forty contained in the parish. There are about thirty-five chapels, including two large Wesleyan, Unitarian, in the pointed style, and three Roman Catholic, one with a tower 150 feet high. The new town-hall, a handsome Corinthian pile, 250 feet by 200, with a dome 250 feet high, opened by the Queen in 1858, and in the vestibule of which stands a statue, in white marble, of her Majesty. It includes a hall 161 feet long, with one of the finest and best organs in Europe, and statues of the late Edward Baines, Esq., M.P., and Robert Hall, Esq., M.P. The commercial buildings comprise an exchange, news rooms, and district bankruptcy court, near which is a statue of the late Sir Robert Peel (1852); coloured cloth hall, 383 feet by 198, inclosing 1780 freehold stands; white cloth hall, 297 feet by 210, with 1200 stands; corn exchange, and statue of Queen Anne; stock exchange (1847); a handsome branch of the Bank of England, and seven other banks. There are three theatres, cavalry barracks, with a parade ground occupying eleven or twelve acres; large jail, court-house, Kirkgate covered and open markets, Smithfield cattle market, central market, built at a cost of 35,000*l.* in 1825-27; south or leather market, public baths, museum, school of medicine of high repute, fine arts' society, mechanics' institute, Dr. Priestley's and other libraries, general infirmary (1767), hospital for women and children, and fever hospital, both elegant and imposing buildings; eye and ear infirmary, and general dispensary. The free grammar-school was founded in 1552, and rebuilt in 1860 in the Gothic style, at a cost of 15,000*l.* The town also contains Harrison's, St. John's, and many other schools; Harrison's, Potter's, and Jenkinson's almshouses; Burmantofts industrial schools, in the Elizabethan style, 276 feet long; new workhouse, a magnificent and extensive building in the Elizabethan style, with room for about 800 inmates; and mendicity institu-

tion. A site for a new infirmary was lately purchased, and the first stone of a new building, from designs by George Gilbert Scott, Esq., R.A., was laid on March 29, 1864. The building alone was to cost 64,750*l.*; but with the expense of the site and palisades, streets and boundary walls, the total cost is computed to be not less than 106,000*l.* The borough jail, completed in 1847 at a cost of 40,000*l.*, in the castellated style, is second to none of its class in the kingdom. Besides the Roman Catholic churches, there is also a magnificent cathedral belonging to them, which is available for use, though for want of funds the details have not been all carried out. The grammar-school, which is a branch of a munificent charity left by Mr. Harrison, has a revenue of 1675*l.* a year; it is situated on the edge of Woodhouse Moor, an open piece of ground of above 60 acres in extent, belonging to the corporation; the scholars from this school have a preference in the election to four scholarships at Magdalen College, Cambridge, and to an exhibition in Queen's College, Oxford. The Harrison almshouses, as well as those of St. John's church, which is a very rich foundation, were established and endowed by the liberality of Mr. John Harrison. The infirmary has an annual income of nearly 5000*l.* The charitable endowments are estimated to produce in all nearly 7000*l.* a year. Four exhibitions of 50*l.* each per annum, tenable for four years, are given to those boys who, having attended the Leeds Grammar-School for four years, are proceeding to Cambridge, Oxford, or Durham.

The chief institutions at Leeds for supplementary education, are the Leeds Philosophical and Literary Society, the Literary Institution, the Mechanics' Institute, and the Working Men's Institute. The Philosophical Society's Hall is a handsome building, of the Doric order, and has a spacious lecture theatre and fine museum. The Literary Institution has a large reading room and extensive library. The Mechanics' Institute has a library of 12,000 volumes, reading room and lecture hall, day schools and evening classes, and about 1500 members. In connection with it is one of the most successful schools of art in the kingdom, giving instruction in drawing to 3000 persons. The Working Men's Institute has about 2000 members. There are several libraries—that established by Dr. Priestley being one of the best in the north of England.

Formerly Leeds had an uninviting appearance, and the older streets, Kirkgate, Briggate, and some others, are still narrow and inconvenient; but the modern thoroughfares are good and spacious. The district on the west is new, and inhabited by the wealthier classes. The population on this side is increasing very rapidly, and new streets and roads are being set out by most of the owners of property in this locality.

The October quarter sessions for the Riding, as well as the borough quarter sessions, have long been held at Leeds, and in 1864 it was made an assize town. It is the seat of a district court of bankruptcy, and of a county court. It is also a warehousing town under the Inland Bonding Act of 1860—the revenue derived from articles subject to customs' duty in 1865 having been 38,470*l.*

Leeds was first incorporated in 1626, though it

was only created a parliamentary borough in 1832. The number of voters in 1866 was 7217.

Kirkstall Abbey, about three miles from Leeds, was founded by Henry de Lacie, for the Cistercian order of monks, in 1150. It is a fine ruin, remarkable for its simple grandeur and unity of design. Adel Church, about four miles distant, is an interesting building, erected in 1140. Near it was a Roman station.

In connection with the Leeds waterworks is the store reservoir at Eccup (about six miles north of the town), covering 50 acres, and containing 257,000,000 of gallons. There are also service reservoirs at Westwood and Woodhouse Moor, of 10 and 6 acres, holding respectively 28,000,000 and 5,000,000 of gallons.

There are botanical gardens and cemeteries at Woodhouse Moor, Burmantofts, and Hunslet.

(Communication from Leeds; Thom's *British Directory*; White's *A Month in Yorkshire*.)

LEEK. [ALLIUM.]

LEEK. [STAFFORDSHIRE.]

LEER, or LIER, a well-built market town, in the Hanoverian province of East Friesland, is situated in 53° 18' N. lat., 7° 25' E. long., on the river Leda, which falls into the Ems about three-quarters of a mile below the town. It has several churches, a synagogue, an orphan asylum, two hospitals, and 8225 inhabitants, who manufacture linen, woollen stockings, soap, vinegar, tobacco, and iron wares. It has also an extensive shipping trade, and a considerable business in butter, cheese, and other articles. Ships of 150 tons' burthen come up to the town.

LEET is the district subject to the jurisdiction of a court-leet. Sometimes the term is used to denote the court itself, the full style of which is 'Court-Leet and view of Frank-pledge.' The court-leet is also called a law-day, as being the ordinary tribunal.

One of the least improbable derivations of the word 'leet' is that which deduces lath and leet from the Anglo-Saxon 'lathian,' or 'gelathian,' to assemble, both lath and leet indicating a district within which the free male resiants (residents) assembled at stated times for preparation for military defence, and for purposes of police and criminal jurisdiction. Of the first of these objects scarcely any trace exists in the modern leet. The title of the court as a 'view of Frank-pledge' points to its former importance, under the system of police introduced or perfected by King Alfred, which required that all freemen above twelve years of age should be received into a decenna, dizain, decennary, or tithing, sometimes called a visne, or neighbourhood—in Yorkshire and other parts of the north, ten-men-tale (a number, tale, or *tally* of ten men)—and forming a society of not less than ten friborgs, or freeborrows, freemen, each of whom was to be *borhoe*, that is, pledge or security for the good conduct of the others.

Leets are either public or private. The Public Leet is an assembly held in each of the larger divisions of the county, called a hundred, at which all freemen who are resiants within the hundred are bound to attend in person or by their representatives. These representatives were the reeves or chiefs of their respective tithings, whether designated by that or by any of the other appellations, each of whom was accompanied by four good and lawful men of,

and elected by, the tithing which deputed them. This public court, which was originally called the folk-mote, being held successively in each hundred in the course of a circuit performed by the sheriff, acquired the name of the sheriff's *tourn*; by which name, though itself a court-leet, it is now distinguished from inferior private leets. The private court-leets appear to have been created by grants from the Crown, obtained by the owners of extensive domains (which afterwards became manors), and most frequently by religious houses, for the purpose of relieving their tenants and those who resided upon their lands from the obligation of attending the tourn or leet of the hundred, by providing a domestic tribunal, before which the resiants might take the oath of allegiance, and the frank-pledges might be inspected, without the trouble of attending the tourn, and to which, as an apparently necessary consequence, the criminal jurisdiction of the precinct or district was immediately transferred. In these private leets the grantee, called the lord of the leet, performed the duties which, in the public leet or tourn, after the ealdorman or earl had permanently absented himself, fell upon the sheriff. These duties he might perform either personally or by his steward. As a compensation for this, and his trouble in obtaining the franchise, it appears to have been the practice of the great landowner, who by his money and his influence had procured the grant of a private leet, to claim from resiants a certain small annual payment by the name of certum letæ. In many cities and boroughs the ancient authority of the court-leet was in later times superseded by charter of incorporation, in some of which the popular election of magistrates was preserved entire; whilst in the great majority of cases, the right, though continued in name, was fettered, if not rendered altogether nugatory, by restrictions of various characters and degrees. In other respects, the course prescribed by these charters was adapted to the changes which had taken place in the habits of the people since the institution of the court-leet. Many of the functions of the magistrates in the new incorporations were borrowed from the then comparatively recent institution of Justices of the Peace.

The court-leet is a court of record, which has jurisdiction of such crimes as subject the offenders to punishment at common law. As criminal jurisdiction belongs exclusively to the kingly office, all criminal prosecutions are called pleas of the crown, and the court in which such pleas are held are the king's courts, although granted to a subject. The authority so exercised under the king's grant is called a lordship, and the grantee is said to be the lord of the leet. It may be claimed either by a modern grant or by prescription, that is, long established user, from which an ancient grant is presumed.

Private Leets are commonly held, as public leets must be, twice in the year: within a month after Easter, and within a month after Michaelmas; and even the former cannot, unless warranted by ancient usage, be held at any other time except by adjournment. The court appears to have been formerly held in the open air. It should be held at its accustomed place, though if sufficient notice be given, it may be held anywhere within the district. All persons above the age of twelve years and under

sixty (except peers and clergymen, who are exempted by statute, and women and aliens), resident within the precinct for a year and a day, whether masters or servants, owe suit to (*i.e.*, personal attendance at) this court, and here they ought to take the oath of allegiance.

It was the province of the court-leet, as well the public leet of the hundred as the private leet, to repress all offences against the public peace, and to enforce the removal of all public nuisances. The leet jury may make by-laws. The leet jury elect their chief magistrates, the reeve or constable, &c., of the private leet, and, as it would seem, the high constable (sometimes called the alderman) of the hundred.

Before the Norman conquest, and probably for some time after, this court of the leet was, if not the sole, at least the ordinary tribunal for the administration of criminal justice in the kingdom.

The steward of a leet is a judge of record, and may take recognizances of the peace; and he may impose a fine for a contempt or other offence committed in court, as where a party obstructs the jury in the execution of their duties, or by public officers in the discharge of their duties out of court. For the fine so imposed the lord may distrain or bring an action of debt.

Of common right the constable is to be chosen by the jury in the leet; and if the party chosen be present, he ought to take the oath in the leet; if absent, before justices of the peace. If he refuse to accept the office, or to be sworn, the steward may fine him. If the party chosen be absent and refuses, the jury may present his refusal at the next court, and then he is amerced.

Though the leet has long ceased to be the principal and ordinary court of criminal jurisdiction, its power has been enlarged by several statutes, which give it cognizance over offences newly created, and it does not appear to have been at any time directly abridged by legislative interference. The business of the court has chiefly been affected by the creation of concurrent jurisdictions, particularly that of justices of the peace, who have cognizance of the same matters, as well as of many others over which the court-leet has no jurisdiction.

It is now usual to give fifteen days' notice of holding a court.

The functions of the steward of a court-leet are mostly judicial. Ministerial acts are performed by an inferior officer called the bedel or bailiff, who of common right is appointed by the lord or steward, though by custom he may be chosen by the jury. The steward issues a precept under his seal, addressed to the bailiff of the leet, commanding him to warn the residents to appear at the time and place appointed for holding the court, and to summon a jury. When the court is opened, he delivers to the steward a list of persons summoned as jurymen, together with the suit or resistant roll. The suit-roll is then called over, and those residents who are absent are marked to be amerced. The bailiff then gives notice, 'If any man will be essoigned, come in, and you shall be heard.' The steward, having called for the essoigns (*excuses*), enters them.

The jury is chosen from the body of the suitors, and consists of not less than twelve, nor more than

twenty-three. A foreman is then named, who is sworn as follows:—'You shall well and truly inquire, and true presentment make, of all such articles, matters, and things as shall be given you in charge; the king's counsel, your companions', and your own, you shall keep secret and undisclosed. You shall present no man for envy, hatred, or malice; nor spare any man for fear, favour, or affection, or any hope of reward; but according to the best of your knowledge, and the information you shall receive, you shall present the truth and nothing but the truth.' As soon as the foreman is sworn, and the rest of the jury, they receive a charge from the steward, pointing out the nature of their duties, and of the matters which ought to be presented. The jury make their presentments to the steward, who, in cases of treason or felony, must return the presentments (in these cases called indictments) to the justices of gaol-delivery, if the offenders be in custody; if they be at large, the indictments must be removed into the King's Bench by certiorari, in order that process may issue thereon. In all other cases the steward of the leet has power, upon the complaint of any party grieved by the presentment, or, on the other hand, upon any suspicion entertained as to the concealment of any offence, by non-presentment, to cause an immediate inquiry into the truth of the matter by another jury, though in the former case the more usual course now is by certiorari or traverse.

The ordinary profits of a court-leet are the fines, amercements, and essoign-pence, and belong, in the case of a public leet or tourn, to the king; in the case of a private leet, to the grantee or lord of the leet.

Though the court-leet may now be considered as an antiquated institution in many respects, it is characterized by many valuable features, and in some districts is still efficient.

LEEWARDEN, the chief town of the Dutch province of Friesland, situated in 53° 12' N. lat., 5° 47' E. long., has about 25,000 inhabitants. It is surrounded with an earthen rampart and a wide moat; the broad straight streets are intersected by canals, the banks of which, as well as the ramparts, are planted with trees, and afford very pleasant promenades. The town, which is well built, has manufactures of linen and paper, printing establishments, and a considerable trade, which is much facilitated by numerous canals. The principal buildings are—the town-hall, the ancient palace of the princes of Orange, a synagogue, and twelve churches, the largest and handsomest of which contains monuments of the princes of the house of Orange. There are also an arsenal, exchange, house of correction, and a branch of the Society of Public Good. Leeuwarden is on the river Ee, and on the great canal between Harlingen and Gröningen.

LEEWARD ISLANDS, or *Greater Antilles*, a name given to the West Indian Islands N. of 18° N. lat., and comprising CUBA, Isla-de-Pinos, HAYTI, Puerto-Rico, and JAMAICA, and the smaller isles of Grand Cayman and the Virgin Islands. They extend from long. 64° 15' to 85° W. South of this group are the Windward Islands, or Lesser Antilles.

LEFEBVRE, FRANCOIS JOSEPH, Duke of Danzig, and Marshal of France, was born of humble parents at Ruffach, in Upper Alsace, October 25, 1755. Having lost his father, he enlisted, when

eighteen years of age, as a private soldier in the regiment of French guards. After the Revolution he obtained rapid promotion, and as a captain of his regiment was enabled to render some valuable assistance to the unfortunate family of Louis XVI. While serving with the army of the Moselle during the whole of the campaign in Germany and the Netherlands, and afterwards with the army of Italy, he repeatedly distinguished himself. On the 25th of March, 1799, was fought the memorable battle of Stockach, in which, with only 8000 men, he resisted for many hours the attack of 30,000 Austrians.

When Bonaparte placed himself at the head of affairs, Lefebvre cordially co-operated with him. He was also instrumental in extricating Lucien Bonaparte from his dangerous position in the stormy meeting of the Council of Five Hundred at St. Cloud. These important services were rewarded by the command of the seventeenth military division, the head-quarters of which were at Paris.

In the year 1804 he was raised to the dignity of a marshal of the Empire. He accompanied Napoleon the following year in the Austrian campaign, and in 1806 took an active part at the battle of Jena. In 1807 he was sent with an army of 16,000 men to invest Danzig. He was rewarded for the brilliant success of his expedition with the title of Duke of Danzig.

In the year 1808 Lefebvre joined the Peninsular expedition. In the German campaign of 1809 he rendered himself conspicuous at the battles of Eckmühl and Wagram, and in the dangerous warfare among the passes of the Tyrol. He was also with Napoleon in the disastrous expedition to Russia, and had the command of the old guard. During the retreat he showed considerable military skill. In the campaigns of 1813 and 1814 he adhered to the declining fortunes of his master. It is, however, stated that Lefebvre greatly influenced the abdication of Napoleon, and at the first restoration of Louis XVIII. he was created Chevalier of St. Louis and a peer of France. But on the return of his former chief from Elba, he accepted a seat in his Chamber of Peers. At the second restoration of the Bourbons he was excluded from the Chamber, but recalled in 1819, having been reinstated in his rank of marshal. He died at Paris on the 14th of September, 1820.

LEFKOSIA. [CYPRUS.]

LEG. [SKELETON.]

LEGACY (*Legátum*), a bequest or gift of goods and chattels by will or testament. The person to whom it is given is termed the legatee (*legatarius*).

The bequest is not complete without the assent of the executor or administrator to the will annexed, as the case may be. [EXECUTOR.] But, before such assent, the bequest is transmissible to the personal representatives of the legatee, and will pass by his will. The executor or administrator is not bound to admit that there is anything due to the legatee till the debts of the deceased are paid.

Legacies are of two kinds, general and specific. A legacy is general when it is so given as not to amount to a bequest of a particular thing, or a particular fund of the testator; a specific legacy is a bequest of a specified thing, or a specific part of the testator's estate. There is also a third description of legacy, partaking somewhat of the nature of both kinds

already mentioned, as a gift of so much money, with reference to a particular fund for payment. This is called a *demonstrative* legacy, but it so far differs from one properly specific, that if the fund pointed out fails on any account, the legatee will be paid out of the general assets.

Legacies may be given either absolutely (*purè*, as the Roman jurists termed it), or upon condition (*sub conditione*), that is, on the happening of any contingency, provided it must happen, if at all, within the duration of a life or lives in being at the time of the decease of the testator and twenty-one years afterwards, allowing in addition the period of gestation where the contingency depends upon the birth of a child. When a legatee has obtained such an interest in the legacy as to be fully entitled to the property in it, the legacy is said to be *vested*, and this property may be acquired before the right to the possession of the legacy accrues. A vested legacy is transmissible to the personal representatives of the party entitled to it, or passes by a will; a legacy which is contingent or not vested is no property at all with respect to the legatee. This distinction of legacies vested and not vested seems derived from the Roman law, which expresses the fact of vesting by the words '*dies legati cedit*.'

Formerly, in all cases when a legatee died before the testator, the legacy lapsed or failed, and went to the person appointed residuary legatee by the testator, or if there was none such, to the next of kin, and lapse might also take place (as in the case of a legacy given to a legatee at a particular time, or upon condition, or the happening of a contingency) if the legatee died before the appointed time arrived, or if the condition was not performed, or the contingency did not happen. The Statute 1 Vict. c. 26, s. 33, has modified the old rule.

The English rules by which gifts of legacies are construed are derived from the Roman law, as appears from Swinburn's '*Treatise on Wills*;' and they have been extended and modified by decisions.

It may be stated, as a general rule, that legacies are payable twelve months after the death of a testator, and with interest from that time at 4 per cent., unless the testator has made some special provision as to the time of payment and interest. When a specific legacy consists of some determinate chattel, whether real, as a lease for years, or personal, as a particular horse, the legatee, after assent by the executor to the legacy, may take possession of it, or sue for it by action at law; but where the specific legacy consists of money, &c., and in all cases of general and of demonstrative legacies, no action at law lies unless the executor has, for some new consideration beneficial to himself, expressly promised payment. As a general rule, therefore, it may be stated that the remedies by legatees against executors are afforded by the courts of equity. (Roper '*On Legacies*;' Williams '*On Executors and Administrators*.')

On the subject of legacies (*legata*) under the Roman law, Gaius (ii. 192-255) and the '*Digest*,' lib. xxx., xxxi., xxxii., '*De Legatis et Fidei Commissis*,' are the chief authorities. By the more ancient law there were four forms of legacies, giving to the legatee, according to the nature of the expression employed, either a real right to the thing bequeathed, or a right of action against the testator's heir. During the reign

of Augustus legacies were frequently bestowed in the form of *fidei commissa*, or trusts, which, being merely a request to the testator's heir to deliver over the subject to the legatee, could be constituted not only by a formal and probative testament, which the stricter forms of legacies always required, but also by any informal writing (*codicilli*) under the testator's hand. All these distinctions were abolished by Justinian.

Legacies pay a tax, which is generally to be paid by the executor or administrator, and the stamp which denotes the payment of a legacy is to be affixed to a receipt which is given to the executor or administrator by the person who receives the legacy. They are subject to the following duties:—Children of the deceased, or any lineal ancestor, pay 1*l*. per cent.; brothers and sisters, 3*l*. per cent.; uncles and aunts, 5*l*. per cent.; brothers and sisters of a grandfather and grandmother, 6*l*. per cent.; strangers in blood, 10*l*. per cent. There are also stamp duties on probates of wills and on letters of administration.

By the law of Scotland legacies may be constituted either verbally (*nuncupative*) or by writing. But no verbal legacy can be effectual to any larger extent than 100*l*. Scots (8*l*. 6*s*. 8*d*. sterling). If in writing, legacies may be bequeathed either by the will itself or by codicil. Legacies are payable out of the free movable estate of the deceased, after payment of all his debts; but if the funds of the testator are insufficient to meet these, the legacy will fail, no legacy being effectual against creditors. Legacies may be either *general*, of a certain portion of the deceased's effects, in which case the legatee has merely a personal right of action against the executor; or *special*, when a specific subject, or debt, or sum of money, is bequeathed, in which case a *real* right to that subject or fund is constituted in the legatee. Legacies are also *universal*, when the subject bequeathed is the testator's whole movable estate; or *residuary*, when it comprehends what of that estate remains after paying expenses, debts, and other legacies. Legacies may be left not only to one or several persons, but, in the event of their failure, to a series of individuals, specially named or described. The rights of parties under legacies with such substitutions have given rise to many intricate questions of vesting. All legacies of 20*l*. and upwards out of estates above 100*l*. are subject to legacy duty.

LEGATE (from the Latin *legatus*, which is a participle from *lego*, and signifies one who is sent with a certain commission). This word had various significations among the Romans. The legates (*legati*) were the chief assistants of the proconsuls and propraetors in the administration of the provinces. The word *legatus* also signifies a military officer who was next in rank to the general or commander-in-chief in any expedition or undertaking, and in his absence had the chief command. The word *legatus* is also often used to denote a person sent by the Roman state or sovereign power on matters that concern the public interest.

At the present day a legate signifies an ambassador, or nuncio, of the pope.

There are several kinds of papal legates: *legatus a latere*, *legatus natus*, &c. Legates *a latere* are sent on the highest missions to the principal foreign courts, and as governors of provinces within the Roman territory which are called legations (*legazioni*),

when they are governed by a cardinal. Legates of a lower rank than cardinals are called *nunci apostolici* (apostolic messengers).

LEGATEE. [LEGACY.]

LEGAT'O (Ital. 'tied'), in music, a term used in opposition to *staccato*, implying that one note is tied to another, and represented by placing these marks $\sim$ above or below the notes intended to be joined. Where these *legati* appear, the notes are to be played in a smooth and gliding manner, each note on the piano to be held down till the next is struck.

LEGEND (from the Latin word *legendum*, 'a thing to be read'), is used commonly in the sense of fabulous or doubtful narratives between history and fiction, tales of superstition, or other subjects, in which credulity and imposture find free room for exercise. Thus legends have come to signify that which is usually rather matter of tradition than of written evidence. In our old authors the word occurs in its simple meaning.

Legend is also used technically to denote the words encircling a coin. To writing on tablets the word *inscription* is applied, which is also used instead of legend where a sentence, instead of encircling, occupies the place of a device on the coin.

LEGENDE, ADRIEN MARIE, an analyst, whose name must follow those of Lagrange and Laplace in the enumeration of the powerful school which existed in France at the time of the Revolution, was born at Paris in 1751, and died there January 10, 1833. He never filled any political post, or took any marked part in public matters: he was, we believe, no favourite of any government, and his scientific fame did not procure for him more than a very moderate competency.

The writings of Legendre are mostly extended applications of the integral calculus. In 1787 he was appointed one of the commissioners for connecting the observatories of Greenwich and Paris by a chain of triangles. Cassini de Thury had memorialized the British government on the expediency of this step, the execution of which was committed to General Roy on the English side, and to Legendre, Cassini, and Méchain, on the French. Much of the work was completed in 1787, and a memoir of Legendre, published in the volume for that year, upon some theoretical points, contains one of those simple and beautiful theorems which carry the name of their inventors with them for ever.

Legendre applied himself at an early period of his life to the development of those integrals on which the determination of the arcs of an ellipse and hyperbola depend. In the *Memoirs of the Academy* for 1786 are two papers on the subject written by him. His '*Exercices du Calcul Intégral*,' published in 1811, contain, among other matters of high curiosity, an extended view of the same subject. He continued to devote himself assiduously to the cultivation of this new branch of science, and in 1825 and 1826 he produced the two volumes of his '*Traité des Fonctions Elliptiques et des Intégrales Eulériennes*,' containing a digested system, with extensive tables for the computation of the integrals. The work was hardly published when the discoveries of MM. Abel and Jacobi appeared. These mathematicians, then both very young, had begun by looking at the subject in another point of view, and had produced

results which would have materially simplified a large part of Legendre's theories, if he had had the good fortune to find them. With a spirit which will always be one of the brightest parts of his reputation, Legendre immediately set to work to add the new discoveries to his own work; and in 1828 and subsequent years appeared three supplements, in which they are presented in a manner symmetrical with the preceding part of the work, and with the fullest acknowledgment of their value and of the merit of their authors.

To Legendre is also due the collection of the results obtained upon the Theory of Numbers, a subject to which he made very remarkable additions. The second edition of his '*Théorie des Nombres*' was published in 1808, and the third in 1830.

LEGHORN (*Livorno*) a large maritime city and seaport of the kingdom of Italy, is situated in 43° 33' N. lat., 10° 19' E. long., at the southern extremity of a low and partly marshy plain extending from the left bank of the Arno to the hills of Montenero, which end abruptly on the sea about 3 miles to the south. The city is 14 miles S. by W. from Pisa, 45 W. by S. from Florence, with both of which it is connected by railway, and had in 1861 96,471 inhabitants, of whom many are Jews. The town is neatly and regularly built; the streets are wide and mostly straight, and there is a fine square in the centre. The western district, called *La Nova Venezia*, is intersected with canals, by which the goods are carried in boats from the shipping in the harbour and landed before the warehouses of the merchants. Many of the private houses are handsome. The shops are well supplied with goods, and fitted up in good taste. The English and Lutherans have chapels and burying grounds, the Greeks a church, and the Jews a very handsome synagogue. The English burying-ground, situated on the ramparts, is adorned with numerous marble monuments—among others is that of Smollett, who died here. The town itself is little more than two miles in circumference; but two large suburbs, one beyond the north or Pisa gate, and the other to the south, called *Borgo Cappuccini*, have gradually increased to the size of towns, and have been included within the boundaries of the *Porto Franco*, wherein goods can be landed and warehoused, and exported again without paying duty. The outer mole, which is more than a mile in length, and joins the lighthouse, affords a pleasant walk. To secure increased shipping accommodation, a new harbour has recently been constructed for vessels of considerable tonnage, but the very largest still lie in the roads, where the anchorage is safe and good. The *Darsena*, or interior harbour or dock, is only fit for smaller vessels. Near the *Darsena* stands a fine colossal statue of Duke Ferdinand I., a great benefactor of Leghorn. The *lazzarettos*, of which there are three, outside of the town and on the sea-shore, are remarkable for their excellent distribution and perfect security, being surrounded by wet ditches, and furnished with extensive warehouses and convenient lodgings.

Leghorn is rather a commercial than a manufacturing town; it has, however, tan-yards, rope-walks, soap and candle factories, glass-works, establishments for the manufacture of coral ornaments, woollen caps, cream of tartar, borax, and sulphur. Steamers and

sailing vessels are built. The town has a casino or assembly-house, a theatre, and very good inns and coffee-houses. Educational establishments of all kinds are numerous.

Leghorn embraces all the foreign trade of Tuscany, and ranks as the greatest commercial emporium in Italy. The imports are either for consumption or for deposit. They consist of corn, cotton, hemp, wool, sugar, raw and manufactured silk, bronze work and jewellery, cotton and cotton yarn, spices and drugs, dye-stuffs, porcelain, gum, wine, spirits, tobacco, &c. Many of these articles of course enter into the exports, for the transit trade is very extensive. Other exported articles are oil, anchovies, paper and rags, straw hats, marble and alabaster, works of art, timber, cork, coral, tallow, potash, &c. The total value of the imports and exports amounts to about 6,000,000*l.* a year. The number of vessels that enter the harbour annually is over 5000, with about 500,000 tons cargo. The number of ships that clear are about the same in number, but the freights are somewhat less. Steamers ply regularly to *Civita-Vecchia*, Naples, Sicily, Genoa, Nice, and Marseilles.

Leghorn was made a free port by the Grand Duke Cosmo in the sixteenth century, and to this circumstance it owes its chief prosperity. The population of Leghorn is much increased during the summer season, in consequence of the large number of visitors who resort to it for its baths and mineral springs, the latter of which enjoy high medical repute. The town is altogether one of the most improving on the Continent.

LEGION. In a Roman consular army each grand division, corresponding nearly to a modern brigade, was so denominated; and the word indicates a selection of the individuals composing such division. The name is still occasionally given to a body of troops consisting of several regiments or battalions, when raised at a particular place or for a particular service.

The strength of a Roman legion varied at different periods. Romulus divided the men who were able to bear arms into legions of 3000 men, but under other rulers their numbers amounted to more than 6000. The legion declined under the later emperors, and in the time of Constantine did not number more than 1500 men.

The manner in which the soldiers were elected to serve in the legions is fully described by Polybius (book vi. ch. 1). When an army consisting of four legions was to be raised, the citizens of the proper ages being assembled on an appointed day in the capitol, the military tribunes drew out the tribes by lot, and from that which was first called they selected four men of nearly equal age and stature. Of these the tribunes who were appointed to the first legion chose one; those who were appointed to the second legion chose another; and so on. Afterwards the whole body of the tribunes chose four other men, and of these the tribunes of the second legion first chose one; those of the third legion then chose another; and so on, the tribunes of the first legion taking the last man of the four. In like order the election proceeded till the required number of men was obtained.

Immediately after the enrolment, the recruits for the legions being made to advance one by one, each was sworn to be obedient to his commanders, and to

execute all the orders which he should receive from them to the utmost of his power.

On the institution of regular bodies of troops by Romulus, he is said to have divided them (probably each legion) into companies of 100 men, and these were called *Manipuli*, from the bundles of grass which served as standards for the people who accompanied him when he attacked the palace of Amulius. The first mention of a cohort occurs shortly after the expulsion of the kings (Liv. ii. 11); and in the time of Polybius the legion was divided into ten cohorts, each of these into three manipuli (Polybius, b. 11), and each of the latter into two centuriae.

Servius Tullius is said to have divided the military force into five different classes of troops (Liv. i. 43), which were distinguished by their armour; but from the commencement of the republic, or nearly so, the order of battle consisted of three lines of troops, the *Hastati*, the *Principes*, and the *Triarii* (Liv. viii. 8). The *Vélites* (light troops or skirmishers) had no particular station.

All the three classes were completely armed with cuirass, helmet, and greaves. Their buckler was 4 feet long and 2½ feet broad, and five arrows were placed in its concavity, to be thrown when necessary. Each man was provided with a long and a short sword, the blade of the former being strong, and made either to cut or thrust; and he carried, besides, two javelins, or *pila* (Polybius, b. 6).

The front of the legion, when in order of battle, was formed by ten corps of the hastati, each corps being arranged with sixteen men in front, and ten in depth. The second line, or that of the principes, was of the same strength, and was drawn up in the same manner. The line of triarii consisted also of ten corps; but these had only ten men in front and six in depth. Every legionary soldier was allowed five feet in front, and as much in depth, in order that he might be enabled to make free use of his arms.

The cavalry of a Roman legion was divided into ten *tumæ*, of about thirty horses each, who, in order of battle, were drawn up with eight in front and four in depth. Each legion of the allies had, however, 600 horsemen; so that the cavalry of a consular army (consisting of two Roman legions and two legions of allies) amounted to 1800 men, who were disposed on the wings of the legion, in one line or two, according to circumstances. The legionary cavalry were furnished with cuirasses and helmets, and they were accompanied by light-armed horsemen, who served as archers.

LEGION OF HONOUR, an order of merit in France, instituted by Napoleon during the year 1802, as a recompense for military and civil services. The order consisted of five divisions: *chevaliers*, of whom the number was unlimited, *officers*, *commanders*, *grand officers*, and *grand crosses*. In the year 1815, on the second restoration of the Bourbons, the entire number of members of the different divisions of this order was 30,747. Louis Philippe distributed the decorations with a prodigal hand, and in 1843 there were no less than 49,417 members. This immense number had naturally detracted much from the value which was at first placed on the honour, and since the election of the present emperor only one appointment has been made for every two vacancies. Some of the privileges which Napoleon conferred on the

order, such as the right to vote at the electoral colleges, were abolished by the Bourbons, and the pensions were much reduced. The college of the legion is, however, still possessed of a considerable income (it was much augmented by the gift of a portion of the property of Louis Philippe), out of which large sums are paid as pensions to certain members of the order. The decoration, as now worn, consists of a cross of ten points of white enamel edged with gold. The points are connected with a wreath of laurel, and in the centre is the head of the emperor. It is worn attached to a red ribbon. Every Frenchman who belongs to the order must pass through the lower grades before he can rise to the superior rank. Candidates, except in special cases, must have served twenty years in time of peace in some military or civil capacity; exploits in war, or severe wounds, constitute special claims. The honour has from time to time been conferred on several eminent men in science and literature, and in this respect has not been confined exclusively to Frenchmen.

LEGISLATION. A magistrate who proposed a law in Rome for the adoption of the assembly of citizens was said *legem ferre* (as we say, to bring a bill into Parliament); and the law, if carried, was said to be *perlata*, or simply *lata*. Hence the term *legem lator*, or *legislator*, was used as synonymous with the Greek *νομοθέτης*, in the sense of a lawgiver. From *legislator* have been formed *legislation*, *legislative*, and *legislature* (the last word signifying a person or body of persons exercising legislative power).

Legislation means the making of positive law. A general command, or law, would be nugatory, if it was not applied in practice to the cases falling within its scope, and if the pains denounced for the violation of it were not inflicted on transgressors. The execution of the general commands, or laws, of a sovereign government is therefore an essential part of the business of a government. Accordingly, the ordinary functions of a government may be divided into the two classes of *legislative* and *executive*.

An *executive* command, or act, of a sovereign government is a special command issued, or act done, in the execution of a law previously established by the government. Executive commands or acts are of two sorts, viz., *administrative* and *judicial*. The distinction between these two sorts of executive commands or acts may (in conformity with modern phraseology) be stated as follows:—A judicial proceeding is a declaration, by a competent authority, that a person has (or has not) brought himself within the terms of a certain penal provision, or that he has (or has not) a certain legal right or obligation which another disputes with him. An administrative proceeding is for the sake of carrying a rule of law into effect, where there is no question about the legal culpability, or dispute about a legal right or obligation of a person. In an administrative proceeding the government functionary acts, or may act, spontaneously and from his own information; in a judicial proceeding he does not act until he is set in motion by others, and he can only take notice of the facts which the litigant parties bring before him. A judge cannot act until his court is (to use the French phrase) *seized*, or *saisi*, with the question; or (to use the language of our ecclesiastical courts) it is necessary 'to promote (or set in motion) the office of judge.'

The division of the functions of government into legislative and executive is not exhaustive, inasmuch as neither class comprehends acts or special commands not founded on a previous general command or law, in other words, *privilegia*; as well as treaties and other compacts of a sovereign government.

Positive law may be viewed from the two following aspects. First, it may be considered as an organic system, consisting of coherent rules, expressed in a technical vocabulary. Secondly, its rules may be considered singly, with reference to their end or object. Law viewed from the former aspect is properly the subject of the science of jurisprudence. [JURISPRUDENCE.] Law viewed from the latter aspect is the subject of a department of political science which is generally termed *legislative science*. Legislation is also concerned about the technical form, as well as the object, of a law; and therefore legislation requires the aid of jurisprudence.

The distinction between the technical form and the substance of a law is also important with reference to the question of *Codification*, i.e., the making of a code of laws.

The making of a code of laws may involve any one of the three following processes:—1. The formation of a new system or body of laws. 2. The digestion of written laws, issued at various times, and without regard to system. 3. The digestion of unwritten law, contained in judicial decisions and authoritative legal treatises. The *codices* of Theodosius and Justinian are examples of the digestion of written laws. [CONSTITUTIONS, ROMAN.] The 'Digest' or 'Pandects' of Justinian afford an example of the digestion of unwritten law. The English statutes for consolidating various branches of the criminal law, the bankruptcy laws, the customs laws, the distillery laws, &c., are instances of the digestion of the written law of England. The digestion of existing law, whether written or unwritten, requires merely juristical ability; the making of new laws requires, in addition to the knowledge and skill of the jurist, that ability which we have termed legislative. In other words, the making of new laws requires attention to their end, design, or object, and technical skill in the composition or drawing of them.

LEGITIM, or BAIRN'S PART OF GEAR, in Scotch law, is the legal share of the father's free movable estate falling to the children of the marriage at their father's death. When a father dies, leaving a widow and children, a tripartite division of his movable estate, one-third going to the widow as her *jus relicte*, another to the children in name of *legitim*; whilst the remaining third, or *dead's part*, if not disposed of by the father during his lifetime, goes also to the children as his next of kin. If the deceased has left heritable estate, his eldest son, as his heir-at-law, is excluded from a share of the legitim, unless he chooses to collate the heritage with the younger children.

LEGITIMACY. All children are legitimate who have been procreated in lawful wedlock, or, in Scotch law, have been legitimated by the subsequent marriage of their parents. [LEGITIMATION.] The presumption of legitimacy arising in favour of a child born of a mother who at the time of conception was lawfully married, can now be rebutted only by the

clearest evidence that the husband could not possibly be the father of the child.

LEGITIMATION, the act by which children born in bastardy are made lawful children, may take place according to Scotch law in two ways, either by the subsequent marriage of their parents, or by royal letters of legitimation.

1. *Legitimation per subsequens matrimonium*, a remedy borrowed from the law of Rome, is competent only when the parents at the time of the birth, and also at the time of the marriage, were domiciled in Scotland, and were under no legal impediment to marry at the time of the procreation of the child. The fact of the parties having contracted an intermediate marriage between the date of the birth of the child and their subsequent marriage, does not operate any bar to legitimation. But a child legitimated in this way cannot succeed to real estates in England, for in that country legitimation by subsequent marriage is unknown.

2. *Legitimation by royal letters* operates only to the effect of dispensing with the Crown's right of succession to the intestate estate of the father of the bastard. [BASTARD.]

LEGNANO. [VERONA.]

LEGUMIN, a peculiar vegetable product obtained by Braconnot from peas, and which he considers as a vegetable alkali. It appears to be a substance intermediate between gluten and vegetable albumen; it differs from the first in being insoluble in alcohol, and from the last in readily dissolving in the alkaline carbonates. It contains some sulphur, and also azote, but less than animal albumen. It exists in peas and beans to the amount of about 18 per cent.

LEGUMINOSE, or FABACEE, a very extensive natural order of plants inhabiting the coldest and hottest, the driest and dampest, parts of the world; assuming the greatest varieties of form and size, some being among the smallest of flowering plants, others forming the largest trees in tropical forests. They vary also in an extraordinary degree in their sensible qualities, some being eatable, as peas, beans, and other pulse; others poisonous, as *Piscidia*, *Tephrosia*, and *Cytisus*; some secreting a fragrant volatile oil, others destitute of all trace of such a substance.

The species amount to some thousands, and are conveniently divided into three sub-orders, *Papilionacee*, *Casalpiniacee*, and *Mimosee*.

Papilionacee have what are called papilionaceous flowers, resembling a butterfly; and it is here that the great mass of the order occurs, especially in the colder parts of the world. Peas, beans, clover, sainfoin, lucerne, liquorice, indigo, medicks, and trefoils, lupines, and numerous other common European genera, belong to *Papilionacee*.

Casalpiniacee includes the Cassia, which furnishes the senna-leaves of the shops; and also the Tamarind and Algaroba fruits, the trees yielding logwood, Brazil-wood, Sapan-wood, &c., and *Hymenaea*, from which Gum-animi is procured.

Mimosee comprehends the species yielding the gums Arabic, Senegal, Sassa, and others. *Catechu* is the extract of the astringent bark of *Acacia catechu*, and rosewood is said to be the timber of some *Mimosa* inhabiting the interior of Brazil. One of the most striking phenomena among the plants of this order is the excessive irritability observable in

the leaves of certain species of *Mimosa*, such as *M. pudica*, *M. sensitiva*, &c., which are hence called Sensitive Plants. It is, however, a special peculiarity, and not one of general occurrence, unless the folding up at night of the leaves of the whole sub-order be regarded as an instance of the same irritable quality in a low degree.

LEIBNITZ, GOTTFRIED WILHELM, jurist, historian, mathematician, and metaphysician, the most learned of modern philosophers, and the eclectic founder of German philosophy. This great German was born on the 3rd of July, 1646, in Leipzig, and was descended of an ancient family, distinguished in civil and ecclesiastical affairs. When he was only six years old his father died, and his religious mother, who lived till 1664, and who had herself been carefully trained in the family of a Lutheran professor of theology, devoted herself exclusively to his education. Both his parents were Lutherans, and his early training probably induced much of the theological character by which his subsequent speculations are distinguished. The first twenty years of the life of Leibnitz were spent almost entirely in Leipzig, where he attended the famous Nicolai school, and afterwards the university, which he entered in 1661. Many anecdotes are recorded of his extraordinary precocity. He has himself, in the 'Pacidii Introductio Historica,' given an interesting account of the self-educating process his mind underwent in these early years, which throws light on the type of his philosophical development afterwards. The universality so conspicuous in the man was illustrated in the universality of the young student. Almost every part of knowledge in turn engaged his attention. He studied history and the ancient classics with enthusiasm, extending his researches far beyond the conventional track in which his narrow-minded teachers sought to restrain him. But the strength of his mind and the bent of his genius were more fully disclosed when he entered logic and philosophy. He read Aristotle, Plato, and Plotinus, and luxuriated in the subtleties of the scholastic metaphysics—that stimulant of the human understanding for so many hundred years. Even at this early period he was no stranger to the literature of theology, for he studied the deep controversies about election and grace in the works of St. Augustine and Luther. During his academical course, the philosophical writings of Des Cartes, published about twenty years before, fell into his hands, and by them, like his contemporary Locke, he was greatly influenced. In his recorded experience, at the age of sixteen, may be found the dim forms of the problems which engaged his thoughts during the remainder of his life. For days together, as he informs us in his 'Personal Recollections,' he was wont to pursue his walks alone in the woods of Rosenthal, near Leipzig, revolving the first principles of this mysterious life to a reflex consciousness of which he was becoming awake. The intellectual movements of the true metaphysician may be discovered in his first printed treatise, 'De Principio Individui,' written on occasion of his promotion to the degree of bachelor of philosophy, when he was only seventeen years of age. This work was followed, about three years after, by those philosophical speculations on mathematics and a universal language contained in his 'Dissertatio de Arte Combinatoria.' Having taken his degree

in arts, Leibnitz devoted himself professionally to the study of law. When he had completed his twentieth year he applied for the degree of doctor of law, with the intention of entering afterwards on the business of professional life. For the accommodation of other candidates the university postponed this academical honour to Leibnitz, who thereupon resolved on expatriating himself. He left Leipzig, and Saxony his native country, and in 1666 went to the University of Altdorf, where he received his degree in law the same year.

Leibnitz led a somewhat desultory life for several years after this. At Nuremberg, in 1667, he met the distinguished statesman and scholar, the Baron Von Boineburg, who had been long prime-minister of the elector of Mentz, and who was then living at Frankfort-on-the-Maine. Boineburg in a great measure determined the subsequent life of Leibnitz. In that year the young philosopher accepted his invitation to transfer his residence to Frankfort, where he became his secretary, and enjoyed the society of men of letters and affairs. During his residence at Frankfort he was patronized by the elector of Mentz, and was much engaged in legal and diplomatic labours as well as in literary pursuits; yet his mind was all the time animated by the great idea of his life. His political relation to the elector occasioned visits by Leibnitz to other courts in and around Germany, and also to Paris, where he went in 1672 to divert Louis XIV. from a suspected attack on Germany, by the project of a French crusade to Egypt and the East. The four following years were for the most part spent in Paris by Leibnitz, in the capacity of councillor to the elector of Mentz. In the circles of that brilliant metropolis he was a conspicuous object; and he found the place so congenial to him that he more than once formed the plan of making the French capital his permanent residence. In 1673 he visited London for a short time, where he became a member of the Royal Society, and made the acquaintance of many English savans. To this period in his life belongs his immortal discovery of the differential calculus, which has placed him in the foremost rank of mathematicians. It was followed by the famous controversy regarding an alleged priority of discovery by Sir Isaac Newton. In this controversy were discussed the difference between the calculus of Leibnitz and the Newtonian method of fluxions, the time of the discovery of the former, and its superiority over the latter. Leibnitz communicated his calculus to Newton in 1677, after he had received a letter from Newton containing his fluxional method concealed in two sentences of transposed characters. Newton then broke off the correspondence. Leibnitz promulgated his discovery in 1684 in the 'Acta Eruditorum,' but made no allusion to his former correspondence with Newton, whose 'Principia,' containing an explanation of the fluxionary method, appeared in 1686. The publication of the 'Principia,' which Leibnitz habitually disparaged, widened the breach between the two philosophers.

The year 1676, when he was thirty years of age, is an era in the life of our philosopher. Then commenced that connection with the court of Hanover which lasted during the remaining forty years of his life. Henceforward Hanover was his home, in which this sage held a succession of political and literary

offices under Duke John Frederick and his successors, the electors Ernest Augustus and George Lewis, the latter of whom became George I. of England two years before the death of Leibnitz. The variety of his aims during these forty years is marvellous, and amid them all the development of his speculative genius continued to advance. History, politics, languages, mathematics, geology, chemistry, medicine, metaphysics, and theology, in turn secured his attention, and his busy spirit collected the varied learning of each department. In history he worked for years on the antiquities of the house of Brunswick and the early annals of Germany. These historical researches became the great labour of his life. Experience of the difficulties of archaeological research suggested to him the comparative anatomy of languages as a means for aiding his efforts to travel back into the past. To the study of languages he accordingly applied himself with extraordinary zeal. He laid ambassadors and Jesuit missionaries under contribution for philological facts. In prosecuting this one department of investigation he maintained an immense correspondence. Not content with the records of the past contained in the words and works of man, he interrogated the globe itself. In the speculations on the physical vestiges of its early history, contained in his posthumous treatise, entitled 'Protogæa,' we find most interesting anticipations of recent geological hypotheses, and a remarkable familiarity with geological facts. Throughout the forty years of his connection with the court of Hanover Leibnitz maintained his literary intercourse with unabated energy. His correspondence forms a very important part of his philosophical writings. In this period he, in fact, settled and extended the foundations of the literary republic of Europe. During the later years of his life he was engaged in a project of ecclesiastical union. About 1697 he promoted a plan, encouraged by the courts of Hanover and Berlin, for a general union of Protestants against Rome, and especially of the two great sections of Protestantism, the Lutheran and the Reformed. These negotiations, in which Jablonski, Molanus, and others took part, gradually proved abortive, and in a few years Leibnitz abandoned his effort.

Leibnitz was able in an unusual degree to unite the practical and the purely speculative life. But amid his varied political and ecclesiastical projects, and his marvellous literary activity, the metaphysical tendency always retained its ascendancy in his mind. His philosophical principles were gradually matured after his settlement in Hanover in 1676, and were given to the world from time to time in a fragmentary form, through reviews, letters, and occasional tracts. Many of these remained unpublished in the royal library of Hanover until long after his death, and his most recent editors are still drawing largely upon the immense stores which his MSS. supply. He has produced no single work which contains a systematic exposition and defence of his philosophical creed. His 'Meditationes de Cognitione, Veritate, et Ideis,' which contain his famous distinction of intuitive and symbolical knowledge, and his exposition of the logical degrees of conception, appeared in 1684, in the 'Acta Eruditorum' of Leipzig. His system of pre-established harmony is referred to in a letter to Arnauld in 1690, and more fully expounded in his

tract, entitled 'Système Nouveau de la Nature,' published in the *Journal des Savans* for June, 1695, as well as in other articles or letters in that journal in the following year. His theory of Monads, indicated in his earlier fragments on substance and cause, as well as in his criticisms of Des Cartes and Malebranche, and which pervades his later philosophical works, is expounded in 'La Monadologie,' written in 1714, and recently published from the Hanover manuscripts. The 'Theodiciée,' published in 1710, when Leibnitz was in his sixty-fourth year, is the most generally known and, except the 'Nouveaux Essais,' the largest of all his philosophical works. It holds a foremost place among works on the philosophy of theology. Its avowed purpose is to refute the scepticism of Bayle, who disputed the consistency of faith and reason, and it was perhaps indirectly suggested by the life-long efforts of Leibnitz to restore the unity of Christendom. The design of the 'Theodiciée' is, by a scheme of optimism, to reconcile the existence and continuance of evil in the universe with the moral government of God—to meet the difficulty common to all religions—the fundamental metaphysical problem of Christianity. The subject had been pondered by Leibnitz for many years. But this mighty spirit was now to pass away. Leibnitz had suffered from occasional periods of ill health for several years. In November, 1716, when he had to prepare his reply to an attack by Dr. Clarke, and was busied with his 'Annals of the house of Brunswick,' of which the first volume had appeared in the preceding year, and when he was contemplating a comprehensive exposition of his entire system of philosophy, he was suddenly overtaken by death. During the last day of his life, we are told, he conversed with his physician on the scientific nature of his disease, and on the doctrines of alchemy. Towards evening his servant asked if he would receive the Eucharist. 'Let me alone,' he said, 'I have done ill to none. All must die.' He raised himself on the bed and tried to write. The darkness of death was gathering round him. He failed to read what he had written, and lying down, covered his face with his hands. In a few minutes he ceased to breathe, on the evening of the 14th November, 1716.

The metaphysical philosophy of Leibnitz may be regarded as a reconstruction of Cartesianism on a broader basis, and with important modifications, suggested by the consequences into which the Cartesian system had been resolved by Malebranche and Spinoza. The systems of Locke and Leibnitz are in truth reactions, in opposite directions, against the earlier philosophy as involving these consequences. Cartesianism, which places the essence of matter in extension, and of mind in thought, tends to eliminate altogether finite causes and substances. Malebranche accordingly rejected secondary causes, and virtually resolved all the changes in the universe into the agency of God. Spinoza, advancing further, deduced all finite existence from the One Absolute Substance. The metaphysic of Leibnitz is fundamentally a theory of the essential activity of the substances or monads of existence, which possess, according to him, a power of spontaneous development. In these unextended forces or monads we obtain, says Leibnitz, the *a priori* idea of substance. Their individuality consists in the series of changes through which each

passes. These changes are termed perceptions. Some perceptions are unconscious, and among these are the elements of which the material world is the issue. There are also the self-conscious souls of men, containing in themselves the seeds of necessary truth, developed through experience. Creation implies the existence of the *Monas Monadum*, or Supreme Substance, whence all that is finite has been derived, and in which it all finds its explanation. The universe is thus a vast collection of unextended spiritual forces, which evolve themselves in a pre-established harmony or cosmical order, and which, in its final issues, constitutes a scheme of optimism. The created universe is a harmonious theocracy which expresses the attributes of the one perfect Being. From his eternal throne its several streams of elementary existence have taken their rise. They have flowed, and they must continue to flow, in the courses into which he sent them in the beginning; and notwithstanding the dark shades in which many of them are enveloped, they are recognized by Omniscience as the only possible, and therefore most glorious illustration by creation of the pure fountain in which they originated. The speculations of Leibnitz, like those of Berkeley, though by a different route, thus conduct to immaterialism.

Eckhart has recorded some particulars regarding the personal appearance and manner of life of this philosopher. He was of middle stature, rather spare in person, and short-sighted. His constitution was vigorous. Like Descartes, Spinoza, Locke, Hume, and Kant, Leibnitz was never married. He had no domestic establishment, and no fixed hours for his meals, which he took when convenient for his studies. These were pursued without intermission, and often for days together he did not leave his chair. In his journeys he often in his carriage carried on mathematical or philosophical investigations, which were afterwards published in the journals. A great part of the '*Nouveaux Essais*' is said to have been written in this manner. In the course of his immense reading it was his habit to make extracts in his commonplace book, and to note, often on fragments of paper, his critical remarks on what he read. His extraordinary memory made it almost unnecessary for him to refer afterwards to what he thus wrote, for Leibnitz was one of those prodigies of memory of whom anecdotes are recorded. He forgot almost nothing that he had once read or heard. In his old age he could recite the most beautiful passages of the ancient classics, and whatever else he had read in his youth. But though he read much he reflected more. He is illustrious, like our own Hamilton, for the mental power which can unite extraordinary reading with a ceaseless energy of thinking. In most parts of knowledge it may well be said that he was self-taught, and he always struggled for deeper insight into things than that attained by other minds. He preferred solitary meditation to conversation, but when once roused in social intercourse he spoke with interest, and even indulged in playful sallies. In accordance with his liberal and tolerant spirit, it was his habit to speak well of others, and to put the best construction on their words and actions. 'When I err in my opinion of men,' he was wont to say, 'I prefer to err on the side of charity, and so too as regards their writings. I seek there for what is

worthy of praise, rather than of blame; and there are few books or persons whence I may not in some form draw wisdom and useful instruction.' Such was the spirit of Leibnitz, and to these comprehensive sympathies we may trace the modern philosophy of the history of man and of human opinion.

A collected edition of the works of Leibnitz was published by Dutens in six vols. 4to, at Geneva, in 1768. His philosophical works were published three years earlier by Raspe, and republished, with many additions, in 1840, in the well-known edition of Erdmann. Since then various monographs and tracts from the Leibnitzian MSS. at Hanover have appeared, and a complete edition of his works has recently been published.

LEICESTER. [LEICESTERSHIRE.]

LEICESTER, ROBERT DUDLEY, EARL OF, was born about 1531. His father, the duke of Northumberland, was executed for his adherence to Lady Jane Grey. The son was imprisoned for a time, but was soon liberated, and afterwards made master of the ordnance by Queen Mary. On the accession of Queen Elizabeth he became a favourite, and received at her hands gifts and titles, the earldom of Leicester being the last and highest. To retain this favour, or, as it has been suggested, in order to marry Elizabeth, Dudley is suspected of having, in 1560, caused the death of his wife, Amy Robsart, whom he had married when very young. He is also accused of having instigated an attempt which was made to poison Lady Sheffield, by whom he had a son; and for this crime, if he committed it, he doubtless had a similar motive. His marriage with the widow of Lord Essex was very nearly depriving him of the queen's favour; but notwithstanding her temporary anger, his influence over her remained undiminished. This marriage, too, involved another case of suspicion: Lord Essex had died in a very unaccountable manner two days before it took place.

Successful as a courtier, Leicester proved his inefficiency as a soldier by his conduct of two separate commands with which he was intrusted in the Low Countries in 1585 and 1587; and it was found necessary in both cases to recall him. The last trust conferred upon him was in 1588, when he was appointed lieutenant-general of the infantry mustered at Tilbury Fort, for the purpose of resisting the Spaniards. This was the year of his death, which took place at Cornbury, in Oxfordshire. It was in the previous year that he advised Elizabeth to put Mary, queen of Scots, privately to death.

LEICESTERSHIRE, a central English county, bounded N. by Nottinghamshire, N.E. by Lincolnshire, E. by Rutlandshire, S.E. by Northamptonshire, S.W. by Warwickshire, and N.W. by Derbyshire. It is included between $52^{\circ} 24'$ and $52^{\circ} 59'$ N. lat., and between $0^{\circ} 39'$ and $1^{\circ} 37'$ W. long. The greatest length, N. by E. to S. by W., is 44 miles; the greatest breadth, at right angles to the length, is 40 miles. The area is about 800 square miles, or 514,164 acres, of which about 480,000 are estimated to be arable, meadow, or pasture. The population in 1861 was 237,412—115,426 males, and 121,986 females—being an increase of 7104, or 3 per cent., since the previous census. There were in 1861 51,894 inhabited houses in the county, 2673 uninhabited, and 211 building.

Surface, Rivers, &c.—The surface of Leicestershire consists almost entirely of gently rising hills. The north-eastern part is occupied by the southern extremity of the Kesteven Cliffe Row. The south-eastern portion is occupied by the hills which separate the basin of the Soar from that of the Welland. The north-western portion constitutes the district which, though now bare of wood, retains its ancient designation of Charnwood Forest. This district is occupied by a group of hills of inconsiderable elevation, but of a rugged character, with distinct and sharp prominences. Bardon Hill, between Leicester and Ashby, 853 feet high, has one of the most extensive prospects in England.

The eastern portions of the county are mostly occupied by the oolite, the lias, and the intermediate formations. The rest of the county, with the exception of Charnwood Forest, the coal-fields near Ashby-de-la-Zouch, and some isolated hills of mountain limestone to the north-west of Charnwood Forest, is occupied by the new red sandstone. The Ashby coal-fields lie one to the north-east, the other to the south-west of the town, and extend into Derbyshire. Isolated beds of mountain limestone are quarried in many places. Charnwood Forest district is occupied by rocks of the transition series, syenite, granite, greenstone, and slate. Coarse slate, gypsum, limestone, freestone, and brick-clay are procured within the county.

Leicestershire is chiefly included in the basin of the Trent, which just touches the county, and for a few miles divides it from Derbyshire. The principal tributary of the Trent belonging to this county is the Soar, which is formed by the junction of several small streams that rise near the south-western border of the county; it flows past Leicester and Loughborough to the Trent, which it joins about 12 miles E.S.E. of Derby. It is navigable for barges from there to Leicester. The Wreak rises in Rutlandshire, and joins the Soar near Mount Sorrel. The Anker skirts the border of the county. Near Atherstone it joins the Tame, a feeder of the Trent, at Tamworth. The Sence joins the Anker. The Mease, the Devon, and the Smyte are small feeders of the Trent. The Avon, a tributary of the Severn, forms the boundary of the county for seven or eight miles on the southern side. The Swift, a small stream which flows by Lutterworth, falls into it. The Welland forms part of the Northamptonshire boundary of the county.

Leicestershire is traversed by the Midland Company's Railway, and is connected by canals with all parts of the kingdom.

Climate and Agriculture.—The climate of Leicestershire is mild and genial, without being so moist as in those counties which lie nearer the Atlantic. There are few high hills to intercept the clouds. The soil is loamy, without the extremes of stiff clay, loose sand, or chalk. The most fertile soils are almost invariably kept in pasture, for which this county is pre-eminent. Out of the entire surface, more than one-half is in permanent grass. The quantity of woods or wastes is very small. Grazing and breeding cattle and sheep are the chief objects of the Leicestershire farmers, and they have succeeded admirably both with oxen and sheep. The manure thus brought upon the fields, and the large culture of turnips and

green crops for the cattle, keep the arable land in good condition. Farms are of all sizes, and generally held by tenants at will. Rents are 30s. per acre per annum, exclusive of tithes and rates, for medium land; but sometimes 4*l.* to 5*l.* is given for good land near the towns. The cheese is generally made from 30 lbs. to 50 lbs. weight, the average yield per cow being from 3 to 3½ cwt. annually.

The natural meadows along the banks of the rivers are considerable, and most of them of excellent quality. The produce in hay is from 1½ to 2 tons per acre.

The county contains many large dairies, and produces excellent cheese, especially the Stilton cheese, most of which is made here. The principal breed of cattle in Leicestershire is the improved long-horn. The Leicestershire sheep are also renowned. They are large, with very long wool, and fatten very readily at an early age. This county is also pre-eminently noted for its breed of horses, hunters and large black cart-horses being reared in large numbers at Melton, &c. The rich pasture favours the rearing of this useful animal. Hogs have been improved in Leicestershire, as well as other animals.

Trade and Manufactures.—Coal and some iron and lead are wrought in Leicestershire, which is also the principal seat of the woollen hosiery manufacture. Hard red granite is quarried at Mount Sorrel.

Divisions and Towns.—Leicestershire is divided into six hundreds and more than 200 parishes. It is in the diocese of Peterborough and province of Canterbury, and in the Midland Circuit, the assizes being held at Leicester. For parliamentary purposes the county is divided into North Leicestershire and South Leicestershire, each of which returns two members to Parliament; besides which, two members are returned for the borough of Leicester: total, six. In 1865 the number of voters on the parliamentary register was—in the northern division, 4767, in the southern, 6283. There are eight polling-places in each division, Leicester being the place of election for the southern, and Loughborough for the northern.

The following are the principal towns, with the population of each in 1861:—

Ashby-de-la-Zouch, a market town, is situated on the Mease, a tributary of the Trent, 17 miles N.W. from Leicester, on the Midland Railway. Originally it was called Ashby; it received the distinctive addition of De-la-Zouch from the Zouches who were formerly lords of it. Ashby contains an ancient and handsome church. On the south side of the town stand the ruins of Ashby Castle, in which Mary, queen of Scots, was imprisoned. Woollen and cotton stockings, hats, and bricks are the chief articles of manufacture. Coal and ironstone are worked in the neighbourhood of the town, and there are some iron smelting works. There is a canal from the Coventry Canal Navigation to the neighbourhood of Ashby. Population of the parish, 6958; of the town proper, 3772. Ashby-de-la-Zouch was made widely known by Scott's brilliant novel of 'Ivanhoe,' as the scene where he laid the famous passage of arms described in that work.

Bosworth (commonly called *Market Bosworth*) is situated on an eminence, 12 miles W. from Leicester. The decisive battle between Richard III. and the earl of Richmond, when the death of the former,

after a bloody struggle of two hours' duration, terminated the long strife between the houses of York and Lancaster, was fought August 22, 1485, on a plain about one mile south of Bosworth. On an eminence called Crown Hill, Lord Stanley placed the crown upon the head of the victor, Henry VII. The population of the parish is 2376, who are partly employed in the knitting of worsted stockings.

Hinckley is on the Chester and Liverpool road, 12½ miles S.W. from Leicester. The church is large and ancient. The staple manufacture of the town is that of coarse stockings. There are also some ale breweries. The town of Hinckley is a polling-place for the southern division of the county. It is a market town, and a small part of the parish extends into Warwickshire. Population of the town proper, 6344; of the entire parish, 7315.

Leicester, a parliamentary and municipal borough, and the county town of Leicestershire, is on the east bank of the Soar, across which there are five bridges. It is 20 miles E.N.E. of Rugby. The 'Jewry' wall, a fragment 70 feet long, and a bank, called Raw Dykes, outside the town, are supposed to be remains of *Ratae* or *Rage*, under which name it was known to the Romans. It is supposed to have been on the line of the Via Devana. It was a populous Saxon city at the time of the Conquest, and was first chartered by King John. In the eighth century it was the seat of a bishopric.

The streets are generally well built, and it is well drained, lighted, and supplied with water. The most ancient church is St. Nicholas. It is chiefly of Norman architecture. St. Mary's Church is a large building, partly of Norman, partly of Early English architecture. The church of St. Martin is an ancient cross church, partly of Early English and partly of Perpendicular architecture. This church is the largest in Leicester. All Saints is a small church, chiefly in the Early English style. St. Margaret's is a handsome church, partly Early English, with a lofty Perpendicular tower. In St. Margaret's parish is a district church, erected in the Perpendicular style. There are two other churches and seventeen chapels in the town.

The borough gaol and house of correction are modern buildings. A new county gaol and house of correction have been built on the south side of the town. The other public buildings are—the assize hall, formerly the castle hall, 178 feet long; the guildhall, or old hall of the Corpus Christi Guild; the corn exchange (in the market-place); county and assembly rooms, a concert hall, mechanics' institute, museum of the Philosophical Society, town library, theatre, five banks, Albion baths, on the New Walk, a promenade one mile in length; Church of England collegiate school, in the Tudor style; Wigston's free grammar-school; Trinity hospital, founded in 1354, by Henry le Bossu, earl of Leicester; county infirmary, union workhouse, and county lunatic asylum. The borough has many valuable charities, including, besides several hospitals, Newton's charity for the support of schools; Johnson's consanguinitarian almshouses; a female asylum; green-coat, national, and British and foreign schools. A cemetery, of 25 acres in extent, was laid out in 1849.

The spring and summer assizes and courts of quarter sessions are held in Leicester. There is

direct communication by railway with Birmingham, Burton, Lichfield, Stamford, Market Harborough, Northampton, Bedford, Rugby, Leamington, and Melton. The distance from London by the Midland line is 97½ miles, or by road, 96 miles.

This town is the principal seat in England for the manufacture of woollen and other hosiery, first introduced in 1680. About 10,000 persons are thus employed. Lace, elastic fabrics, and boots and shoes are also extensively made. It is the centre of a great agricultural and wool-raising district.

Leicester has returned two members to Parliament since the time of Edward I. The municipal borough is divided into seven wards, and is governed by fourteen aldermen and forty-two councillors. The parliamentary and municipal limits are co-extensive, being the same as those of the old borough and liberty. Population 68,056, inhabiting 14,595 houses. The excess of females over males is nearly 5000. In 1851 the population was 60,584. The number of parliamentary electors in 1866 was 4762, including more than 1000 freemen. The borough covers altogether 3960 acres, and includes six whole parishes, with parts of others. The town is built at an altitude of 208 feet.

This place was called *Ledicester* at the making of Domesday survey, which enumerates as many as eight churches here. The castle, rebuilt on a large scale on the site of a fort called Newarks by John of Gaunt, was dismantled in the Civil War. In 1530 Cardinal Wolsey died in Leicester Abbey, now in ruins.

Loughborough, a market town, is 11 miles N. by W. from Leicester. The church is a handsome building in the Perpendicular style. There is also a Burton foundation school, and five schools in connection with it, a union workhouse, barracks, a public library, news room, and theatre. The chief manufactures are hosiery, bobbin-net lace, cotton goods, and shoes. The Leicester Navigation and the Loughborough Canal, communicating with the Trent and the Soar, tend much to the prosperity of the place. There is a branch railway from Leicester to Loughborough. Population of the town, 10,830; of the entire parish, 10,955.

Lutterworth, a market town, is 13 miles S. by W. from Leicester. The church is a large handsome building, containing a portrait of its rector, the reformer Wycliffe (who died here in 1384), and a part of his pulpit. The town is on the Swift, a tributary of the Avon, and on the Midland Railway. The inhabitants are employed in manufactures of hosiery and ribbons. Population of the town and parish, 2289.

Market Harborough, a market town, is 14½ miles S.E. from Leicester. It stands on the north bank of the Welland, and has a Gothic church, a town-hall, a union workhouse, and considerable manufactures of carpets and tanneries. Market Harborough was the head-quarters of Charles I. before his defeat at Naseby. It is in the parish of Bowden Magna, the population of the township being 2302.

Melton Mowbray, a market town, is 15 miles N.E. from Leicester. The town is in a valley, on the river Eye, near its junction with the navigable Wreak, over which are two bridges. The church is large, in the Gothic style. The chief manufacture is bobbin-net lace. Population of the parish, 4936;

of the town proper, 4047. At Melton is a station of the Midland Railway, and stabling for 800 horses, belonging to the members of the subscription fox hunt. Pork pies, for the London market, are extensively made here.

Mount Sorrel, probably *Mount Soar Hill*, is 7 miles N. by W. from Leicester on the road to Loughborough. The town is in a very romantic situation, on the side of a steep hill of red granite, on the left bank of the Soar, and consists chiefly of one street. There is a small market-house. The principal manufacture is of stockings. Population of the chapelry, 1754. It is in the parishes of Rothley and Barrow-on-Soar, and has a station on the Midland Railway.

History, Antiquities, &c.—Leicestershire was anciently comprehended in the territory of the Coritani; and when the Romans had subjugated Britain, and divided it into provinces, it was included in the province of Flavia Cesariensis. A Roman milestone, portions of wall, and numerous coins, urns, household utensils, and tessellated pavements of Roman work, have been met with near Leicester. South of Leicester town are two remarkable parallel embankments, called the Raw Dykes, extending about three furlongs in length, and about sixteen yards apart. They have been commonly regarded as the limits of a race-course, and as of British origin; but neither of these points is ascertained. There are many traces of Roman encampments in the county. The Roman roads named Watling Street, Fossway, Via Devana, and Saltway, cross portions of the county. Venonæ, or High Cross, was the principal Roman station.

During the Heptarchy, Leicestershire was included in the kingdom of Mercia. In the year 680, or according to others 737, Leicester was made the seat of a bishopric, which existed one or two centuries. By the treaty between Alfred and Guthrun the Dane (in 878 or 880), Leicestershire was included in the Danelagh or Danish territory; and Leicester became one of the great Danish burghs. It was recovered by the Saxons during the reign of Edward the Elder.

Upon the Norman Conquest, Leicestershire was divided between the followers and relatives of the Conqueror. Several of these or their descendants, to secure the territory thus acquired, erected castles or repaired older ones at Leicester, Mount Sorrel, Shilton, Whitwick, Groby, Hinckley, Donnington, Melton Mowbray, Ravenston, Thorpe, Sauvey, and Belvoir. There are abbey remains at Leicester and Gracedieu; and ancient castles at Ashby-de-la-Zouch, Donnington, and Bradgate, where Lady Jane Grey was born. The present Belvoir Castle is a more modern edifice.

In the civil war of Charles I. the men of Leicestershire seem generally to have taken the side of the Parliament.

LEIGH. [LANCASHIRE.]

LEIGHTON, ROBERT, D.D., Archbishop of Glasgow, a divine celebrated for his moderation and enlightenment during a time of great excitement. He presided over the University of Edinburgh; but when Charles II. attempted to introduce Episcopacy into Scotland, he was nominated to the bishopric of Dumbane. His conduct won him the affections of even the most rigid Presbyterians. He was afterwards induced to accept the archbishopric of Glasgow, which, however, he resigned, and retired to England, where he died in 1684.

LEIGHTON BUZZARD. [BEDFORDSHIRE.]

LEININGEN, formerly a county situated between the Lower Palatinate and the bishoprics of Spire and Worms, gives title to one of the German princely houses. The principal line obtained in 1779 the dignity of princes of the empire. In 1803 it lost its possessions on the left bank of the Rhine, and obtained, instead, a territory of 545 square miles, 425 of which are in Baden, 110 in Bavaria, and 10 in Hesse-Darmstadt. The principality was mediatised in 1806; but though no longer an independent prince, Prince Leiningen retains his wealth and rank. His possessions are within the territories of Baden, Bavaria, and Hesse. The prince's residence is at Amorbach, in the Bavarian Odenwalde, which has a population of 3400. The religion is Lutheran. There are four other branches of the house of Leiningen, two Lutheran and two Catholic; the head of each branch has the title of count.

LEINSTER, a province of Ireland, containing the counties of Carlow, Dublin, Kildare, Kilkenny, King's County, Longford, Louth, Meath, Queen's County, Westmeath, Wexford, and Wicklow. It lies between 52° 6' and 54° 7' N. lat., and between 6° and 8° 3' W. long. It is bounded E. by the Irish Channel, S. by the Irish Channel and the county of Waterford, W. by Tipperary, Galway, Roscommon, and Leitrim, and N. by Cavan, Monaghan, and Armagh. The greatest length, from the mouth of Waterford Harbour to the head of Carlingford Bay, is about 138 miles; the greatest breadth, from the Shannon, a little below Shannon Harbour, to Dalkey, near Kingstown, is about 80 miles. The entire area is 4,940,319 statute acres, and the population at the last census was 1,457,635, of whom 1,252,553 are Roman Catholics.

Of the four provinces of Ireland, Leinster possesses the greatest advantages in point of soil and surface, being little encumbered with mountains, and having consequently superior facilities for internal communication. The navigable Shannon forms part of its western boundary, and the navigable Barrow intersects its central and southern counties. The Boyne also, the basin of which lies within its north-eastern limits, is partly navigable, and the Royal Canal and Grand Canal traverse it from east to west. The coast is inferior in point of natural harbours to that of the remainder of the island, but it is more sheltered from the prevalent winds.

Upon the coming of the English in 1170, the present province was divided into the two petty kingdoms of Meath and Leinster, and embraced also a part of the then kingdom of Ulster, in the present county of Louth. The first counties elected were those of Dublin, including the present county of Wicklow; Meath, including the present Westmeath and Longford; Louth; Kildare, including the present King's and Queen's counties; Carlow, Kilkenny, and Wexford. Meath was divided into Meath and Westmeath in the reign of Henry VIII.; King's County and Queen's County were separated from Kildare, and erected into separate counties, in that of Mary; Longford was made shire-ground in the time of Elizabeth; and Wicklow was finally separated from Dublin and made a county in the reign of James I.

The ancient kingdom of Leinster, including all the

counties south of Meath, with the exception of Dublin, was inherited by the descendants of Eva, daughter of Dermot MacMurrough, and wife of Earl Strongbow. Meath was bestowed on Hugh de Lacey, and descended to the families of De Verdon and Geneville. Almost all the inheritors having ultimately become absentees, the native Irish of Carlow, King's County, Queen's County, and Westmeath seized on their estates, and obliterated all traces of the English law from the western and some of the midland parts of the province; nor was it till the reign of Elizabeth that the whole was brought again under a regular government. The counties of Louth, Meath, Dublin, Kildare, and Wexford have not shaken off the English law or abjured English manners at any time since the Conquest.

Leinster gives the title of duke to the Fitzgerald family, whose head is the sole duke and premier peer of Ireland.

LEIODON, a genus of fossil reptiles. (Owen.) One species, found in the chalk of Norfolk.

LEIOTRICHANÆ, a sub-family of birds established by Mr. Swainson. Legs large, robust, syndactyle. Hind toe longer than the outer. Wings short and rounded. Bill strong; the gonyes ascending. The only genera are *Leiothrix* and *Pteruthius*. Locality, India.

LEIPOA (*ocellata*), is the name of the Australian native pheasant. It belongs to the gallinaceous family of birds *Megapodidae*. Its habits bear a very close resemblance to those of our own pheasants.

LEIPZIG, one of the four circles of the kingdom of Saxony, is bounded W. and N. by Prussia, E. by the circle of Meissen, and S. by that of the Erzgebirge and the principality of Saxe-Altenburg. Its area is 1342 square miles, and the population in 1861 was 506,492. The country is level, except in the south and south-east, where there are some offsets of the Erzgebirge. The soil is fertile and well cultivated; but the country is deficient in wood, which is procured from the Erzgebirge and the circle of Voigtland. Potter's clay, limestone, marble, porphyry, and jasper are found. The breed of sheep is good, and great numbers are reared. The manufactures consist of woollens, cotton, and linen. The climate is temperate and healthy.

LEIPZIG, the second city in the kingdom of Saxony, and capital of the circle of Leipzig, stands in 51° 20' 16" N. lat., 12° 21' 45" E. long., in an extensive plain watered by the Pleisse, at a distance by railway of 65 miles N.W. from Dresden, and 133 S. by W. from Berlin. The town, including its suburbs, is nearly a mile in length, from N. to S., and three-quarters of a mile in breadth. It was formerly well fortified, but the ramparts have been converted into public walks and gardens. The only remaining part of the fortifications is the castle, called the Pleissenburg, upon which the observatory now stands, in 51° 20' 19" N. lat., 10° 1' 45" E. from Paris. This town is the largest commercial place in East Germany, and is situate on the White Elster, where it is joined by the Pleisse and Parde. The population in 1861 was 78,495, nearly all Protestants.

Leipzig is not regularly built; the streets are generally narrow, though well paved and lighted; but it contains many very handsome parts, numerous

elegant public buildings, private houses resembling palaces, and many seats, with fine gardens, in the suburbs. The most remarkable edifices are—the churches of St. Thomas, St. Nicholas, St. Paul, and St. John; the university buildings; the theatre, and the town-hall, built in 1599; the palace, formerly the residence of the electors and kings of Saxony; the clothmakers' and booksellers' halls, and post-office. The great building called Auerbach's House is, in the time of the fairs, a kind of bazaar, where the finest and most costly articles are exposed for sale. There are numerous excellent schools, academies, and many literary and learned societies; a deaf and dumb institution; orphan and lunatic asylums; an academy of design, painting, and architecture; many museums; a large public library of 80,000 volumes, and 2000 MSS., with a cabinet of 6000 coins and medals, and admirable establishments for the poor. The town has a tribunal of commerce, an exchange, savings bank, a discount bank, &c. There is a considerable trade in American and Russian furs; and the wool fairs, especially that held in June, are very important. Leipzig, though comparatively small, has become one of the most important cities in Europe, owing to its university, its fairs, and its book trade.

The university was founded by the Elector Frederick and his brother William, on the 4th December, 1409, which is the date of the bull of Pope Alexander VI., confirming the foundation. During its whole existence of more than four centuries, it has enjoyed the reputation of being one of the most eminent in Germany. The library consists of 150,000 volumes and above 4000 MSS., and is particularly rich in works on philology, medicine, and divinity. The university has attached to it a museum of natural history and a botanic garden, sixty professors, and seventy private teachers. The average number of students is 800. The *Augusteum* contains a very valuable library.

The origin of Leipzig was a Slavonian village that stood in the fork between the Parde and the Pleisse; this is said to have received its name from the lime-trees growing about it, which are called, in Slavonian, Lip, Lipa, or Lipsk. It is not spoken of as a fortified town till the twelfth century, under Margrave Otho the Rich, who granted it a license to hold two fairs, at Easter and Michaelmas. The first fair at New Year was proclaimed in 1458, and the three fairs were confirmed by the emperor in 1507. These fairs have laid the foundation of the prosperity and wealth of Leipzig. They are attended by a vast concourse of merchants from most countries of Europe and Western Asia, and the value of the manufactured goods of all kinds sold annually is estimated at nearly twenty millions sterling. A wool market is also held here in May. The goods brought to the fairs are chiefly woollen and cotton manufactures, iron and hard-wares, leather, linen, paper, porcelain, silks, hides, furs, glass, drugs, cocoa-nut and palm oils, &c.; large quantities of English soft goods are also sold. There are manufactures of silk and half silken fabrics, hosiery, leather, oil-cloths, playing cards, tobacco, gold and silver articles, snuff, chocolate, starch, soap, liquors, and musical instruments, with numerous engraving, dyeing, and wool-spinning establishments. But the singular concentration of the German book trade in Leipzig has been the main cause of the celebrity and wealth of that city. The first two

booksellers, who were also printers, that settled in Leipzig were Steiger and Boskopf, in 1545. It is now the grand emporium of the book trade of Germany, in which more than 180 houses are engaged, and there are many large type-founding establishments. The importance of the publishing business may be judged from the numbers of orders disposed of at the booksellers' exchange or clearing house. The average of such orders is about 50,000 per diem, or about 15,000,000 a year. The number of works published in Leipzig in 1863 exceeded 10,000. Printing is carried on by thirty-nine firms, employing about 1500 workmen and 350 machines. A natural result of the active printing and bookselling trade is a brisk business in paper, which is valued at not less than 225,000*l.* a year. An annual fair is held for the sale of books, which is attended by purchasers from all parts of Europe. For the transaction of business and settlement of accounts, there is a handsome building called the Booksellers' Common Exchange, which was opened in 1836.

Leipzig communicates by railway with Dresden, Berlin, Magdeburg, Halle, Weimar, and Zwickau. Its elevation is 350 feet above the sea, and the mean temperature of the year 46°·4; winter, 32°; and summer, 60°·3 Fahrenheit.

Leipzig has suffered at different periods from the miseries of war. In September, 1631, the great victory obtained by Gustavus Adolphus over Tilly was fought on its plain; and in 1642 it was besieged by the Swedish general Torstenson. The fearful conflicts of the 16th, 17th, and 18th of October, 1813, in which Napoleon was defeated by the allied armies under Prince Schwartzberg, took place near the town; in the village of Probstheida, which was in the centre of the combat, a colossal cross has been erected to commemorate the terrible battle; and the fiftieth anniversary was commemorated October 19, 1863, by veteran survivors and an immense multitude. In the war between Austria and Prussia, in 1866, Leipzig was occupied by the troops of the latter country.

LEITH, a seaport town and contributory parliamentary borough in Edinburghshire, is situated on the banks of the river Leith (which is crossed by stone and other bridges), at its confluence with the Frith of Forth, about two miles N.E. from the city of Edinburgh, with which it is connected by a broad street called Leith Walk. The omnibuses which pass along this fine road every few minutes, and the accommodation afforded by the Edinburgh and Leith Railway, conduct a great traffic from one town to the other. The houses along the Walk now almost join the two places together. Leith is irregularly built and ill-paved, but contains many handsome houses of recent erection, and the streets have been recently much improved. The principal buildings are—North Leith church, with a spire of 140 feet high, in place of one built in 1496; South Leith church, a fine edifice of the fifteenth century; three other churches; five Free churches; four United Presbyterian churches; two Episcopalian chapels; one Roman Catholic chapel; and three chapels belonging to other denominations; a handsome new court-house; exchange and assembly rooms in the Grecian style, with a large news room; custom-house, built 1812; dock warehouse; baths; public

library of 10,000 volumes; mechanics' subscription library, with 7000 volumes; philharmonic society (1831); barracks at Piershill; nautical school (1853); Dr. Bell's and other schools; Marionville girls' school of industry; Trinity house for shipmasters, founded 1555; Gladstone asylum for incurables (1840) near St. Thomas' church; Hawkfield-house lunatic asylum; Leith hospital, and dispensary; South Leith and North Leith poorhouses. There is also a new corn exchange, a town-hall, a mariners' church, and seven branch banks. Among the charitable institutions not noticed above are—John Watt's hospital, erected in 1862, and a ragged industrial school, built in the same year. Half way to Edinburgh, on Bonnington Road, is the Edinburgh and Leith Cemetery. The port of Leith is superintended by a Board of Commissioners. A tidal harbour has been gradually formed by running out piers of wood and stone across the sands; the E. pier being 3530 feet, and W. 3120 feet long. It has a depth of from 20 to 25 feet at high water. There are six graving docks, one lately finished, 400 feet long, 80 wide, and 25 deep at spring tides. New docks to the eastward of the east pier are also in course of construction, occupying 10½ acres in area; the entrance basin covering over two acres. The length of lock is 350 feet, and the breadth 60 feet. The embankment is 3480 feet long, and incloses an area of 36 acres. The dock will be 1100 feet long by 450 wide, and will have 28½ feet of water at high water of spring tides, or 26½ at low. The amount granted by the Loan Commission for constructing it was 224,000*l.* The contract time ends at the beginning of 1868. Across the Water of Leith and Harbour are a stone bridge, three drawbridges, one of which is for the North British Railway. Leith Fort, ½ mile W. of the Custom-house, is an artillery station. A branch rail unites Leith with the fishing town of Newhaven, and Granton pier, erected by the duke of Buccleuch. The Caledonian Railway Company have also formed a large station at the west end of the old dock on ground reclaimed from the sea. Steamers run from here or Granton to Aberdeen, Alloa, Anstruther, Copenhagen, Danzig, Oporto, Dunkirk, Hamburg, Hull, Kirkwall, London, Newcastle, Pillau, Rotterdam, Stettin, St. Petersburg, Stirling, Thurso, Wick, and Lerwick.

The chief commerce of Leith consists in its colonial and foreign trade, and imports of grain, for which it is the great emporium in Scotland. The other chief imports are wine, oil, flax, and wool. The exports are coal, iron, spirits, ale, paper, linen, &c. It has a considerable shipping trade, and there are also several breweries and distilleries. The manufactures consist principally of glass-making and glass-staining, rope and sail making, artificial manures, candles and soap, sugar, oil-cake, ale, printing ink and printing machinery, preserved provisions, iron shipbuilding, iron founding, and machine making. The Leith flour mills are the most extensive and complete in the country. Fish-curing is an important branch of industry.

The number of vessels which entered and cleared at the port of Leith in 1865 was as follows:—Coastwise, entered, sailing vessels, 708 (43,378 tons); steamers, 475 (198,212 tons); cleared, sailing vessels, 615 (39,326 tons); steamers, 470 (200,361 tons).

From the colonies there arrived 32 vessels (14,639 tons); and cleared for thence, 24 (13,420 tons). From foreign countries the entries were 1792 (360,492 tons), and the clearances 716 (233,127 tons). Total entries from all parts, 3007 (616,721 tons); clearances, 1825 (486,234 tons). The number of vessels registered as belonging to the port in 1866 was 213 (46,674 tons), of which 68 (18,958 tons) were steamers. The customs revenue in 1865 amounted to 429,359*l*.

Leith, in union with Portobello and Musselburgh, returns one member to Parliament. The total registered electors in the district in 1866 was 2672; in the borough of Leith only, within ten of 2000. The population of the parliamentary borough, in 1861, was 33,628. Leith was created a parliamentary borough by the Reform Act of 1832. It is governed by a provost and four bailies, who are also admirals, and other eleven councillors; has a sheriff-substitute court, and is a coast-guard station. It was a port as far back as the eleventh century, and was formerly called Inverleith and Restalrig. In 1838 it was made independent of the city of Edinburgh, to which it had been sold in 1567.

In early times the prosperity of Leith, then considerable, was often checked by warlike conflicts: in 1541 the town was burnt by an English fleet; in 1549 it was taken possession of by the French troops who came to the assistance of Mary of Guise during the contest with the Reformed party. Cromwell repaired its fortifications.

This town was the birthplace of the Rev. George Wishart, and of Hugo Arnot, author of the 'History of Edinburgh.'

LEITRIM, a maritime county of the province of Connaught in Ireland, is bounded N. by the Bay of Donegal and by Donegal county, N.E. by the county of Fermanagh, E. by the county of Cavan, S.E. and S. by the county of Longford, and S.W. and W. by the counties of Roscommon and Sligo, from the former of which it is separated by the river Shannon. It lies between 53° 47' and 54° 27' N. lat., and between 7° 35' and 8° 25' W. long., and extends from N.N.W. to S.S.E. 51¼ miles, varying in breadth from 5½ miles to 21 miles. The area is 613 square miles, or 392,363 acres, of which 249,350 are arable, 115,869 uncultivated, 3396 in plantations, and 23,748 under water. In 1851 the population was 111,915; in 1861 it had decreased to 104,744, of whom 94,006 were Roman Catholics, and 9488 belonged to the Established Church.

The outline of Leitrim is very irregular, being contracted in the centre to little more than the breadth of Lough Allen. The district lying S. and E. of Lough Allen is an irregular parallelogram of about 17 miles by 18. This is to a considerable extent encumbered with narrow and steep ridges of low elevation, and there are many small lakes, of which one of the largest is Lough Rinn, about 2 miles in length by 1½ mile in width. Northward from Lough Rinn extends an open undulating plain, interspersed with numerous lakes and streams as far as the southern extremity of Lough Allen. This district forms part of the great limestone plain of Ireland, and contains some patches of excellent arable land, but is in general more adapted for grazing. The main drainage of the limestone district is S. and W. to the Shannon,

but several considerable streams run E. to the lakes on the border of Cavan. Of the latter the principal is the river Dale. A cluster of lakes, of which the largest are called Lough Scur and St. John's Lough, occupies a tract of about 6 miles in length on the north of this level district, and there are upwards of fifty other lakes, varying in size from a quarter of a mile to a mile in length, scattered throughout the same portion of the county. N.W. from Lough Allen is a low tract, in which the river Bonnet flows. With this exception, the northern part of Leitrim is covered with mountain-groups, of which none of the elevations exceed 2000 feet. Lough Maenean and Lough Melvin extend along the eastern boundary of the county, separating it from Fermanagh, in which they partly lie. They are respectively 3½ and 7½ miles in length, and are pleasingly diversified with wooded islands. The Kilcoo river connects them, and their waters are discharged into the Bay of Donegal, by the Drowes. The river Duff, which separates Leitrim from Sligo, runs into the Bay of Donegal, at the eastern extremity of the coast-line. The shore is for the most part a rocky bluff, with a rough stony beach along the foot of it, and is exposed to the whole swell of the Atlantic.

The climate is raw and damp, particularly in the northern parts of the county, owing to the great extent of moory ground and the vicinity of the Atlantic. In the sheltered valleys, however, particularly in the vicinities of Dromahair and Manorhamilton, where there is a kindly soil (often a deep dark loam, overlying limestone), vegetation is as luxuriant as in most parts of other counties in the same latitude. The surface of Leitrim is now barer of wood than most of the neighbouring counties.

The varieties of surface in Leitrim indicate the internal structure with peculiar precision. The flat-topped mountain groups showing steep escarpments and natural terraces belong to the millstone grit or Lough Allen coal formation. The undulating open country has the floetz limestone for its substratum, and the rough coarse land, when not belonging to the Lough Allen basin, generally consists of sandstone, conglomerate, and wacke. The rocks of the Lough Allen coal district are more analogous to the millstone grit of the north of England than to coal tracts in general. Alternations of shale and sandstone containing beds of coal appear wherever the mountains are of sufficient altitude; for it would seem that such a formation had originally extended over the entire district, and that the absence of those members from the lower mountains has been owing to their removal by some abrading and denuding force. At present they remain only on the summits of Sliev-an-ieran, Lugnaculleagh, Lackagh, and on the highest part of the Munterkenny range; and the occurrence of coal in lumps throughout the sandstone, gravel, and blue-clay hills of the south and south-eastern parts of the county confirms the supposition that a portion of the coal formation has been removed. Where the millstone grit formation terminates, the floetz limestone reappears, and occupies the greater portion of the district watered by the Bonnet and its tributaries. The only primary rock within the county is along the western boundary of the valley of the Lower Bonnet, where the granite and trap formation occurs.

The soil of Leitrim is for the most part stiff, cold, and very retentive of wet, but fertile in the valleys. The best tracts are along the Shannon, the Rinn, and the Bonnet. The crops are corn, potatoes, and flax. Leitrim is, however, more a grazing than an agricultural county. Large quantities of young stock, chiefly horned cattle, are raised on the pasturable plains of the southern district. Agriculture is in a very backward condition. Estates are generally large, tillage farms small, and farmsteads often mere cabins. Average rent of land, 10s. 8d. per acre per annum.

Iron and lead ores are abundant; also coal in Sliev-an-ieran mountain, and on the south side of Lough Allen, where it is raised to some extent.

The county is intersected by a new canal, uniting the Shannon, at Carrick-on-Shannon, with Lough Erne at Ballyconnell.

The extension of the Midland Great Western Railway from Longford to Sligo is open through the southern part of Leitrim, by Newtownforbes, Rooskey, Dromod, Drumsna, and Carrick-on-Shannon, and the railway from Enniskillen to Bundoran and Sligo through the north of this county.

The spinning and weaving of coarse linens for domestic use, is the only branch of manufacture carried on with activity. There are three or four bleach-grounds in the county.

Divisions and Towns.—Leitrim is divided into five baronies and seventeen parishes. It is in the dioceses of Kilmore and Ardagh, and the Connaught Circuit, the assizes being held at Carrick-on-Shannon. The county returns two members to Parliament. The number of parliamentary voters is about 2400. The county is in the Dublin or northern military district, and there are barracks at Carrick-on-Shannon.

Carrick-on-Shannon, the chief town in Leitrim, is 98 miles N.W. from Dublin by the road. It is situated on the west bank of the Shannon, and contains a good court-house, county gaol, church, and Roman Catholic chapel. A small part of the town is in Roscommon, on the opposite bank of the river, across which is a bridge. It was formerly a parliamentary borough, but has been disfranchised. Population, 1587. *Leitrim* is a poor village, 3 miles N. from Carrick-on-Shannon, on the river Shannon, here crossed by a six-arched bridge. Population, 243. *Manorhamilton* is a small market town, about 28 miles N. from Carrick-on-Shannon, situated in a beautiful part of the county, and watered by the Owenmore, a fine mountain stream, which falls into the Bonnet a little below the town. Population, 1167. *Mohill*, a market town, about 10 miles S.E. from Carrick-on-Shannon, is partly in Leitrim and partly in Longford county. The parish covers more than 30,000 acres, having a total population of 10,363. The town has 1123 inhabitants in Leitrim.

History and Antiquities.—Before the coming of the English, Leitrim formed a portion of the territory of Breifne, of which O'Rourke was petty king, and was called Breifne or Brenny O'Rourke, to distinguish it from Brenny O'Reilly, the present county of Cavan. The whole of Brenny O'Rourke is said to have been bestowed by King John de Lacey; the O'Rourkes nevertheless continued to maintain their independence until the reign of Elizabeth, when Leitrim was first reduced to shire ground as a separate county in 1563. There were many disturbances in the county subse-

quently, which were not settled till 1615, when the king's title to the greater part of Leitrim was confirmed, and numerous patents were granted to undertakers by a commission appointed for the purpose of disposing of the estates of the Crown in Leitrim, Longford, and King's county. Again, however, on the breaking out of the rebellion of 1641, the native Irish, headed by Sir Owen O'Rourke, seized all the places of strength in the county, with one or two exceptions. The confiscations which followed on the termination of these wars in 1650 included almost all the lands that had been allowed to remain to the native proprietors under former attainders, and may be said to have extinguished the family of O'Rourke.

The remains of antiquity in Leitrim are not very interesting. There are some ruins of the abbey of Fenagh, celebrated during the early period of Irish church history as a school of divinity. The abbey of Creevelea, near Dromahair, founded by the wife of Owen O'Rourke in 1508, was an extensive pile, of which the principal walls are still standing. The remains of the other religious houses are insignificant. O'Rourke's Hall at Dromahair, Castle Longfield, Cloncarrick Castle, Castle Car, and several others now in ruins, belonged to the O'Rourkes. The strongest and handsomest fortalice, however, in the county is the castle of Manorhamilton, built about 1628 by Sir Frederic Hamilton. It is quoined and corniced with cut stone, and is surrounded by a regular rampart with four bastions.

LEITMERITZ. [BOHEMIA.]

LEIXLIP. [KILDARE.]

LE'LEGES. The Leleges appear, from numerous traditions, to have inhabited the islands of the Ægean Sea and the western coasts of Asia Minor from a very early period. In Homer they are represented as the allies of the Trojans. Strabo informs us that they once inhabited, together with the Carians, the whole of Ionia. But in the numerous traditions respecting them in the north of Greece we find no connection between them and the Carians. According to Aristotle, they inhabited parts of Acarnania, Ætolia, Opuntian Locris, Leucas, and Bœotia.

LELY, SIR PETER (or Peter Vander Faes), was born in 1617, at Soest in Westphalia. He studied under Peter Grebber at Haarlem. He afterwards came to England, and was appointed state-painter to King Charles II. He occasionally painted historical pictures, one of the best of which is a representation of Susannah and the Elders, at Burleigh House. His most celebrated performances are the well-known portraits of the beauties of the Court of King Charles II., preserved at Hampton Court. Lely equally excelled as a crayon painter. He died in England in 1680.

LEMAN, LAKE, *Lemánus Lacus*, *Lake of Geneva*, *Genfersee*, extends in the form of a crescent from east to west between Switzerland and the French department of Haute-Savoie. Its breadth varies greatly, being about 9 miles in the middle, 4 towards the eastern extremity, 3 in its western part opposite Nyon, and 1 mile just before reaching Geneva. This narrow part, which is about 14 miles in length from Nyon to Geneva, is called the Little Lake, and more especially the Lake of Geneva. The greatest length of the lake is about 45 miles. The depth of the Lemán, below the cliffs of Meillerie, on

the coast of Savoy, is nearly 1000 feet; it is 500 feet deep near the castle of Chillon, on the opposite coast, and from 600 to 300 feet in other places. Its surface is 1230 feet above the sea, but in summer it rises sometimes from 6 to 8 feet higher, owing to the melting of the snow in the Alps. The water reflects a bright azure tinge like that of the Mediterranean Sea. The Rhone, coming from the Valais, enters the lake at its south-east extremity, where the waters of the river are muddy-coloured; and it issues out of it again at Geneva at the south-west extremity, where its waters assume a deep blue tinge. The area covered by the lake is about 331 square miles. Its waters are transparent, and contain a great variety of fish; it is never wholly frozen over, and is subject to *seiches*, or risings of from 1 to 4 or 5 feet, which last about twenty-five minutes only. Steamboats introduced in 1823 ply regularly between several points on the shores of the lake, the scenery around which has been always a subject of admiration to travellers.

LEMBERG (*Leopol*), the capital of the kingdom of Galizia, lies in 49° 52' N. lat., 24° 2' E. long., and has a population of over 70,000, about 24,000 of whom are Jews. It is situated in a narrow deep valley, on a small stream called the Peltew, which is dry in summer. The town has greatly improved since it came into the possession of Austria. It contains many handsome buildings, broad straight streets, and lofty houses built of freestone, which, with the cupolas and steeples of the cathedrals and churches, give it an air of grandeur. In 1704 Charles XII. of Sweden took it by storm. It was formerly an important fortress, but the fortifications have been pulled down, and low ramparts erected, which are planted with trees and laid out in public walks. This city is the seat of a Greek and an Armenian archbishop, and has, among its public buildings besides, a Dominican church, council-house, and theatre, a handsome cathedral and eighteen other Roman Catholic churches, an Armenian and a Greek cathedral, a Lutheran chapel, three Jews' synagogues, and nine convents. Besides being the residence of the governor-general, and all the chief military and civil authorities of the kingdom, Lemberg has a university, two gymnasia, two theological seminaries, and numerous charitable institutions. The university was founded in 1784, and has a library of 48,000 volumes; the literary institute has 58,000 volumes, mostly of Slavonic history and literature, 1200 MSS., 15,000 medals, and a collection of paintings and prints. The town has several breweries and distilleries, manufactures of woollens, linens, and jewellery; an important transit trade, and extensive corn and cattle markets. Near it are the baths of Szeκλο and Lubien.

LEMGO. [LIFFE.]

LEMMA (λήμμα, literally 'a thing taken or assumed'), a preparatory proposition borrowed from another subject, or from another part of the same subject, and introduced at the point at which it becomes indispensable.

LEMMING (*Georychus lemmus*), a curious little quadruped, found in the northern regions of Europe and America, and more particularly in Norway, Lapland, and Siberia. It varies in size and colour according to its habitat. In Norway it is nearly as

large as our British water-rat; its colour tawny, streaked with shades of black, and spotted with patches of white all about the under parts, and the sides of the head. In Lapland and Siberia it grows no bigger than a field-mouse, and its different hues are less conspicuously defined. Its head is short, but large, thick, and well furred; eyes and ears small; body thick; limbs, and notably its fore-legs, clumsily thick; on each foot there are five toes, and the fore-claws are strong, compressed, and rather crooked; the tail is very short, thick, cylindrical, and covered with strong hairs disposed like those of a pencil at the tips.

The lemming feeds entirely on vegetable food, and hence in the regions which he haunts man regards him with abhorrence; for in winter these animals assemble in immense numbers, and make long journeys in quest of nourishment, devouring every herb and blade they can discover. At certain epochs, not very well understood, but supposed to be decennial, when they have largely multiplied in their mountain homes, and a consequent scarcity of food obtains, they make the most extraordinary migrations. Descending in troops from the snow-clad heights they collect in the plains, like the divisions of a great army, and then, as if by some understood agreement, march forward in defiance of every obstacle, so that nothing can divert them from their chosen course. They swim across the lakes and rivers that lie in their way, and on arriving at the opposite shore re-form in regular array. In these expeditions myriads are drowned, and myriads fall victims to the attacks of hawks, owls, and weasels; but onward they press, devouring all the vegetation they meet with, until the ground they have passed over looks as if scathed by some destructive conflagration. These migrations invariably foretell very severe weather.

When enraged, the lemmings rise on their hind feet and emit a hoarse barking sound. They breed several times in the year, and produce five or six at a birth. The Hudson's Bay lemming is of an ashen colour, with a tinge of tawny on the back. Its docility is remarkable. It inhabits the regions bordering on the Polar Sea, and is very numerous around Hudson's Bay. Gmelin distinguishes two species, which he names *Mus Hudsonicus* and *Mus aspalax*, or the Siberian lemming. To these Linnæus adds *Mus lemmus*, the Scandinavian lemming. All these species belong to the genus *Rodentia*, and burrow under ground, like the moles, though their fore-feet are better adapted for digging.

Some interesting details respecting their migrations will be found in Forester's and Sir Capel Broke's narratives of travels in Norway and Sweden.

LEMNIAN EARTH is an earthy substance, soft, dull, opaque, yellowish white, and falls to pieces when put into water. It was formerly used in medicine under the name of *Terra Sigillata*. Two-thirds of its weight consist of silica.

LEMNISCATĀ, a curve (first noticed by James Bernoulli) having the form of an 8, but with the upper and lower parts perfectly symmetrical.

LEMNOS, or STALIMENE, one of the northern islands of the Ægean Sea, belonging to Turkey, situated nearly half way between Mount Athos and the entrance of the Dardanelles, and about 22 miles south-west of Imbros. Its area is 160 square miles,

and its population about 10,000, all Greeks, with the exception of the Turkish garrison and governor. The modern Greeks call both the island and the town Stalimene. The surface is mountainous, and there are extinct craters; the western part of the island, which is more fertile than the eastern, produces wine and corn, oil, hemp, and flax, and fruits, but it is deficient in timber trees and in wood for fuel. The principal harbour, called Sant Antonio, in the south-west part of the island, is large and safe. The capital town, Lemnos, is on the western coast, and has a citadel, harbour, and shipbuilding docks, with a population of about 1000.

Lemnos is known, in ancient mythology, as the spot on which Vulcan fell after being hurled down from heaven. The Athenians, led by Miltiades, took Lemnos after their conquest of the Chersonesus. (Herod., vi. 140.) Lemnos had two towns, Hephæstia and Myrina. The present castle is supposed to be on the site of the latter.

LEMOINE, FRANÇOIS, was born at Paris in 1688. He was the pupil of Louis Galloche, and in 1718 he was elected a member of the Royal Academy of Painting. He obtained a great reputation by his painting in oil of the Transfiguration of Christ on the ceiling of the choir of the church of the Jacobins, Rue du Bacq, Paris. In 1724 Lemoine visited Italy, where he remained for a year. After his return to France he was made professor of painting in the Academy, and Louis XV. appointed him in 1736 his principal painter, with a salary of 4100 francs. The first of Lemoine's great works was the cupola of the chapel of the Virgin in St. Sulpice, in fresco, which he commenced in 1729, a work of three years' labour. His masterpiece, however, is the Apotheosis of Hercules, painted in oil on canvas attached to the ceiling of the Salon d'Hercule at Versailles.

After the completion of this great work he was without a rival in France, but he never enjoyed his success. He was naturally of a melancholy temperament, a weakness which the loss of his wife and his constant and intense application aggravated to such a degree that it amounted to a chronic aberration of intellect, and he destroyed himself in one of these nervous fits, June 4, 1737, ten months after the termination of his great work at Versailles, and in the fiftieth year of his age.

LEMON. [CITRUS.]

LEMON ACID. [CITRUS AURANTIUM.]

LEMONADE, a well-known cooling beverage, is made by slicing two lemons, and mixing them with two ounces of white sugar in a quart of boiling water, and allowing the mixture to stand till cold. This is the simplest and commonest form. It is a useful drink for allaying thirst, and is employed as a cooling medicine in some diseases.

LEMON GRASS (*Andropogon schenanthus*), an odoriferous grass, a native of India, Arabia, &c., grows in the West Indies and Australia. Its fragrance is oppressive where the grass abounds, and cattle will not eat it. It grows three or four feet high, and is very coarse. Lemon-grass oil is obtained from it by distillation. This oil is used by perfumers, and as a liniment for rheumatic complaints. Europeans in India make a tonic beverage of the young blades of lemon grass.

LEMONS, ESSENTIAL OIL OF, this well-

known essence is extracted from the little cells visible on the rind of lemons, by submitting raspings of the fruit to pressure. It may also be obtained by distilling the peel with water, but the product is less agreeable, although not so liable to undergo decomposition, owing to the absence of mucilaginous matter. When pure, essential oil of lemons is colourless and limpid; specific gravity, 0·847 at 70° Fahr., boiling point about 145° Fahr.; soluble in all proportions in alcohol or ether. It is used to give an agreeable odour to other medicines, and sometimes taken as a carminative in the dose of two or three drops upon sugar. From its agreeable scent it is often added to lotions and ointments.

LEMURIDÆ, the family of Lemurs (*Les Makis* of the French), constituting the last great group of the *Quadrumanæ*, in Cuvier's 'Règne Animal.'

The characters distinguishing the Lemurs from the Monkeys were founded by Linnæus upon the number of the incisor teeth; but as these characters are negative, their application in a strict sense is impossible. The Lemuridæ resemble the monkeys of the old world in having opposable thumbs on the forehands as well as on the hinder pair; and indeed the thumb of the hinder hands is large, and greatly expanded at the tip. In some species the index finger of the fore hands is abbreviated, and the index finger of the hinder pair is armed with a long, subulate, slightly curved claw (in the *Tarsier* the next also); the other nails are flat. Tail variable. Fur woolly. The molar teeth are tuberculous, the tubercles and depressions of the opposing teeth mutually fitting into each other. Habits arboreal and nocturnal.

Several genera are comprehended under the Lemurine family. Of these the chief are:—

1. *Propithecus* (Bennet). Locality, Madagascar.
2. *Lemur*. Locality, Madagascar.
3. *Lichanotus* (*Indris*). Locality, Madagascar.
4. *Stenops* (*Loris* and *Nycticebus*, Geoff.). Locality, India, Ceylon, Java, Sumatra.
5. *Otolienus* (*Galago*). Locality, Africa.
6. *Cheirogaleus*. Locality, Madagascar.
7. *Microcebus*, or Mouse Lemurs. Locality, Madagascar.
8. *Perodictus* (Bennet). Locality, Sierra Leone.
9. *Tarsius*. Locality, Sumatra.

To these we may add two abnormal genera, viz.—

10. *Cheiromys*. Locality, Madagascar.
11. *Galeopithecus* (Flying Lemurs). Locality, Moluccas.

The genus *Lemur* may be thus described. Head long, muzzle pointed; eyes moderate and oblique; tail long and bushy; mammae two, pectoral; all are natives of Madagascar; arboreal, nocturnal. Their movements are light, sweeping, elegant, and precise. They repose wrapped up in the form of a ball, with the bushy tail twined around them. Their usual voice is a low inward grunt, but they often break forth into an abrupt hoarse roar.

Incisors, 4,	Canines, 1—1,	Molars, 6—6.
4	1—1	6—6.

The first false molar below is stout, and resembles a canine, whence has arisen the idea that it is really a canine, whereas the true canines of the lower jaw

are in close contact with the incisors, and like them are obliquely directed. As examples of this genus we may notice the White-fronted Lemur (*Lemur albifrons*), the Ruffed Lemur (*L. macaco*), the



White-Fronted Lemur (*Lemur albifrons*).

Mongooz Lemur (*L. mongos*). These animals are easily tamed, very gentle, and remarkable for their address and agility.

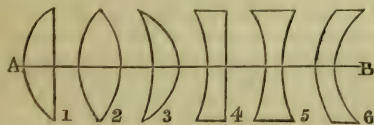
LENA, River. [SIBERIA.]

LENCLOS, NINON DE, was born in 1616, of a noble family of Touraine. Being remarkably handsome and graceful, she was courted by most of the noblemen and wits about court. She retained her attractions to a very advanced age. Some of her letters to St. Evremont, among the works of that author, and in the 'Letters des Femmes Célèbres,' edited by L. Collin, 1805, are the only authentic memorials of her pen. She died in Paris in 1706.

LENNEP. [DÜSSELDORF.]

LENS (Latin for 'a small bean'), a name given to a glass, or other transparent medium, ground with two spherical surfaces in such manner as is seen in the accompanying Plate. Fig. 2 is plano-convex; fig. 1 is double-convex; when the radii are equal, it is called equi-convex; and when one radius is six times the other it is called a crossed lens; fig. 6 is a meniscus; in every such lens the concave side has the larger radius; fig. 5 is plano-concave; fig. 4 is double concave; fig. 3 is concavo-convex; fig. 7 is a compound lens.

Let the following figure represent the passage of a ray, PQ, of light, parallel to the axis, MF, through a lens, QM: then a number of such rays constituting a cylindrical surface about the same axis will, after refraction, converge to a certain point, as F; and at



a greater distance from the axis a like cylinder of parallel rays will converge to a different point, as A, nearer the lens. If the former cylinder be very near the axis, MF, F is considered as the *focus* of the lens; AF is called the longitudinal aberration of a ray, PQ, and FB its latitudinal aberration.

We shall merely state here the principal formulæ for determining the focal length, MF, of a lens. (Illustrative figures are given in the Plate which accompanies this article.)

To find the focus for parallel rays, let $R = \frac{1}{r}$ = curvature of the surface, there being positive values of r and R . Again, let $D = \frac{1}{QC}$ (fig. 8) =

proximity of the focus of incident rays to the surface, D being regarded as positive when Q lies to the right of C , as in fig. 8, and as negative when to the left, as in fig. 9. Then since $QE = a$, and since a is regarded as positive when Q is to the left of E , we must have (fig. 42) $QE = a$, and $QC = QE + EC = r - a$; so that $D = \frac{1}{r - a}$; $a = \frac{1}{R} - \frac{1}{A}$.

Let also $M = \frac{1}{\mu}$; $F = \frac{1}{CF}$ = power of the surface:

$f = \frac{1}{Cq}$ = proximity of the focus of refracted rays to the surface. The focus for parallel rays on the posterior surface of a sphere falls on that surface, and in any other case (as in figs. 10 and 11) q is given by the proportion, $QE : CE :: EH : Hq$.

Figs. 12 and 13 illustrate the aberration of a system of spherical surfaces. If Q and q (fig. 12) be the *aplanatic foci* of the spherical refracting surface, and if with the centre q and any radius greater than qC when the incident rays diverge from Q , but less if they converge to Q , as we describe a surface, KL or kl , and turn the whole figure about Qq as an axis, the surfaces $CPKL$ or $cpkl$ will generate the aplanatic lens.

To find the foci for oblique rays, let Q and Q' (fig. 14) be the foci of two pencils of convergent rays incident on the spherical surface, CC' , whose centre is E ; draw QEC , $Q'E'C'$, cutting the surface in C and C' , and regarding CEQ as the axis of the pencil, RQ , SQ , TQ , the focus of the refracted rays will be found by taking qQ such as that $\frac{1}{Cq}$ or f shall be equal to $(1 - m)R + mD$, and f' shall be equal to $(1 - m')R + m'D$.

When an oblique pencil of light is incident on any system of spherical surfaces, the focus of refracted rays is found according to fig. 15. Take E' , the centre of the first surface, and let Q' be the focus of incident rays. Join $Q'E'$, and produce it to C' , then will C' be the vertex of the surface corresponding to the pencil whose focus is Q' ; and taking $\frac{1}{C'Q''} =$

$\frac{1 - m'}{C'E'} + \frac{m'}{C'Q'}$, Q will be the focus of the refracted rays. Again, join Q'' and E'' , the centre of the second surface, produce to C'' , and take $\frac{1}{C''Q''} =$

$1 - \frac{m''}{C''E''} + \frac{m''}{C''Q''}$, and Q will be the focus after refraction at the second surface; and so on.

The centre of a lens is a point in its axis where a line joining the extremities of two parallel radii of its two surfaces cuts the axis. Thus, in figs. 16, 17, 18, and 19, $E'A$ and $E''B$ being two parallel

radii, join BA, and produce, if necessary, to x , and x will be the centre.

An inverted image of an object is formed behind a convex lens beyond the focal length, as in fig. 20. Let C be the centre of the lens, Pp, passing through C; the rays cross at C, and the image is inverted subtending the same angle, pCq, at C that the object does before the lens. This is the principle of the common camera obscura (fig. 21), in which the rays from external objects are thrown by an inclined looking-glass downwards, and being received on a convex lens, are brought to their focus on a white horizontal table in a room where no other light is admitted. In fig. 21, P is the object, AB the reflector, BC the lens, and p the image on the table, D. If the lens used to form the image be a concave one, or if a convex reflector be used, as in figs. 22 and 23, the rays, after refraction or reflection, diverge, not from any actual points in which they cross, but from points in which they would cross if produced backwards. There is in this case only a *virtual* image formed, visible to the eye if properly situated.

When two or more lenses are placed close together, in finding the approximate focal distance, uncorrected for the thicknesses, they may be considered as one lens, whose focal distance has a reciprocal equal to the sum of the reciprocals of the focal distances of the component lenses.

LENS, CRYSTALLINE. [EYE.]

LENT (in Latin, *Quadragesima*), a time of mortification, commemorative of the miraculous fasting of our Saviour in the desert; used as a preparation for Easter. The Saxon term was *Lencten*, implying Spring, the season when the day increases in *length*, about the commencement of which this fast usually falls: it is, in fact, the Spring Fast. In the ancient Latin church Lent consisted only of thirty-six days: the four additional days were instituted in the ninth century.

LENTIBULA'CEÆ, a small monopetalous order of exogenous plants, resembling *Scrophulariaceæ*. *Pinguicula* and *Utricularia* are the only genera of this order.

LENTIL. [VICLE.]

LENZINITE, an earthy, soft, whitish, translucent mineral, consisting of silica, alumina, and water. When put into water, it divides into numerous small translucent bits, which, when touched, fall into grains of great hardness.

LEO I., Emperor of Constantinople, born in Thrace of obscure parents, entered the military service, and rose to high rank. At the death of the Emperor Marcianus, in 457, he commanded a body of troops near Selymbria, and was proclaimed emperor by the soldiers. Leo followed the measures of Marcianus against the Eutychians. In concert with Anthemius, emperor of the West, he prepared a numerous fleet for the recovery of Africa, which was occupied by the Vandals. The expedition, however, was defeated. Leo died in January, 474, bequeathing the throne to his grandson Leo, the child of Zeno, the captain of his guards, and Ariadne, Leo's daughter, who died in the following year, aged five years.

LEO III., called Isauricus from the country of his birth, was of humble parentage, and served in the army under Justinian II. Under the reign of Anas-

tasius II. he received the supreme command of the troops of Asia. Anastasius was deposed, but Leo would not acknowledge Theodosius III., who was proclaimed in 716, and marched to Constantinople, when Theodosius resigned the crown to Leo in 717. He defeated the Saracens, who had laid siege to Constantinople; and in 719 Anastasius, who had attempted to resume the crown, was beheaded. It was in this reign that the schism of the Iconoclasts or Image-breakers commenced, by an edict of Leo ordering the immediate removal of all images from churches. This led to great disorders, and in the midst of an unsuccessful struggle both against the Saracens of Asia and against the Italians and the pope, Leo died of the dropsy in the year 741, and was succeeded by his son Constantine.

LEO I. was only a deacon when he was chosen by the clergy and the people of Rome to be their bishop, after the death of Sextus III., in 440, under the reigns of Valentinian III., emperor of the West, and Theodosius II., emperor of the East. Soon after his exaltation he had a controversy with Hilarius, bishop of Arelate, and obtained a rescript from the Emperor Valentinian III. suspending Hilarius from his episcopal office. Leo also induced the emperor to issue, in the year 445, several laws against the Manichæans and other heretics. He assembled a council at Rome in 449, in which he annulled the acts of the council of Ephesus, which had absolved Eutyches. [EUTYCHIANS.] Soon afterwards the Ecumenic council of Chalcedon, in 451, condemned the doctrine of Eutyches, and defined the doctrine concerning the person of Christ. Leo died in 461, and was succeeded by Hilarius I. His writings, especially his Sermons and his Epistles, are useful for the history of the times. Quesnel has given a full account of his life, as well as Maimbourg, 'Histoire du Pontificat de St. Léon le Grand.' The Roman Church numbers him among its saints, and gives him the epithet of Magnus, or 'St. Leo the Great.'

LEO III., a native of Rome, was elected after the death of Adrian I., in 795. The principal event of his pontificate was an attempt made upon his life by a band of armed ruffians (for which the two chief conspirators, Paschal and Campulus, were exiled), and an examination into certain charges brought against him by his enemies, but which they failed in establishing. Leo crowned Charlemagne, who from that time styled himself Augustus, and emperor of the Romans. He died in 816, and was succeeded by Stephen IV.

LEO X., *Giovanni de' Medici*, the second son of Lorenzo the Magnificent, was born in December, 1475. After experiencing some reverses of fortune he was elected pope in March, 1513. He appointed his nephew Lorenzo governor of Florence, which continued during Leo's life to be a dependency of Rome.

Leo found the war renewed in Northern Italy. The French were defeated at Novara, and driven from that country; they then formed an alliance with the Venetians, which he endeavoured to break off.

He reopened the council of the Lateran, which Louis XII. acknowledged. That monarch died in the following year, and his successor, Francis I., among his other titles, assumed that of duke of Milan, which proved the signal for a new Italian war.

The French took possession of Milan, and the contending parties subsequently came to terms. A concordat was agreed upon regulating the appointment to the sees and livings in the French kingdom, which remained in force till the revolution of 1789. A marriage was also agreed upon between Lorenzo, the pope's nephew, and Madeleine de Boulogne, niece of Francis de Bourbon, duke of Vendôme.

In 1516 Leo, under some frivolous pretences, deprived Della Rovere, the nephew of Julius II., of his duchy of Urbino, Pesaro, and Sinigaglia, which he gave to his nephew Lorenzo de' Medici. Soon afterwards a conspiracy to murder the pope was discovered at Rome, and Cardinal Petrucci, who was at the head of it, was hanged. In 1517 the council of the Lateran was finally closed, and in the same year Leo authorized the sale of indulgences in Germany, which was the immediate cause of the Reformation. [LUTHER.]

In 1518 a league of five years was proclaimed by Leo among the Christian princes, to oppose the advance of the Turks, who were threatening Italy.

The alliance of Leo with Francis I. was a hollow one, and the former concluded a secret treaty, offensive and defensive, with Charles V., July 8, 1521, by which it was stipulated that the duchy of Milan was to be taken from the French and given to Francesco Maria Sforza, and Parma and Piacenza to be restored to the pope. These changes were soon effected; but in the midst of the public rejoicings thereupon, Leo fell ill, and died December 1, 1521.

For other popes of this name, see article POPE.

LEO (the Lion), a constellation of the Zodiac, which commemorates the Nemean lion killed by Hercules in the mythology of the Greeks. It is surrounded by Ursa Major, Leo Minor, Cancer, Hydra, Sextans, Virgo, and Coma Berenices. A line drawn through the pole star and the lowest of the four in the Great Bear (or γ) passes through Deneb (or β Leonis); and a line drawn through the bright star Regulus (or α Leonis) of the first magnitude and Deneb passes nearly through Arcturus.

LEO, ALLATIUS. [ALLATIUS.]

LEOCEPH'ALUS (Gr. 'smooth-headed'), a genus of Saurian reptiles, of the family *Aganidae*.

LEO MINOR, a constellation of Hevelius, surrounded by Ursa Major, Lynx, Cancer, and Leo.

LEOMINSTER. [HEREFORDSHIRE.]

LEO'N, the name of a kingdom in Spain, which grew out of the conquests of the Christians from the Moors. The immediate successors of Pelayo were kings of Asturias, and resided at Oviedo. Alfonso the Catholic, from 739 to 757, conquered the towns of Leon, Astorga, Simancas, Zamora, Salamanca, and Ledesma, as well as part of Galicia, all of which were added to the dominions of the Asturian kings. Garcia, son and successor of Alfonso III., about 910 transferred the seat of sovereignty from Oviedo to Leon. Henceforth the Christian kingdom in Northern Spain was called the Kingdom of Leon and Asturias. The male line of the kings of Leon became extinct with Bermudo III. in the year 1037. His sister had married Fernando, king of Castile, who thus united both crowns. But upon Fernando's death, Sancho, one of his sons, had Castile, and Alfonso had Leon and Asturias. The two kingdoms remained distinct, although their crowns were sometimes worn by the

same person, for nearly two centuries, until Fernando III., in 1230, permanently united them, assuming the title of king of Leon and Castilla, which his successors retained.

The territory of the kingdom of Leon is comprised in the basin of the Duoro, between the Asturian mountains on the north, the Sierra de Gata and Sierra de Gredos on the south, which divide the basin of the Duoro from that of the Tagus, Old Castile on the east, and Portugal and Galicia on the west.

LEON, a city of Central America. [NICARAGUA.]

LEO'N, THE PROVINCE OF, is bounded N. by the Asturias, S. by Zamora, E. by Palencia, and W. by Galicia. It is 130 miles in length from E. to W., and about 50 wide from N. to S. The area is 5869 square miles, and the population at the last census was 348,756. The province belongs mainly to the basin of the Duoro, being crossed from N. to S. by the Esla, which rises in the mountains of Valdeburon, on the borders of Asturias, and flows southwards into the province of Zamora, where it enters the Duoro. There is a small part of the province of Leon, west of Astorga, which belongs to the basin of the Miño, being watered by the Sil, a tributary of that river. The surface of Leon is mountainous in the north of the province, where it rises towards the Asturian chain, but it slopes to the south, where it sinks into the plain of the Duoro. The country produces corn, fruit, vegetables, hemp, flax, and wine. Large herds of cattle and flocks of sheep, as well as horses and mules, are reared in this province. The inhabitants are for the most part uneducated and lazy; agriculture is in a very backward state; and everywhere the means of communication are defective. The manufactures are unimportant.

Leon, the capital, an old and somewhat decayed city, is said to have been built by the Roman soldiers of the seventh legion, in the time of Vespasian; it was for more than two centuries the residence of the kings of Christian Spain. Its cathedral, built in the thirteenth century, is one of the finest in Spain, and contains the tombs of the old kings. There are two collegiate churches, San-Marco and San-Ysidro, twelve other churches, and four hospitals. The Plaza Mayor, or principal square, is handsome, and there are other squares adorned with fountains. Leon contains 5720 inhabitants. It is 60 miles S.E. of Oviedo, and 174 miles W.N.W. of Madrid. Linen weaving, stocking knitting, and glove making are the principal branches of industry.

LEONARDO OF PISA, or LEONARDO BONACCI, an Italian mathematician who lived at the commencement of the thirteenth century, was the first person who brought to Europe the knowledge of algebra. His work was never printed, but is preserved at Rome, and is described in Cossali's 'History of Algebra.' He was author of a treatise preserved in the Magliabecchi library at Florence, entitled 'Practica Geographia.'

LEONARD, ST. [VIENNE, HAUTE.]

LEONARD'S ST. [SUSSEX.]

LEO'NIDAS, King of Sparta, commanded the Grecian troops sent to maintain the pass of Thermopylae against the invading army of the Persians under Xerxes, B.C. 480. The force under his command amounted to 4200 men, besides the Opuntian Locri and a thousand Phocians. With these, during

two days' fight, he defended the narrow defile which was the usual passage from Thessaly to the southern parts of Greece. But some renegades discovered a circuitous and unfrequented pass by which a body of the invaders crossed Mount Eta. On receiving intelligence that his position was thus turned, Leonidas dismissed all his soldiers except 300 Spartans, the Thebans, whose fidelity to the common cause was suspected, and the Thespians, 700 in number, who resolved to share the fate and the glory of the Spartans—for the laws of Sparta forbade her citizens to turn their backs upon any odds. Being surrounded and attacked in front and rear, the Spartans and Thespians fell to a man after making vast slaughter: the Thebans asked and received quarter. The corpse of Leonidas was mutilated, and exposed on a cross by Xerxes. A stone lion was afterwards raised on the spot where he fell. The slain were buried where they fell, and their memory was honoured by monumental pillars. Two of the inscriptions ran thus:—'Here four thousand men from Peloponnesus once fought three millions.' 'Stranger, tell the Lacedæmonians that we lie here, obeying their laws.'

This is the account of Herodotus (vii. 202, &c.). Diodorus and Plutarch tell the story somewhat differently.

LEONINE VERSES, a kind of measure much in fashion during the middle ages, which rhymed at the middle and end. It consists properly of the Latin hexameter, or hexameter and pentameter rhymed. The most common structure of the verse is that in which the cæsura on the fifth syllable rhymes with the end of the line: as,

'En Rex Edvardus, debacchans ut Leopardus.'

There is an example of a modern attempt at Leonine verses in Parnell's translation of a passage in the 'Rape of the Lock,' beginning,

'Et nunc dilectum speculum pro more reiectum.'

The classical metre is not essential. We find in the ancient hymns of the Roman Catholic Church the rhythm of modern versification; and in the famous song of Walter de Mapes, archdeacon of Oxford in the time of Henry II.:

'Mibi est propositum in taberna mori,
Vinum sit appositum morientis ori,
Ut dicant, cum venerint Angelorum chori,
Deus sit propitius huic potatori.'

Leonine verses were so named after Leoninus, a canon of the church of St. Victor, in Paris, about the middle of the twelfth century; or, as others say, after Pope Leo II., who was a lover and improver of music.

LEONTODON TARAXACUM (*Dandelion*), a perennial herbaceous plant of frequent occurrence. The root, leaves, and flower-stem (scape) contain much milky juice; but the root only is employed in medicine. The leaves by blanching can be rendered fit for use as a salad, as they then retain only a moderate degree of bitterness.

LEONURUS (from *λέων*, 'a lion,' and *οὐρά*, 'a tail'), a genus of plants belonging to the natural order *Labiatae*. *L. cardiaca*, Motherwort, is a bitter herb with a pungent unpleasant smell. It is found in hedges and waste places in Great Britain, all over Europe, and in the middle of Asia. There are eight species of *Leonurus* described by botanists as growing

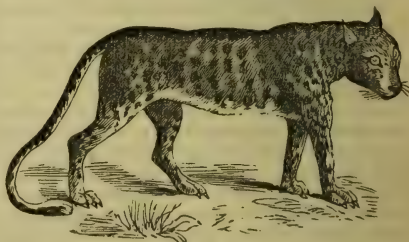
chiefly in Europe and in the north of Asia. None of them are very ornamental, and being biennial plants, the seeds only require to be sown in the open ground.

LEOPARD'S BANE. [ARNICA.]

LEOPARDS, a name by which the greater spotted feline animals are popularly known. These animals, though less in size than the lion and tiger, are larger than the lynxes and tiger-cats; they are very formidable, active, and daring, and ascend trees with the utmost facility. The group is principally confined to the old world, one species only being American.

1. The Panther and Leopard (*Felis Pardus* and *Felis Leopardus*).—It is difficult to say what positive distinctions exist between the panther and leopard. In both we observe rosettes, or even simple spots on a fine yellow ground; but in the size and minor arrangement of the open rosettes there is the greatest variation. The leopard has been described as differing from the panther in being of a paler yellowish colour, of rather smaller size, and with the rosettes made up of several dots partially united into a circular figure in some instances, and into a quadrangular, triangular, or less determinate form in others. But on these very grounds, if there be two species, there must be several more. Once or twice black leopards or panthers (whichever they be) will be found, in which the ground colour is dull black, with spots of a rich glossy black; and Pennant ('Hist. Quad.') figures a black leopard in the Tower of London, brought from Bengal by Warren Hastings. Some consider this animal to be a distinct species, and describe it under the title of *Felis melas*. In certain parts of Java, according to Péron, the black leopard is common.

Mr. Bennet says, 'Whether the leopard and the panther are in reality distinct species, and if so, on what particular characters the specific distinction depends, are questions that have been so variously solved by writers of the highest eminence, that we cannot, without better opportunities for comparison of specimens than we at present possess, adopt the



Leopard (*Felis leopardus*).

conclusions to which any one of them has come upon the subject.' The fact is this: Suppose it be proved that there are several species of old world *Felidae* entitled to the names of panther or leopard, how can we tell to which the specific title of *Pardus* and *Leopardus* is applicable? On this point we might waste pages by references to writers whose conclusions end in nothing. The leopard or panther is found in Africa, India, and the Indian Islands, as Ceylon, Sumatra, Java, &c.

2. The Rimau Dahau (*Felis macrocelis*, Temm.).—a beautiful species, with bold square or angular markings; a native of Sumatra, and discovered there by Sir Stamford Raffles. This form leads the way to the tiger-cats, with marbled markings.

3. The Ounce (*Felis uncia*).—Till recently the Ounce (*Ounce*, Buffon) was confounded either with the leopard or the panther, but it is a decidedly distinct species. Buffon has figured it, and Bewick has copied the figure.

In 1837 Dr. Gray brought before the notice of a meeting of the Zoological Society of London some mammalia which he had lately purchased for the British Museum from a collection made by the late Colonel Cobb in India, among which was an adult specimen of the *Ounce* of Buffon ('Hist. Nat.'). on which Schreber formed his *Felis uncia*, which has been regarded by Cuvier, Temminck, and most succeeding authors, as a leopard, but which, continued Dr. Gray, 'is a distinct species, easily known by the thickness of its fur, the paleness of its colour, the irregular form of the spots, and especially by the great length and thickness of the tail.' Dr. Gray observed that a more detailed description of this animal was unnecessary, as it agreed in all particulars with the specimen described by Buffon.

4. The Cheetah, or Hunting Leopard (*Felis jubata*, Schreber, *Cynailurus jubatus*, Wagler).—The Cheetah, or Chetah, is a slender but tall animal, with wiry limbs, and with claws but slightly retractile. It is extensively spread through Africa and the warmer parts of Asia, and in India and Persia it is domesticated and trained to the chase or rather the surprisal of the antelope, towards which it creeps stealthily until within range of its spring. The general colour of the cheetah is fawn yellow, variegated with round black spots; a distinct black stripe passes from the inner angle of the eye to the angle of the mouth; the tip of the nose is black. The profile of the forehead and face is convex; the eye is peculiarly large, fine, and expressive; the pupils are circular. The tail is long and curled up at its extremity, which is white. The fur is rather crisp, and on the neck and shoulders is longer than elsewhere, and forms a sort of mane.

5. The Jaguar or American Panther (*Felis onca* of Linnæus).—This formidable animal is larger, and more robust and stoutly made, than the leopard. The head is larger and rather shorter, and the profile of the forehead more prominent; the limbs are more thick and muscular, and the tail shorter. Specimens of this savage beast have been confounded with the leopard; but the Jaguar, besides differing in other points, always displays a bold streak or two of black extending across the chest from shoulder to shoulder. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a chain of black dashes extends along the spine.

Of all the American *Felidæ* the jaguar is the most formidable. It prefers the wooded and marshy districts of the warmer regions, and is common in Paraguay and Brazil. According to Humboldt 4000 of these beasts are annually killed in the Spanish territories, and 2000 skins are exported every year from Buenos Ayres only. The jaguar climbs with the utmost ease, and chases the monkeys among the

branches. It also swims well, crossing broad rivers with ease. Birds, fish, turtles, peccaries, capybaras, monkeys, and domestic quadrupeds are its prey, but it seldom voluntarily attacks man: when hard pressed, however, it makes a resolute defence.

There is a black variety of the jaguar, *Le Jaguar Noir* of the French, *Felis nigra* of Erxleben, and probably the *Jaguarete* of Marcgrave.

The *Chati*, the *Ocelots*, and other *Tiger-cats*, are noticed under the article **TIGERS**. The *Puma* is described under the article **LION**.

LEOPOLD I., Emperor of Germany, of the house of Austria, son of Ferdinand III. and of Mary Anne of Spain, born in 1640, was proclaimed king of Hungary in 1655, king of Bohemia in 1657, and emperor of Germany in 1659. The Turks, who were then overrunning Hungary, were joined by a large portion of the Hungarians under Emeric Tekeli, and gained several victories over the emperor. Louis XIV., who had encouraged the Turks in their invasion, now formed a plot, by means of his diplomatic agent at Cracow, to dethrone Sobieski, who had promised to assist Leopold. The plot, however, was discovered by means of an intercepted letter written by the French ambassador. Sobieski laid the matter before the Polish diet, expressing at the same time his conviction, whether real or politically assumed, that the whole was a fabrication. 'But,' added he, 'let us convince the world also that it is an imposture; let us declare war against the infidels.' The declaration was voted almost unanimously. On September 11, 1683, the allied army reached the summit of the Calenberg, which commanded a view of the Austrian capital, then invested by the Turks. On the 12th the battle was fought, the Turks were defeated, and Vienna and perhaps all eastern Europe were saved.

At the diet of Presburg of 1687 the crown of Hungary was declared to be no longer elective, but hereditary in the Austrian male line. Transylvania likewise submitted to Leopold. The Turkish war was at length concluded by a great victory gained by Prince Eugene, in September 1697, near Zenta in Hungary, which was followed by the peace of Carlowitz.

Leopold sustained three wars commenced by Louis XIV. The first was ended by the treaty of Nymuegen in 1679, and the second by the peace of Ryswick, in 1697. The third was that of the Spanish Succession, to which Leopold's son, the Archduke Charles, had undoubted claims. Leopold, however, did not live to see the termination of it; he died in 1705.

The principal internal events in Germany during the reign of Leopold are—1. The establishment of a ninth electorate in favour of Ernest Augustus, duke of Brunswick Lüneburg, who in 1692 became the first elector of Hanover. 2. The assumption of the regal title by Frederic, elector of Brandenburg and duke of Prussia, in 1701. 3. The establishment of a permanent Diet, attended, not by the electors in person, but by their representatives. Leopold's private character was estimable, and his disposition was good and well-meaning, but he was weak, irresolute, and inclined to bigotry. He was succeeded by his eldest son, Joseph I.

LEOPOLD II. of Germany, and I. of Tuscany, was the second son of Maria Theresa of Austria and Francis of Lorraine. He succeeded to the Grand

Duchy of Tuscany in 1765, and fixed his residence at Florence. During the five-and-twenty years of his administration he greatly improved the condition of Tuscany. By his own absolute act, in 1786, he promulgated a new criminal code, abolished torture and the punishment of death, and established penitentiaries to reclaim offenders. He finally abolished the Inquisition in Tuscany in July, 1782, and placed the monks and nuns of his dominions under the jurisdiction of the respective bishops. This he effected through the agency of Ricci, bishop of Pistoia. A curious controversy followed with the court of Rome. In his civil administration Leopold effected many important reforms.

By the death of his brother Joseph II., February 20, 1790, Leopold succeeded to his dominions, and was elected emperor of Germany, whilst his son Ferdinand succeeded him as grand duke of Tuscany. On assuming the administration of the hereditary dominions of the house of Austria, Leopold showed an earnest desire to please his subjects, and he succeeded; he abolished the more obnoxious innovations of his brother; he concluded a peace with the Porte; he pacified Hungary; and having done this, his next step was to endeavour to pacify the revolted states of the Netherlands, by offering to re-establish their ancient constitutions. The insurgents having obstinately refused to listen to his offers, he sent troops against them, and recovered without much difficulty those fine provinces. Then came anxieties concerning the fate of his sister Antoinette, queen of France, and her husband; the convention of Reichenbach, and that of Pilnitz, in August, 1791, between Austria and Prussia, for the purpose of checking the progress of French revolutionary proselytism. But the intentions of Leopold were essentially pacific. In the midst of all these cares Leopold died, March 1st, 1792, aged forty-four. He was succeeded by his eldest son, Francis II.

LEOPOLD I., GEORGE CHRISTIAN FRIEDRICH, King of the Belgians, was born on December 16, 1790. He was the youngest son of the late Duke Francis of Saxe-Coburg, and brother of the late Duke Ernest, and also of the duchess of Kent. He was consequently uncle both of the late Prince Consort and Queen Victoria. He was most carefully educated, having the reputation of being one of the best informed princes of Europe. His sister having married the Grand Duke Constantine, he entered the Russian military service with the rank of general, and in that capacity accompanied the Emperor Alexander to Erfurt. The menaces of Napoleon forced him to resign his commission for a time, but he afterwards re-entered the service, and distinguished himself at the battles of Lutzen, Bautzen, Leipzig, and Culm. He visited London in 1815, and out-rivalled the prince of Orange as suitor for the Princess Charlotte, daughter of George IV., and heirress to the throne. A settlement of 50,000*l.* per annum was made upon him, and he was naturalized and created Duke of Kendal and a field-marshal. The marriage was celebrated on the 2nd of May, 1816, and on the 5th of November in the following year the princess died in childbirth. For many years after this melancholy event Prince Leopold lived a very quiet and retired life, residing principally at London and Claremont. In 1830 he was offered the crown

of Greece, but finally declined it in consequence of the dissatisfaction which the Greeks felt at the arrangements which had been made on their behalf by the three great powers—England, France, and Russia. About this time Belgium threw off the yoke of Holland, and in June, 1831, he was elected king of that country by a national congress. Both externally and internally the new monarch had great difficulties to confront, as Holland refused to accept the settlement of Belgium acknowledged by the other European powers, and Leopold once more took the field at the head of a portion of the Belgian army. In 1832 he married Louise, the daughter of Louis Philippe, king of the French, and thus secured an alliance with his most powerful neighbour; but it was not until 1838 that the differences between Holland and Belgium, as to certain territories, were finally and amicably settled. The treaty of separation was signed April 19, 1839. For many years it required all his majesty's great ability to deal with the internal affairs of his kingdom, more especially with the 'religious difficulty,' he being himself the Protestant sovereign of a Catholic country, and there being endless controversies between the liberals and the extreme church party. But whatever his private feelings might have been, Leopold always acted as a thoroughly constitutional king, and endeavoured to govern according to the wishes of the parliamentary majority, of whatever political or religious sect. In the revolutionary year of 1848 he assembled the leaders of the chief political parties, and reminding them that as he had accepted the crown solely at the desire of the Belgian people, so he was equally ready to relinquish it if it was their general wish that their country should become a republic. This dignified offer was declined, and the revolutionary bands who appeared on the Belgian frontier from France were quickly repulsed. His queen died in 1850. She had borne him three children, Leopold II., the present king, and another son and a daughter. On many occasions subsequent to the death of his wife King Leopold had attacks of severe and painful illness, and underwent more than one medical operation. His death finally took place at his palace of Lacken, December 10, 1865. During his reign he effected much for the internal prosperity of his kingdom, especially in the establishment of an extensive system of railways, and a national bank. His commercial policy with foreign countries was also exceedingly liberal; and in fact he always conducted himself with prudence, firmness, and moderation, with continual regard to the principles of the Belgian constitution, and with an evident desire to do everything in his power to promote the welfare and happiness of his people, by whom he was very much beloved. During the latter years of his life he was the confidential adviser of several European sovereigns, but more especially of her majesty Queen Victoria. On accepting the throne of Belgium he surrendered his pension from England, on the sole condition that the British government should undertake the expense of keeping up Claremont.

LEPADITES (Gr. *λαπάς*, 'a limpet'), the Goose Barnacles, of the family *Cirripedes*, of which *Lepas* (Barnacle) is one of the genera.

LEPANTO, GULF OF, the ancient Corinthian Gulf, is a narrow sea above 70 miles in length from

west to east, extending between the northern coast of the Peloponnesus and the mainland of Greece. It is entered from the Gulf of Patras on the western side by the Strait of Lepanto, not quite two miles wide, which is defended by two castles. A few miles inside of the straits, on the northern coast, is the town of *Lepanto*, the ancient *Naupactos*, built on a hill, and commanded by a castle, with a good harbour and between 2000 and 3000 inhabitants. The gulf widens towards the middle to the breadth of 12 or 13 miles, exclusive of several deep bays which indent its northern coast, especially the Bay of Salona, the ancient Crissæan Gulf, which stretches about 8 miles to the north. The eastern extremity of the Gulf of Lepanto terminates in two bays; that of Corinth to the south-east, where the Lechaum or western harbour of Corinth once was; and the other, which extends to the north-east, bordering on the territory of Mégaris and stretching to the foot of Mount Cithæron. This last bay is now called Livadostro.

Lepanto has given its name to a celebrated naval battle fought on the 7th October, 1571, in which the Christian allied fleet, amounting to 210 ships in all, commanded by John of Austria, utterly defeated the Turkish fleet of 300 sail under Ali Pasha, who lost his life in the engagement. Cervantes fought in this battle, and received a wound which deprived him of the use of his left hand for the rest of his life. The battle of Lepanto is called by some Italian writers the battle of Curzolari, from the group of islets so called at the mouth of the Achelous, where the battle commenced.

LEPEDOLITE, *Lilac Mica*, occurs massive, and is usually composed of small flexible thin scales. The colour varies. Before the blow-pipe it melts into a spongy semi-transparent white globule. It consists mainly of silica and alumina.

LEPER, a person affected with leprosy, a scaly cutaneous disease very general in the East. Lepers are frequently mentioned in the Old Testament. By the Jewish law they were excluded from all society, and driven into uninhabited places. Even kings, when afflicted with the disease, were shut out of their palaces, and deprived of their sovereign power. When a leper was cured he appeared at the city gate; but was not allowed to enter until examined by the priest, and had undergone certain ceremonies and ablutions. The disease is supposed to have originated from the poor living so much on fish, and wearing dirty under-garments. It seems to have disappeared, as it is supposed, with the use of tea, and the wearing of linen next the skin.

LEPIDIUM (from *lepis*, 'a scale,' in allusion to the form of the pods, which resemble little scales), a genus of plants belonging to the natural order *Cruciferae*. *L. sativum* is the common Garden Cress. It is a native of Persia and the island of Cyprus in corn-fields. There are three varieties of the species; the broad-leaved cress, which is cultivated chiefly for rearing young turkeys; the curled variety, which is sometimes used as a salad, but is considered preferable as a garnish; and the common plain-leaved cress, which forms one of our earliest spring salads, and has a peculiarly warm and grateful relish. All the varieties are raised from seed, of which one ounce will serve for a bed four feet square.

L. latifolium is a native of Europe, also of Algiers,

and of several parts of England, generally near the sea. It has a very hot biting taste, and has been used instead of horse-radish. Poor people are in the habit of eating it as a condiment to their food, hence it has acquired the name of Poor Man's Pepper.

LEPIDODENDRON, an important genus of fossil plants, in the examination of which Sternberg, Brongniart, and Lindley have signalized their abilities, not without success, though some uncertainty yet attaches to the botanical relations of these singular specimens of the flora of earlier nature. M. Brongniart referred the *Lepidodendra* to the natural group of *Lycopodiaceæ*, pointing out, however, their analogies to *Cycadææ* and *Coniferæ*.

Dr. Lindley, in the first volume of the 'Fossil Flora of Great Britain,' after discussing the botanical relations of *Lepidodendra*, remarks, 'On the whole, we are led to conclude that the *Lepidodendron* genus was not exactly like either *Coniferæ* or *Lycopodiaceæ*, but that it occupied an intermediate station between these two orders, approaching more nearly to the latter than the former.' These views have since been confirmed by later discoveries. The species are numerous, and confined to the older strata, and specially abundant in the coal formation. [COAL PLANTS.]

LEPIDOPHYLLUM. Fossil leaves which occur in the coal formation are thus named by M. Brongniart. Some of these belong to *Lepidodendron*, others to *Stigmara*.

LEPIDOPTERA, one of the orders into which insects are divided, called *Glossata* by Fabricius.

This order is composed of those insects which are commonly known by the names of Butterflies and Moths, and which possess four wings, usually of large size, and covered with a multitude of minute scales, which to the naked eye appear like powder. The nervures of the wings are not very numerous, and are disposed chiefly in a longitudinal direction; a small tippet-like appendage is situated on each side of the thorax at the base of the wings, which appendages are called by Latreille *pterygoda*. The antennæ are almost always distinct, and are composed of numerous minute joints. The parts of the mouth are formed into a proboscis fitted for extracting the nectar from flowers, or conveying other juices to the oesophagus. This proboscis, when not in use, lies spirally folded beneath the head and between two palpi covered with hair, which are usually directed forwards and upwards, and which represent the labia palpi. The proboscis is called, in these insects, *anthia* by Messrs. Kirby and Spence, *spitrontrape* by Latreille, and *lingua* according to the nomenclature of Fabricius, and is composed of two subcylindrical tubes, which vary greatly in length in the different species of lepidopterous insects, and between which there is an intermediate one, formed by their junction, which is effected by means of a series of hooks inosculating one with another like the laminae of a feather. It is through this central tube that the juices are conveyed, the lateral tubes being intended, as it is supposed, for the reception of air; they are called by Messrs. Kirby and Spence *solenaria*, a name, however, which is not wanted, since the two tubes in question represent the maxillæ, and are furnished with minute maxillary palpi at their base. The mandibles and labrum in these insects are

reduced to mere rudiments. The head, thorax, and abdomen are always more or less covered with hair; the former, besides the ordinary compound eyes, is sometimes furnished with simple eyes or stemmata; these, however, are generally hidden by the hair of the head, and do not exist in the diurnal lepidoptera.

The food of the larvæ almost always consists of vegetable substances, generally the leaves of plants. Some live in rotten or rather dead wood, upon which they feed; others feed upon animal substances, and are very destructive to furs, woollen goods, feathers, &c.; and the larva of a species of moth (the Honeycomb moth, *Galleria cereana*) subsists upon wax, living in bee-hives. This larva forms galleries in the honeycomb, which are invariably inclosed by a strong silken web, serving to protect it from the bees; and as the moths increase rapidly in number, the hive is of necessity soon deserted by its proper inhabitants.

The pupæ, or chrysalises, are incapable of eating or locomotion, and are termed obtected; they usually approach somewhat to an oval form, but are pointed more or less at the posterior extremity. The shape of the pupæ, however, varies much according to the species; and those of butterflies often present numerous angular projections, and sometimes exhibit brilliant metallic colours. The parts of the perfect insect, such as the head, thorax, segments of the abdomen, wings, and legs, can be distinctly traced.

Latreille divides this order into three principal groups, according with the three Linnæan genera *Papilio*, *Sphinx*, and *Phalæna*. To this first group he applies the name *Diurna*; *Crepuscularia* is used to designate the second; and the third group, or that corresponding to *Phalæna* of Linnæus, is called by Latreille *Nocturna*.

In the accompanying Plate various species of Lepidoptera and Hemiptera are figured. Figs. 1, 2, 3, and 4, belong to the *Heliconidæ*, a family of Lepidopterous insects belonging to tropical regions; the other figures represent varieties of the HEMIPTERA, which see.

LEPIDOSIREN, or Mud Eel, a genus of animals, two species of which have been met with, namely, *Lepidosiren paradoxa* and *L. annectans*. There was for a considerable time much controversy among naturalists as to the true place of this form in the zoological scale. Should it be ranged with the class fishes, or with amphibious reptiles? Professor Owen has ever held that its true place is among the fishes, and Dr. Gray has as earnestly pleaded for its classification among the *Amphibia*. It is now regarded by most zoologists as having its proper place among fishes. There are, however, many characteristic features which make it look almost like a transitional link between fishes and amphibia. The leading features of its organization are these: the body is round, compressed posteriorly, and surrounded by dorsal and anal fins; the skeleton is partly of cartilage and partly of bone; the pectoral and ventral fins resemble flexible cirrhi; the body is covered with cycloid scales invested with an epidermis. It has two small conical teeth which are movable in the intermaxillary bone, and two large ones folded longitudinally in the margin of each jaw. The internal structure likewise presents many points intermediate between fish and reptile.

LEPIDO'STROBUS. M. Brongniart gave this name to the Fossil Fruits, supposed to be those of the *Lepidodendra*, which frequently occur in the coal formation.

LEPIDUS, MARCUS ÆMILIUS, a celebrated Roman triumvir, was elected ædile of Rome B.C. 52, and prætor B.C. 49, in which year Cæsar came to an open rupture with the senatorian party. [CÆSAR; ANTONIUS.] From his entrance into public life he opposed the senatorian party; and his great riches and family connections made him an important accession to the popular cause. On the first expedition of Cæsar into Spain, Lepidus was left in charge of the city. During Cæsar's absence, Lepidus proposed the law by which that great general was created Dictator.

After the death of Cæsar, Lepidus was courted by both parties. Lepidus promised to assist the Senate, but at the same time carried on a secret negotiation with Antonius; and when ordered by the Senate to join Decimus Brutus, instead of obeying, he united his forces with those of Cæsar's successor.

In the autumn of this year, B.C. 43, the celebrated triumvirate was established between Antonius, Lepidus, and Octavianus (Augustus); and in the division of the provinces, Lepidus received Spain and Gallia Narbonensis. The conduct of the war against Brutus and Cassius was assigned to Antonius and Augustus; while the charge of the city was intrusted to Lepidus, who was again elected consul (B.C. 43). After the defeat of Brutus and Cassius, in the new division of the provinces which was made after the battle of Philippi, Spain and Gallia Narbonensis were taken from Lepidus, and Africa given to him instead. Lepidus had now lost all authority; but he was again included in the triumvirate, when it was renewed B.C. 37. In the following year he was summoned from Africa to assist Augustus in Sicily against Sextus Pompeius; and he landed with a large army, by means of which he endeavoured to regain his lost power. But being deserted by his own troops, he was obliged to implore the mercy of Augustus, who spared his life, and allowed him to retain his private property and the dignity of pontifex maximus, though he banished him, according to Suetonius, to Circæi ('Octav.' c. 16). Lepidus died B.C. 12.

LEPONTIAN ALPS. [ALPS.]

LEPORIDÆ, a family of Rodents, the type of which may be considered as existing in the common Hare.

Cuvier characterizes the Hares as having the upper incisor teeth double, that is to say, each of them has, behind, another smaller one. Their molars, to the number of five, are formed each of two vertical laminæ soldered together. In the upper jaw there is a sixth, which is simple and very small. They have five toes before and four behind, an enormous *cæcum* five or six times larger than the stomach, and furnished within with a spiral lamina, which runs throughout its length. The interior of their mouth and the bottom of their feet are furnished with hair, like the rest of their body. He divides the group into—

1. The Hares, properly so called, which have long ears, a short tail, the hind-feet much longer than the fore-feet, imperfect clavicles, and the suborbital space in the skeleton pierced like net-work. The species

are, he observes, rather numerous, and so much alike that it is difficult to define them.

The common Hare, *Lepus timidus*, which is generally considered as the type, is too well known to need description, and it will suffice to state that it is the *Lagos* (*Lagus*) of the Greeks; *Lepus* of the ancient Italians; *Lepre* and *Lievora* of the modern Italians; *Liebre* and *Lebratillo* of the Spaniards; *Lièvre* of the French; *Has*, *Haas*, and *Hase* of the Germans; *Maukin* of the Scotch.

We must here notice the Irish Hare, *Lepus Hibernicus*, which Mr. Jenyns considers a variety of *Lepus timidus*; but Mr. Bell ('British Quadrupeds') states that a careful examination of several specimens has assured him that it is not merely a variety of the common Hare of England, but that it is specifically distinct. It further appears that *Lepus Hibernicus* is the only Hare found in Ireland, which may account for its remaining so long unnoticed; for opportunities of comparison could not have been very frequent. Its fur is considered valueless.

The Varying Hare, or Alpine Hare, *Lepus variabilis* of Pallas, which changes the colour of its coat with the seasons, requires a short notice. The fur, which is full and soft, is in summer gray, intermixed with silky hair of a yellowish brown; the ears are tipped with black, and the under parts are light gray. The tail is white beneath and gray above. As the winter approaches, the fur gradually becomes white, except that on the lips and the tips of the ears, which remains black.

The Rabbit, or Coney, *Lepus cuniculus*, Linn., *Coniglio*, of the Italians, *Conejo* of the Spanish, *Kaninchin* of the German, is known to every one.

2. *Lagomys*. The species composing this division have the ears moderate, the legs not much differing from each other, nearly perfect clavicles, and no tail: they have hitherto, he adds, been only found recent in Siberia, and fossil remains of an unknown species have been detected in the osseous breccia of Corsica.

In the genus *Lagomys* the muzzle is acute; the ears short and somewhat rounded; the soles of the feet hairy; the claws falcular; no tail. Locality, Northern Asia.

• Example.—*Lagomys pusillus*. This species



Calling Hare (*Lagomys pusillus*).

(*Lepus pusillus* of Pallas; Calling Hare of Pennant) has the head longer than is usual with Hares, and thickly covered with fur, even to the tip of the nose; numerous hairs in the whiskers; ears large and rounded; legs very short; soles furred beneath; its

whole coat very soft, long, and smooth, with a thick long fine down beneath, of a brownish lead colour; the hairs of the same colour, towards the ends of a light gray, and tipped with black; the lower part of the body hoary; the sides and ends of the fur yellowish. Length about six inches; weight from $3\frac{1}{4}$ to $4\frac{1}{2}$ ounces; in winter scarcely $2\frac{1}{2}$ ounces.

Localities.—The south-east parts of Russia, and about all the ridge spreading from the Ural chain to the south, about the Irish, and in the west part of the Altaic chain, but nowhere in the East beyond the Oby.

Habits.—Delighting in the most sunny valleys and hills, where the herbage is plentiful and delicate, the Calling Hares choose those localities, when in the vicinity of a wood, which will afford them a ready refuge in the case of danger or alarm. Their burrows, especially those belonging to the old ones and to females, are curious and intricate, so well concealed amid the shrubs of some dry spot that detection is very difficult; and to increase the difficulty, the animal is said to drop its excrements under some bush, that they may not betray its abode, which would almost defy search, were it not for their peculiar cry or call; this is described as being like the piping of a quail, but deeper, and so loud as to be heard at the distance of half a German mile. It is repeated at just intervals, thrice, four times, and even six, at night and morning, but seldom in the day, unless the weather be cloudy. Both the male and female emit this note, but the latter is silent for some time after she has given birth (in May) to her young, which are born naked and blind, and are carefully attended to by the mother, who covers them up warm with the cosy materials of her nest.

LEPRA (the Greek word *λεπρα*, 'scaliness'), an affection of the skin. It is characterized by an eruption of circular spots of inflamed skin covered with scales, varying from the size of a pin's head to that of a shilling or even a half-crown piece, occasionally mixed with large irregular patches formed by the coalescing of the borders of several contiguous spots. The whole is surrounded by a slight aureola of redness. In the early stage of the disease, and in the small spots, the inflamed skin, which is slightly raised above the surrounding parts, possesses only a thin scaly covering; and in the larger patches, formed by the coalescence of several spots, the characteristic appearances become somewhat confused; still, on careful examination, the elevated margin, circular outline, and central free spot may more or less be recognized.

It is generally tedious of cure, recurring periodically in some constitutions, whilst in others it will continue for two or three years. Most frequently it arises without any assignable cause; but occasionally it has appeared to be dependent upon suddenly suppressed cutaneous transpiration in consequence of drinking cold water when over-heated. For a careful examination of the various forms of leprosy mentioned in the Bible, see *Biblical Natural Science*, by Dr. Duns. (Mackenzie.)

LEPROSY. [LEPRA.]

LEPTACANTHUS, a genus of fossil placoid fishes, occurring in the carboniferous and oolitic strata. (Agassiz.)

LEPTÆNA, a subdivision of the great family of

fossil *Brachiopoda*, proposed by Dalman to include species which Mr. Sowerby named *Producta*. Its use is at present more restricted, and has become rather indefinite. *Leptæna lata* of the Silurian system may be regarded as a frequent type. The species are extinct, and are confined to palæozoic strata.

LEPTIDES, a sub-family of dipterous insects of the family *Brachystoma* (Macquart). The family of insects to which the present section belongs is distinguished by the proboscis being short and membranous; the lips terminal and thick; third joint of the antennæ simple, often spatulate; stylet often dorsal; abdomen usually with five distinct segments. The wings have commonly one submarginal and three posterior cells. The family *Brachystoma* is divided by Macquart into four tribes or sub-families—*Xylotomæ*, *Leptides*, *Dolichopoda* and *Syrphidæ*. The first, or the *Xylotomæ*, are distinguished by the third joint of the antennæ being conical, by the wing having two submarginal cells, and by the tarsi being furnished with two small cushions. In the sub-family *Leptides* the antennæ are inserted near the base of the head, and have generally a terminal stylet; the tarsi are furnished with three small cushions; the femora are elongated; the wings have two submarginal and generally five posterior cells. The Leptides are remarkable for the habits of their larvæ, which excavate funnel-shaped cavities in the sand, and, secreting themselves at the bottom, lie in wait for their prey. When an insect falls into the pit, the larva of the *Leptis* suddenly rising seizes it, and clapping the body sucks out the juices, after which it flings away the carcass. The sub-family *Dolichopoda* is distinguished by the second joint of the palpi being membranous, depressed, and covering the base of the proboscis. The stylet of the antennæ is sometimes dorsal and sometimes apical; the eyes are generally separated in both sexes; the abdomen is somewhat cylindrical, or approaches a conical form; wings decumbent, without any discoidal cell, and generally possessing four posterior cells. The sub-family *Syrphidæ* is a very extensive group, and although given by Macquart as a division of his family *Brachystoma*, certainly constitutes a section of higher value than a sub-family. [SYRPHIDÆ.]

LEPTOCEPHALUS, a remarkable fish of the Eel tribe, discovered on the British coast in Pennant's time, and since observed in the Mediterranean. The *Leptocephalus Morrisii* is a small, slender, and compressed animal, as thin as a piece of tape, and at first sight resembling a marine worm. The head is extremely small and short, the eyes large, the jaws furnished with numerous minute teeth, the pectoral fins and gill-openings very small, and the anal and dorsal fins connected with the tail. The outline of the body resembles that of the Lancelet (*Branchiostoma*); but the organization of the *Leptocephalus* is that of a perfect fish. Mr. Yarrell describes the vertebrae as having no spinous processes. It lives among sea-weed.

LEPTOCOCHUS, Dr. Rüppell's name for a genus of pectinibranchiated gastropodous Molluscs, remarkable for their subglobular, delicate, fragile, translucent shell. Example, *Leptocochnus striatus*, Rüppell. Locality, the Red Sea, where it is found in coral (*Meandrina Phrygia*), having no communication with the water except by a moderate opening.

LEPTOPHINA, Mr. Bell's name for a sub-family of snakes belonging to the family *Colubridæ*. All the species are arboreal in their habits, entwining themselves among the branches of trees, and gliding from one to another with great rapidity. They are extremely elongated and slender in form, and glitter with metallic hues. Their food consists of young birds, large insects, &c. Two genera are described, *Dryinus* and *Leptophis*.

LEPTOSOMUS, a genus of birds established by Vieillot, and belonging to the family *Cuculidæ*. Example, *Leptosomus afer*; *Cuculus afer*, Gmel.; Edolian Cuckoo of Shaw, found between Calcutta and Benares, and in the Vindhyan mountains.

LEPUS. [LEPORIDÆ.]

LEPUS (the Hare), one of the old constellations, said by Hyginus to be in the act of running from Orion's dog, which is the greater dog according to some, and the lesser according to others. It is situated directly under Orion.

LERIDA. [CATALUNA.]

LERISTA, a genus of reptiles belonging to the family *Scincidæ*, established by Mr. Bell, and thus characterized by him:—Head scutated; no eyelids; the ears hidden under the skin; the body slender; the scales smooth and equal; feet four; the anterior little, very short, and didactylous; the posterior longer, and tridactylous; vent simple, semicircular. Example, *Lerista lineata*, which is bronze green, paler beneath, with two dorsal and two lateral black lines. Locality, Australia.

LERNEA, the *Lernæans*, which M. de Blainville collected into a family with that name, are parasitic animals adhering to fishes, and have presented some difficulty to zoologists as to their natural position. Cuvier placed them at the end of his *Intestinaux Cavitaires*, Cavitary Intestinal Worms, *Entozoa Nematoidea* of Rudolphi, but as a very different family, and requiring to be divided into many genera when their economy is better known. The better opinion seems to be that they are crustaceans, and Milne-Edwards so considered them.

LESAGE, ALAIN RÉNÉ, the author of 'Gil Blas,' was born 8th May, 1668, at the village of Sarzeau, near Vannes in Brittany, and was educated at the Jesuit college of Vannes. He went to Paris in 1692, and qualified himself as an *avocat*; marrying in 1695 the daughter of a citizen whose face was her only fortune, but with whom he enjoyed for many years complete domestic happiness. He supported himself entirely by literature till the Abbé de Lyonne gave him a pension of 600 livres. He wrote upwards of a hundred dramas, the principal being 'Turcaret,' 'Don César Ursin,' and 'Crispin,' which attained great popularity. His comic novels won for him a still higher place in literature, and have never been excelled by anything of the same kind. 'Le Diable Boiteux,' or 'Devil on Two Sticks,' had a prodigious success, and Sir Walter Scott declared the principal character, Asmodeus, to be as much a creation of genius as Ariel or Caliban. In 1715 he published the first two volumes of the work on which his fame mainly rests. Completed by the publication of a fourth volume in 1735, 'Gil Blas de Santillane' occupies in French fiction the same place as 'Don Quixote' in that of Spain, and 'Tom Jones' and 'Roderick Random' in that of Britain. There exists

little doubt, however, that Lesage based his fiction on the work of some obscure Spanish writer; nor does this detract from his admirable merits. He took the dry bones and made them live; clothed them with flesh, as Shakspeare did the legends and stories on which he founded his dramas. Lesage died at Boulogne on the 17th of November, 1747.

LESLIE, SIR JOHN, was born April 16, 1766, at Largo, a village on the coast of Fifeshire. He studied at the University of St. Andrews, and afterwards travelled in America as a private tutor. He eventually became a contributor to the *Monthly Review*, in London, and furnished notes for a new edition of the Bible. After spending some years on the Continent, he was elected to the Professorship of Mathematics in the University of Edinburgh. At this period his only production relative to pure mathematics was an essay on 'The Resolution of Intermediate Equations.' In 1809 Mr. Leslie was called to the chair of Natural Philosophy. He was knighted June 27, 1832, and died November 3 in the same year, at his residence in Fifeshire.

Besides some other works, Sir John Leslie has left—'Elements of Geometry, Geometrical Analysis, and Plane Trigonometry,' 'Geometry of Curve Lines,' 'Philosophy of Arithmetic,' 'Account of Experiments and Instruments depending on the relations of Air to Heat and Moisture,' 'Elements of Natural Philosophy' (containing Mechanics and Hydrostatics). Sir John Leslie also furnished several important papers to the 'Edinburgh Philosophical Transactions,' the 'Encyclopædia Britannica,' the *Edinburgh Review*, and to *Nicholson's Philosophical Journal*. Some papers on physical subjects were also read before the Royal Society of London, though not printed in their 'Transactions.'

LESPARRE. [GIRONDE.]

L'ESPINASSE, MADEMOISELLE, the name of a lady much celebrated in the Parisian literary circles soon after the middle of last century, was born in 1732. She is supposed to have been the illegitimate daughter of people of rank. She was employed to read to and converse with Madame du Defand in her blindness; but being ambitious, well-informed, and eloquent, she attracted the interest of the circle surrounding Madame du Defand to herself. She died in 1776. Three volumes of her love-letters, conspicuous for very ardent eloquence, were published in 1809.

LESSINES. [HAINAUT.]

LESSING, GOTTHOLD EPHRAIM, was born at Kametz in Upper Lusatia, of which place his father was pastor, January 22, 1729. His attachment to reading displayed itself from his earliest childhood. From a school at Meissen he was sent to the University at Leipzig. His first literary productions were one or two minor dramatic pieces, which were printed in a journal entitled *Ermunterungen zum Vernügen*.

In conjunction with his friend Mylius he began a quarterly publication at Berlin, *Beiträge zur Historie des Theaters*, which, however, was not carried on beyond its fourth number. After some minor speculations, he formed a close intimacy with Moses Mendelssohn and Nicolai, which had a highly beneficial influence upon each of them. One of the first results of their joint studies was the dissertation,

'Pope als Metaphysiker' (1754), the object of which was to show that the English poet had no fixed philosophical system. His next work was his 'Miss Sara Sampson,' the first specimen of domestic tragedy in German literature.

In 1757 he and his friends undertook the *Bibliothek der Schönen Wissenschaften*, which may fairly be said to have been the best literary journal Germany could then boast of. To this period, from 1753 to 1760, during which he resided at Berlin, belong his 'Fables' and his 'Litteraturbriefe,' or 'Letters on Literature' (1759), a life of Sophocles, after the manner of Bayle, and a translation of Diderot's dramatic pieces. From 1760 to 1765 Breslau was his residence, he having accepted the appointment of government secretary to General Von Tauenzien. Here he seems to have injured his health by the excitement of the faro-table; but eventually giving up both play and his appointment, he returned to Berlin, and published his celebrated 'Laocoon.' The following year was marked by another triumph, namely, his 'Minna von Barnhelm,' and the succeeding one by his 'Dramaturgie' and the 'Antiquarische Briefe.' His 'Emilie Galotti' was published in 1772. His last drama, 'Nathan,' was also almost the last of all his literary productions. He had entered only into his fifty-third year when he died, February 15, 1781.

His brother, Karl Gotthelf Lessing (born 10th July, 1740), who published his biography and some posthumous pieces, in 1793, wrote several comedies, which exhibited considerable dramatic talent.

L'ESTRANGE, SIR ROGER, was born in Norfolk in 1616. Like his father, he was a royalist, and accompanied Charles I. to Scotland in 1639. He was arrested by the emissaries of the Parliament in 1644, and sentenced to be shot as a spy, but escaped in 1648, and attempted to raise an insurrection in Kent. This having failed, he fled the country, but returned in 1653, hoping to take advantage of the general act of amnesty. Cromwell having taken his part, his hopes were realized. After the Restoration he was appointed censor of the press, and in 1665 he brought out a paper called the *Public Intelligencer*. He was devoted to the court, and on the approach of the Revolution of 1688 lost all his appointments. He died in 1704. His works consist of a vast number of political pamphlets, besides indifferent translations of Josephus, Cicero's 'Offices,' Seneca's 'Morals,' Erasmus' 'Colloquies,' Æsop's 'Fables,' Quevedo's 'Visions,' &c.

LE SUEUR, JEAN-FRANÇOIS, Knight of the Légion d'Honneur, and director of the music of the Emperor Napoleon, was born in 1776. After having been maître de chapelle of several cathedrals in France, for which he composed a great number of masses, motets, &c., his reputation called him to Paris, where he produced his five grand operas:—'La Caverne,' 'Paul et Virginie,' 'Télémaque,' 'Les Bardes,' and 'La Mort d'Adam.' His work on music, adapted to sacred solemnities, is highly esteemed.

LETHARGY, a state of unnaturally deep and prolonged sleep, a condition intermediate between the sleep of health and complete coma. If not the result of unusual fatigue, it is often an alarming symptom, indicating congestion of the brain, and a disposition to apoplexy, or even an impending attack of that disease.

LETHE. In Greek mythology, the river of oblivion. Its waters possessed the quality of causing those who drank them to forget the whole of their former existence.

LETTER OF CREDIT, [CREDIT, LETTER OF.]

LETTER or POWER OF ATTORNEY is an instrument by which one person authorizes another to do some act for him: it may be used in any lawful transaction, as to execute a deed, to collect rents or debts, to sell estates, and other like matters. The authority must be strictly followed. The power which authorizes an attorney or agent to do some particular act impliedly includes an authority to do whatever is incident to that act. But the authority never goes beyond that which is given in terms, or is absolutely necessary for carrying the authority into effect.

The authority must be executed during the life of the person who gives it.

Powers of attorney are generally executed by deed, and where they contain an authority to bind the principal by deed, it is essential that they should be so executed. When the agent signs any instrument which is to bind his principal, he must sign it in the name of the principal, and not in his own name.

A power of attorney, unless it be given as a security, is revocable, either directly, or indirectly by the principal granting a new power to another person. But if the power has been given as a security, it is not revocable by the principal.

A letter of attorney is also in general revoked by the bankruptcy of the principal, unless it is coupled with an interest.

The person having the power cannot delegate his authority.

LETTERKENNY. [DONEGAL.]

LETTERS OF MARQUE were abolished among European nations at the treaty of Paris in 1856. Before that time, all vessels making war upon, or seizing the property of another nation, without carrying a commission called letter of marque, granted by the lords of the Admiralty, were treated as pirates. This referred principally to privateers.

LETTERS PATENT, the king's letters, sealed with the great seal. These grants, says Blackstone, ('Comment.' b. ii. ch. 21), whether of lands, honours, liberties, franchises, or anything else that can be granted, are contained in charters or letters patent, that is, open letters, *littere patentes*. They are so called because they are not sealed up, but open to view, with the great seal pendent at the bottom, and are usually directed or addressed by the king to all his subjects at large. They are now frequently granted under the royal authority as the reward of ingenuity, and are in some cases the only means by which a man can secure any compensation for a discovery, or for the labour and expense which he may have employed in perfecting an invention. The consideration of the legal rights of patentees, and of the modes in which they may be acquired and secured, properly belong to the head of **PATENT**. Many letters patent have been granted by the king to the founders of schools and other charitable endowments, empowering the donor to make rules and ordinances for the government of his charity, and constituting into a body corporate those persons and their successors whom the founder should choose to nominate.

LETTERS, THREATENING. [THREATS.]

LETTER-WOOD is the heart of a tree found in the forests of British Guiana, and belongs to the bread-fruit family *ARTOCARPACEÆ*. It is called letter-wood on account of the beautiful black marks on its rich dark-brown wood, which bear some slight resemblance to the old black-letter printing. The outer layers of the tree are white, and only the central portion or heart is of this dark colour; it is also extremely hard and heavy. It is scarce and valuable, and used for fine veneers and inlaying.

LETTRES DE CACHET. [CACHET, LETTRES DE.]

LETTUCE (the *Lactuca sativa*, or Garden Lettuce) is one of the principal kinds of vegetables used for salads, and it also forms an ingredient in some kinds of soup. It has been introduced and cultivated in this country for nearly three centuries, but, like many other domesticated plants, its origin is unknown. The excellence of lettuces consists in their being crisp and tender; their growth should therefore sustain no check or interruption.

The ground intended for the seed should be fresh dug, rich, and mellow. The principal summer crop should be sown in March and April, and the seed lightly covered. If the plants are intended to attain their full perfection where sown, they must be thinned out to distances of nine inches square in the case of the small cabbage varieties, and the larger sorts should be allowed at least a foot each way. Water should be given, but not at any one time to excess, not merely at the root of each plant, but over the whole of the ground.

The Cos Lettuces require to have their leaves tied together moderately close with a strip of matting, for the purpose of assisting their blanching and rendering them more crisp and delicate. This should be done about a week previous to their attaining full perfection.

LEUCADIA. [SANTA MAURA.]

LEUCHTENBERG is a lordship in the kingdom of Bavaria, which has an area of 84 square miles. In 1817, Maximilian Joseph, king of Bavaria, gave it, with the principality of EICHSTADT, to his son-in-law, Eugene Beauharnois, who assumed the title of Duke of Leuchtenberg. The title of royal highness was conferred on the duke and his successors, who were also declared capable of succeeding to the throne, in case the royal line of Bavaria should become extinct.

LEUCIN, a name given by Braconnot to a substance obtained by the action of dilute sulphuric acid upon fibrin. Leucin is white, pulverulent, very soluble in water, and crystallizable. The crystals, when heated to above 212°, fuse and suffer partial decomposition, and exhale an odour of roast meat.

LEUCISCUS, a genus of fishes of the family *Cyprinidæ*, distinguished by having short and soft anal and dorsal fins, and a mouth unfurnished with barbules. There are many species, well-known inhabitants of the rivers of Europe. Those best known in Britain are the Roach (*Leuciscus rutilus*), the Dace (*Leuciscus vulgaris*), the Chub (*Leuciscus cephalus*), the Rudd (*Leuciscus erythrophthalmus*), the Bleak (*Leuciscus alburnus*), and the Minnow (*Leuciscus phoxinus*). More rare are the Graining (*Leuciscus Lancastriensis*), and Azurine (*Leuciscus*

caruleus), formerly supposed to be peculiar to the north of England, but stated by Agassiz to inhabit certain Swiss lakes. The Dobule (*Leuciscus dobula*), a native of the rivers of Western Germany, has been taken by Mr. Yarrell in the Thames, and the Ide (*Leuciscus idus*) is doubtfully recorded as a native of Scotland. Most of these fishes are sought after by anglers, either for the sport they afford or to be used as bait for pike. None of them are very excellent as food. The roach and chub have been known to attain a weight of five pounds.

LEUCITE, *Amphigene*, occurs imbedded in lava in trapezoidal crystals, and massive; the colour is yellowish white, and the lustre vitreous. The crystals have various degrees of translucency. The massive varieties are granular. It consists chiefly of silica, alumina, and potash.

LEUCOMA, a white opacity of the cornea. [EYE.] It is the result of acute inflammation producing a deposition of lymph on the surface and in the layers of the cornea, either with or without ulceration of its substance.

LEUCTRA. [EPAMINONDAS.]

LEUWENHOEK, or LEEUWENHOEK, ANTHONY VAN, was born at Delft, in Holland, in 1632. He does not seem to have had the advantage of a learned education. Dr. De Graaf introduced him to the notice of the Royal Society of London, and the greater number of his discoveries and researches were published in the 'Philosophical Transactions' of that body. In 1680 he was chosen a fellow of the Royal Society, and he was made a corresponding member of the Academy of Sciences at Paris in 1697. He appears to have passed the whole of his life at his native place, devoting his time to microscopic researches, chiefly relating to anatomy; and the

success which attended his observations is said to have principally arisen from his having paid the most minute attention to the grinding and polishing of single lenses, which he always used in preference to the compound microscope.

Leuwenhoek died at Delft in 1723. Besides his contributions to the 'Philosophical Transactions,' he published about twenty-six papers in the 'Memoirs of the Academy of Sciences.'

LEUZE. [HAINAULT.]

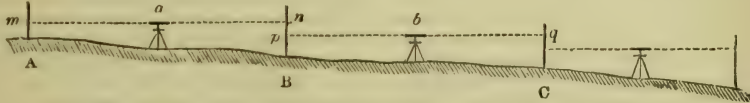
LEVA'NT, or LEVANTE, an Italian word which means the East, and which is also commonly used, especially among seafaring and commercial people of the countries bordering on the Mediterranean, to designate the eastern or Asiatic shores of that sea, namely, those of Syria and Asia Minor, the harbours of which are styled 'Scale di Levante,' in French 'Echelles du Levant' ('stairs of the East'). Smyrna, Alexandretta, Beyrout, Acre, the harbours of Cyprus, and other islands near the coast of Asia, are included within this denomination.

LEVANTER, the name given to an easterly wind blowing up the Mediterranean.

LEVEE, the state ceremonial of the sovereign receiving at court those subjects who are entitled to that honour. A levee differs from a drawing-room in that it is exclusively for gentlemen.

LEVELLING is the art of determining the heights or depressions of points on the ground with respect to a spherical or spheroidal surface coinciding nearly with that of the earth, or, when the extent of ground is inconsiderable, with respect to a horizontal plane passing through some given point on the ground.

The relative heights of a series of points on the ground are obtained by means of their vertical distances from others which, on the supposition of the



earth being a sphere, are equally distant from its centre; and these, which are called level-points, must be found by an instrument constructed for the purpose. [SPIRIT LEVEL; THEODOLITE.] In general, a choice is made of any convenient stations, A, B, &c., on the line of operation, and the distances between them are determined by actual admeasurement. The instrument is then set up at or near the middle of the interval between every two such points in succession. When the telescope thus placed, as at *a*, has been rendered horizontal by means of the adjusting screws, an assistant at each of the stations A and B, holding what is called a station staff in a vertical position, moves a vane or index along the staff, upwards or downwards, according to the directions of the observer at the telescope, till it appears to coincide with the intersection of two wires in the telescope.

The points thus determined on the staves are represented by *m* and *n*; and these are level-points, or points equally distant from the centre of the earth. Therefore the heights *Am* and *Bn* being read on the graduated staves, the difference between them will

give the relative heights of the ground at A and B. A similar process is repeated with respect to the points, B and C, the instrument being placed at *b*, midway between them; and the operation is to be continued to the end of the line on which the profile is required. It is customary to insert the heights, *Bn*, *Cq*, &c., in a column headed *Fore Sights*, in a sort of field-book, and the heights, *Am*, *Bp*, &c., in a collateral column headed *Back Sights*. The difference between the sums of the numbers in these two columns will be equal to the height of one extremity of the line above the other.

It is, however, very frequently the practice to execute a sort of double-levelling; which consists in placing the instrument successively at each of the stations, A and B, a staff being held up vertically at the other, when the axis of the telescope being at equal heights from the ground at both stations, half the difference between the heights read on the staves will express the height of A above B. This is strictly correct, however, only on the supposition that the visual rays at both stations are parallel to one another, and it must be evident that in very extensive sur-

veys some allowance must be made for the earth's curvature.

On ascending or descending a steep hill, no other method can be adopted than that of placing the instrument at one extremity of the station-line and the staff at the other; but as these lines are then necessarily very short, the deviation above mentioned need not be regarded.

The profile of the ground is usually expressed on paper, in portions of any convenient length, for the purpose of enabling the engineer to determine the depths of his excavations, or the heights of the masses of earth to be raised, when it is proposed to execute a railway or road. A right line being drawn to represent one parallel to the horizon, and passing through the highest or the lowest point of the natural ground, the heights or depressions of the remarkable points, as A, B, &c., with respect to such line, are obtained by additions or subtractions from the numbers in the field-book, and are, by a proper scale, set out from that line on others drawn perpendicularly to it at intervals equal to the horizontal distances between the same points. The series of points thus obtained, being joined by hand or otherwise, give the figure of the required vertical section of the ground.

LEVEN, LOCH. [KINROSS-SHIRE.]

LEVER (*levare*, 'to lift up'), the name of a common mechanical instrument, consisting of a simple bar of wood or metal, by fixing one point of which, called the fulcrum, a pressure at the end more distant from the fulcrum is made to counterbalance a larger pressure at the nearer end; or if both ends be equally distant from the fulcrum, equal pressures are made to balance each other.

The first explanation of the lever was given by Archimedes, and that in so simple a manner, that while his method has always been the best for a popular view of the subject, it has never been surpassed, or even equalled, in rigour or purity, considered as a foundation for the science of Statics.

It assumes two principles; firstly, that when a system is in equilibrium, the state of rest will not be disturbed if additional pressures, such as compensate each other, and would by themselves produce no motion, be introduced or removed; secondly, that when a weight is made to rest by being attached to an immovable point (say it is suspended by a string), the point or pivot of suspension undergoes a pressure equal to the weight of the system, whatever may be the form of that system, or the dispositions of its parts. Thus, a cylindrical or prismatic bar of uniform material will necessarily rest if a pivot be passed through a section in the middle of its length, since there is no reason why it should preponderate on either side; now, divide the bar into any two parts, and from their middle points suspend weights equal to the weights of the parts; also apply counterpoises of equal weights at the same points, by means of strings passing over pulleys; the equilibrium will then be undisturbed; take away from the system the parts of the bar and the counterpoises (which are equal and opposite to one another), and the equilibrium will subsist between the remaining weights, which are those first suspended. The points of suspension being in the middle of the lengths of the two parts, are at distances from the pivot (at the middle

of the whole length of the bar), which are inversely proportional to the suspended weights.

The most simple way in which the preceding result can be stated is as follows: when a weight, V, placed at K balances a weight, W, placed at L, about the pivot, A, the number of pounds in V multiplied by the number of feet in KA gives the same product as the number of pounds in W multiplied by the number of feet in AL. (Any other units of weight and length will do equally well, if only the same be used in both.) The product of a pressure and the perpendicular let fall upon its direction from a fixed pivot or fulcrum is sometimes called the moment, sometimes the leverage, of the weight.



In English treatises on mechanics it is customary to call one of the pressures which balance on a lever, the power, and the other the weight. Levers are thus distinguished as of the first, second, or third kind, according as the fulcrum, the weight, or the power, is in the middle.

LEVERIDGE, RICHARD, a celebrated singer towards the end of the seventeenth and beginning of the eighteenth centuries, for whom Purcell wrote most of his bass songs. He is best known by his music to Gay's 'Black-Eyed Susan.' During his life, Leveridge published several of his songs, in two 8vo volumes. He died in 1758.

LEVITES, among the ancient Jews, descendants of the tribe of Levi, who were usually employed in the inferior offices of the temple, in which they were distinguished from the superior priests who were of the same race, and from those who were of the family of Aaron. The Levites applied themselves to the study of the law, sang, and played upon instruments in the temple. They were also the inferior judges of the country. They were divided into three classes; the first for preparing the offerings for sacrifice; the second for the performance of the vocal and instrumental music; and the third for taking charge of the gates of the temple, and preventing the entry of intruders in the sacred ground. For their sustenance they had the tithes of forty-eight cities allotted them, with fields, gardens, and pastures for their habitations.

The tribe of Levi is the only one which is supposed to have maintained its lineage pure to this day, and certain signs of distinction are still bestowed upon its members, more especially in the case of the presumed descendants of Aaron.

The name Levite is also given to certain sacerdotal assistants in the Roman Catholic Church.

LEVITICUS, a canonical book of the Old Testament, being the third of the Pentateuch, supposed to be written by Moses; and so called from its containing the regulations relative to the priests, Levites, and sacrifices.

LEVY, the act of a compulsory raising of a body of troops for the defence of a country or for the purposes of war. The mode of making a levy varies with the purpose for which it is raised. If only for recruiting the army, the district selected may draw them by lot from the males of the required age. In other cases, it is restricted to a class, as for instance, all men between the ages of twenty and twenty-five.

In very urgent cases, a general levy is made of all persons capable of bearing arms. In Britain the army is well sustained, and its vacancies filled by volunteers; in France by conscription; but in America, during the late civil war, large levies were raised at various times. In some instances, those on whom the lot falls can only escape serving by providing an able-bodied and healthy substitute.

LEVYNE occurs crystallized; primary form, an acute rhomboid. It is whitish, translucent, and has a vitreous lustre. Its elements are silica, alumina, lime, soda, potash, magnesia, and water, of which the first occupies about one-half the whole weight.

LEWES. [SUSSEX.]

LEWIS, an island of Scotland. [Ross and Cromarty.]

LEWIS, MATTHEW GREGORY, a writer of novels, poems, and dramatic pieces, was born at London on the 9th of July, 1775. Lewis studied at Christ Church, Oxford, and afterwards lived for some time in Germany. There he became acquainted with Goethe and his followers, and imbibed the mysterious and tragic spirit of which his writings are full. Previously to his residence in Germany, when only sixteen years old, he wrote a successful comedy, called 'The East Indian.' The novel by which he is chiefly known, 'The Monk,' was published in 1794, when he was in his twentieth year. In 1812 he introduced to the stage the drama of 'Timour the Tartar,' which is said to have had much influence in creating a taste for gorgeous pageants. His best dramatic work is 'The Castle Spectre.' Lewis died at sea, on the 14th May, 1818.

LEWIS, SIR GEORGE CORNEWALL, BART., English statesman and author, was born in London in 1806. He was the eldest son of Sir Thomas Frankland Lewis, who from 1821 to 1839 filled several important public offices—among them the vice-presidency of the Board of Trade and the chairmanship of the Poor Law Board. Sir George was educated at Eton and Christ Church, Oxford, where he graduated B.A., in 1828, as first-class in classics and second in mathematics. Three years afterwards he was called to the bar at the Middle Temple, and after acting on various commissions of inquiry, he was appointed a poor-law commissioner, an office which he retained till 1847. Meanwhile he found time for the composition of several works, political and literary. In 1836 he published a disquisition on 'Local Disturbances in Ireland, and the Irish Church Question;' and in 1839 two philological works, entitled 'Glossary of Herefordshire Provincial Words,' and an 'Essay on the Origin and Formation of the Romance Languages.' In 1841 he published a political 'Essay on the Government of Dependencies.' Entering Parliament as member for Herefordshire, in 1847, he became successively secretary to the Board of Control, under-secretary for the Home Department, and financial secretary to the Treasury, going out of office with the Whigs on the accession of Lord Derby to power in 1852. Before this time he had published two elaborate and argumentative works—one in 1849, 'An Essay on the Influence of Authority in Matters of Opinion,' and the other 'A Treatise on the Methods of Observation and Reasoning in Politics.' From July, 1852, to February, 1855, Sir G. C. Lewis was not only out of office, but

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out of Parliament, having been defeated as a candidate for the representation of Herefordshire in the former month, and for that of Peterborough in the November following. In the meantime he became editor of the *Edinburgh Review*, and wrote his great work, 'An Inquiry into the Credibility of the early Roman History,' in which, impugning the reconstructive system of Niebuhr, he sought to disprove the credibility of the Roman history for the first 473 years of the city. Re-entering Parliament in March, 1855, as member for the Radnor burghs, which he represented until his death, he resigned the editorship of the *Edinburgh Review*, and held the post of chancellor of the exchequer till the dissolution of Lord Palmerston's government in 1858. On the return of the Whigs to power in 1859, Sir George was appointed Home Secretary, an office which, to the surprise of the nation, he exchanged in 1861, on the death of Lord Herbert, for that of Secretary of State for War. In the same year he published a work of much research, entitled the 'Astronomy of the Ancients.' His latest work was a 'Dialogue on the Best Form of Government.' Sir G. C. Lewis married, in 1844, Lady Maria Theresa Villiers, sister to the earl of Clarendon; succeeded to the baronetcy on the death of his father in 1855; and died, from congestion of the lungs, on April 13, 1863. A statue has been erected to his memory at Hereford, and his bust placed in Westminster Abbey.

LEWISHAM. [KENT.]

LEX MERCATORIA, or LAW-MERCHANT, in a general sense, denotes the usages and customs of merchants, which, having been adopted as part of the law of most countries, and particularly of maritime states, for the protection and encouragement of trade, have been termed a branch of the Law of Nations. (Blackstone's 'Commentaries.')

The term Lex Mercatoria, when used with reference to English law, like the Lex et Consuetudo Parliamenti, merely describes a general head or division of the system. What customs or rules are comprehended under that division must always be matter of law for the consideration of the judges; and it was said by Chief Justice Hobart, that, if they doubt about it, they may 'send for the merchants to know their custom, as they may send for the civilians to know their law.' The principle seems to be as alluded to by Lord Hale in a case in Hardres' 'Reports,' p. 486, that the courts are bound to take notice of the general law of merchants; but that, as they cannot know all the customs which form part of that law, they may inform themselves by directing an issue or making inquiry in some less formal manner. The latter mode has frequently been adopted in modern times, and evidence of mercantile customs has often been given before juries. When the custom is ascertained, the court may declare it to be legal or not, according to their judgment; for the expression, that the court is bound to take notice of the general law of merchants, does not mean, or should not mean, that the custom, simply as such, must be recognized as law by the judges. The recognition of the custom by the judges makes it law.

LEXICON. [DICTIONARY.]

LEXINGTON. [KENTUCKY; MASSACHUSETTS.]

LEYCESTERIA, a genus of plants of the natural

family of *Rubiaceæ*. The genus consists of only a single species, *L. formosa*, a native of the Himalaya mountains, at elevations of from 6000 to 7000 and 8000 feet, in Nepal and Sirmore, where it grows among oaks and pines, and is therefore well suited to the climate of England, where indeed it may be seen growing in great luxuriance, as well as in the south and west of Scotland.

LEYDEN, a city of the Netherlands, the capital of a canton, 22 miles S.W. of Amsterdam, and 17 N. from Rotterdam (with both of which it is connected by canals and railways), is situated in 52° 9' 30" N. lat., 4° 29' 13" E. long., on a branch of the Rhine, and had, in 1862, 37,339 inhabitants. The town is traversed by many broad canals, which are bordered with trees, and which, intersecting each other, divide it into fifty small islands, connected together by 145 bridges. It is surrounded with a rampart, on which are fine shady walks; and outside there is a deep and broad moat, crossed by eight bridges leading to as many gates. The city is well built, and the principal streets are broad and well paved. The street in which the town-hall is situated extends nearly across the city from east to west; it is almost 2 miles in length, and is reckoned one of the handsomest in Europe. The houses are mostly of brick, with the gable-ends to the streets. Among the public buildings the most worthy of notice are—the town-hall; St. Peter's Church, the finest of the seventeen in the city; the great hospital; the arsenal, custom-house, and chamber of commerce. An ancient castle or fort, ascribed by tradition to the Romans, stands in the middle of the city, and commands an extensive prospect of the town and the surrounding country. The manufactures of linen and woollens have declined considerably, but are still the most important in Holland. In the middle of the seventeenth century, Leyden had 100,000 inhabitants. Its principal trade is in grain, butter, and cheese. The most remarkable event in the history of Leyden is its successful resistance to the Spaniards in 1573, when it sustained a severe siege; it was ravaged by the plague in 1655, and was greatly injured by an explosion of gunpowder in 1807. The university, which was founded in 1575, and was once the most celebrated in Europe, has an extensive library of books, and rare Oriental manuscripts, a valuable botanical garden, an observatory, a museum particularly rich in Japanese, Egyptian, and Etruscan antiquities, and a cabinet of natural history. The attendance of students is about 420. There are, besides, several private museums, and many learned societies.

LEYDEN JAR, a vessel employed in electrical experiments, so called from M. Vanleigh, of Leyden, the inventor. The preparation of this jar consists in a coating of tin-foil, inside and out, to within one-third of the top, in order that it may be readily charged and discharged by means of a metallic rod, which is in communication with the interior coating. [CHEMISTRY.]

LEYDEN, LUCAS VAN, a very celebrated old Dutch painter and engraver, was born at Leyden in 1494. He distinguished himself even as a boy by his engravings, and was a famous painter as early as his twelfth year. He painted in distemper a picture of St. Hubert, in 1506, for a citizen of Leyden

of the name of Lokhorst, who was so gratified at the excellence of the work, that he paid him twelve gold pieces for it, one for each year of his age. Some of Lucas' early engravings are highly prized by print-collectors, and accounted among the greatest rarities of their class. He died in 1533, aged only 39.

L'HOPITAL. [HÔPITAL.]

LIAS, in Geology, the name of a series of argillaceous and calcareous strata, forming the basis of the oolitic system. The name is supposed to be derived from the appearance of the bed in layers in the quarries where it is worked, in the middle of England. It overlies the new red sandstone series, and is everywhere remarkable for its fossils. Among these are included the *Ichthyosaurus*, *Plesiosaurus*, *Pterodactyle*, and other giants of the primeval world. [GEOLOGY.]

LIBANUS. [SYRIA.]

LIBATION (Lat. *libo*, 'I pour'), an essential part of sacrifice among the Greeks and Romans. It consisted in the offering up of any liquid to the gods, usually of wine, water or milk. Libations were also made at funerals, and at banquets.

LIBAU. [COURLAND.]

LIBEL (from the Latin *libellus*, 'a little book') is a malicious defamation, expressed either in writing, or by signs, pictures, &c., tending either to blacken the memory of one who is dead, or the representation of one who is alive, and thereby exposing him to public hatred, contempt, or ridicule. (Hawkins, 'P. C.')

This species of Defamation is usually termed *written scandal*, and it is generally treated as a more serious mode of defamation than Slander. [SLANDER.]

Whatever written words tend to render a man ridiculous or to lower him in the estimation of the world amount to a libel, although the very same expressions, if spoken, would not have been slander or defamation in the legal sense of those words. To complete the offence, publication is necessary, that is, the communication of the libel to some person, either the person himself who is libelled, or any other. The mere writing of defamatory matter without publication is not an offence punishable by law; but if a libel in a man's handwriting is found, the proof is thrown upon him to show that he did not also publish it.

Libellers may be punished by indictment or criminal information and by action.

Indictment or criminal information is for the public offence (as it is termed), for every libel has a tendency to a breach of the peace by provoking the person libelled; the civil action, which is on the case, is to recover damages by the party for the injury caused to him by the libel.

The truth of a libel was formerly no justification in a criminal prosecution; yet it was so far considered an extenuation of the offence, that the Court of King's Bench would not grant a criminal information unless the prosecutor by affidavit distinctly and clearly denied the truth of the matters imputed to him, except in those cases where the prosecutor resided abroad, or where the imputations were so general and indefinite that they could not be expressly contradicted, or where the libel was a charge against the prosecutor for language held by him in Parliament.

A fair report of judicial proceedings does not

amount to a libel, but a publication of *ex parte* proceedings before a magistrate may be punished as such.

A petition containing scandalous matter, presented to Parliament or to a committee of either House, and legal proceedings of any kind, however scandalous the words used may be, do not amount to a libel. But if the petition were delivered to any one not being a member of Parliament, or the legal proceedings were commenced in a court not having jurisdiction of the cause, they would not be privileged. Confidential communication reasonably called for by the occasion, as charges made by a master in giving the character of his servant to a party inquiring after it, or a warning by a person to another with whom he is connected in business, as to the credit or character of a third party about to deal with him, are considered as privileged communications, and are not deemed to be libels unless malice be proved, or the circumstances be such that malice may be inferred by the jury.

It was settled by an Act of Parliament that the jury must find not only the fact of publishing, but whether the matter in question be a libel or not (32 Geo. III. c. 60, extended to Ireland by 33 Geo. III. c. 43). In a civil action the question whether the publication is or is not a libel is decided by the judge or court.

The punishment in a criminal prosecution may be fine and imprisonment; and upon a second conviction for publishing a blasphemous and seditious libel, the court might sentence the offender to banishment for any term it might think fit. (1 Geo. IV. c. 8.) But this was repealed by 11 Geo. IV. & 1 Will. IV. c. 73.

The printer of a libel is liable to prosecution as well as the writer, and so is the person who sells it, even though he is ignorant of its contents.

By the 28th section of 38 Geo. III. c. 78, a bill of discovery may be supported against the editor of a newspaper, or other person concerned in the publication, or interested in the property thereof, to compel a disclosure of the name of the author of the libel, or of the name of any person connected with the publication against whom the party libelled may think proper to bring an action; and such a bill may also be obtained against any person suspected of being the author, which would compel him to discover on oath whether he did or did not write the libel in question. (Holt, 'On Libel.')

The Act of 6 & 7 Vict. c. 96, entitled 'An Act to amend the law respecting Defamatory Words and Libel,' has made some alterations in the law of defamation and libel. It enacts—Sec. 1, That in any action for defamation it shall be lawful for the defendant, subject to a certain notice in writing therein described, to give in evidence, in mitigation of damages, that he made or offered an apology to the plaintiff for such defamation at such time as in the said section is more particularly described.

Sec. 6 makes an important change: it enacts, That, on the trial of any indictment or information for a defamatory libel, the defendant, having pleaded such plea as in this section is afterwards mentioned, the truth of the matters charged may be inquired into, but shall not amount to a defence, unless it was for the public benefit that the said matters charged should be published. The defendant must in his plea to such indictment or information allege the

truth of the matters charged in the manner that is required in pleading a justification to an action for defamation.

Sec. 7 enacts, That when on the trial of any indictment or information for the publication of a libel, under the plea of Not Guilty, evidence shall have been given which shall establish a presumptive case of publication against the defendant by the act of any other person by his authority, it shall be competent to the defendant to prove that such publication was made without his authority, consent, or knowledge, and that the said publication did not arise from want of due care or caution on his part.

This Act does not extend to Scotland (s. 10). As it was doubted whether or not it appertained to Ireland, this Act was extended to Ireland by 8 & 9 Vict. c. 75.

Defamation and libel were punished among the Romans. The various rules of Roman law on this subject are stated in Rein, 'Das Criminalrecht der Römer.'

In Scotland a libellous or defamatory attack upon a person's character or reputation may be the foundation of a criminal prosecution at the instance of the public prosecutor, or for a civil action for damages and reparation, which may now proceed before a jury. The amount of injury or loss suffered, actual or probable, and the insult or offence to the individual, are both to be considered in an action for damages on the ground of libel. Malice need not in general be averred, but it must be stated and proved in the case of actions of libel against persons who, from their position or duties, are privileged in interfering with the conduct and character of others. Members of Parliament, judges and counsel in courts of justice, and members of corporations, in inquiries relating to which the body has cognizance, have this privilege; but this is not extended to members of the General Assembly of the Church of Scotland, except when sitting as a court of justice. The press is free: but it is not entitled to animadvert upon the conduct and character of individuals, except in their public capacities. *Veritas conviciū*, or the truth of the statement complained of, is a good defence to a civil action of damages for libel, as tending to disprove the *implied* malice which is always presumed in such cases. The term *libel* is also used in Scotch law to denote the form of complaint, or ground of charge, on which either a civil or a criminal action proceeds. (Bell's 'Dict.,' art. *Libel*).

LIBELLULA, the genus of insects which includes the well-known Dragon-flies. It belongs to the order *Neuroptera* and to the section *Subulicornes* in the arrangement of Latreille. The dragon-flies have horny strong mandibles and maxillæ, covered by the labrum and labium; their tarsi are three-pointed; their wings are equal; the posterior extremity of the abdomen is furnished with hooks or peculiar appendages. The size, beauty, and habits of these insects have rendered them favourite objects of study with the entomologist. In the larva state they live entirely in the water, engaged in unceasing war with other insects, which by singular devices they entrap and devour. Their pupa state is also passed in water, and contrary to the usual habits of insects, is a period of activity and locomotion. They are then furnished with an extraordinary mask formed out of

that part of the head which replaces the lower lip, and by which they cover the jaws and the whole under part of the head. They use it to alarm and seize their prey, projecting it at will. When perfect insects, they become inhabitants of air, and are endowed with extraordinary power of flight and precision of movement, performing astonishing evolutions. Their habits continue as ferocious as they were before. Several valuable monographs have been published on these interesting insects, but one of the most important is that of the distinguished Belgian zoologist, M. de Selis Longchamps, entitled 'Monographie des Libellulidées d'Europe.' In this work sixty-one species are described, arranged under the genera *Libellula*, *Cordulia*, *Lindenia*, *Gomphus*, *Cordulegaster*, *Æstha*, *Anax*, *Calepteryx*, *Lestes*, *Sympecma*, and *Agriion*.

In the arrangement of Westwood ('Introduction to the modern Classification of Insects') the genera of *Libellulidæ* inhabiting Britain are grouped under two sub-families, *Libellulidæ* and *Agriionidæ*. The following are the British genera: Sub-family 1, *Libellulidæ*.—*Anax*, 1 species. *Æstha*, 7 species. *Cordulegaster*, 1 species. *Gomphus*, 2 species. *Cordulia*, 3 species. *Libellula*, 15 species. Sub-family 2, *Agriionidæ*.—*Agriion*, 13 species. *Lestes*, 3 species. *Calepteryx*, 4 species.

LIBER, the inner bark of a plant, is a layer consisting of woody tissue, cellular substance, and vessels of the latex, forming a compact zone immediately applied to the wood. The woody tissue of which it is composed quickly becomes thick-sided, by the addition of internal ligneous strata, the consequence of which is, that such tissue in this part is more tough than elsewhere. Hence it is usually from the liber that are extracted the fibres employed in making cordage or linen-thread: this at least is its source in hemp, flax, the lime-tree, the lace-bark, and the many other exogens which furnish thread; but in endogens, which have no liber, as the cocoa-nut, it is the ordinary woody bundles of the leaves, stem, and husks of the fruit from which the fibre used for ropes is procured. It is said that certain exogens, such as *Menispermaceæ*, have no liber. In many plants a new layer of liber is formed annually, contemporaneously with a new layer of wood; but this is by no means universal; on the contrary, the oak and the elm increase their liber slowly and irregularly.

LIBER REGIS, another term for the *Valor Ecclesiasticus* of the 26th Henry VIII., is the book which contains an account of the valuation of the whole ecclesiastical property of England and Wales, on the eve of the Reformation. By an act of the 23rd of Henry VIII., the payment of annates, or the first-fruits of bishoprics and archbishoprics, with all sums paid for palls, bulls, and the like, at the consecration of every new prelate, was restrained. This was followed by an Act in the 26th Henry VIII., for the payment, not only of 'first-fruits of all dignities, benefices, and promotions spiritual,' but also of an 'annual pension of the tenth part of all the possessions of the church, spiritual and temporal, to the king and his heirs,' as supreme heads of the Church of England. The *Valor Ecclesiasticus* is the return which the commissioners under this Act made into the exchequer. This record, in full, except certain portions which have been lost, was published under

the orders of the commissioners upon the records of the realm, in six vols. folio, London, 1810-34. An abridgment of it is preserved in the Office of First-Fruits, entitled '*Liber Valorum*,' and was the foundation of the '*Liber Regis*, vel *Thesaurus Rerum Ecclesiasticarum*,' by John Bacon, Esq., receiver of the first-fruits, with an appendix, &c., 4to, London, 1786. This latter work also contains an account of such benefices as have been since discharged from any payment to the above revenues, on account of the smallness of their income. Queen Anne, in the second year of her reign, gave up first-fruits and tenths to trustees who were empowered to administer them for the benefit of the poorer clergy. This gift of the queen was confirmed by Act of Parliament, 2 & 3 Anne, c. ii.

LIBERIA is the name of an independent negro republic of Western Africa, established in 1822, which extends along the coast of Guinea, between lat. 4° 50' and 7° N.; long. 6° 50' and 12° 39' W. Its sea-board extends 600 miles, including the colony of Cape Palmas, with an average breadth of 100 miles. The area is about 23,000 square miles. The inhabitants belong to all nationalities of Africa, and were computed, in 1863, to number altogether 422,000, of whom 16,000 were born in the United States, and 6000 were rescued from slave-ships. The establishment of Liberia is due to the Americans. In 1816 the American Colonization Society was established at Washington for the purpose of founding a colony of emancipated negroes. The first attempt to carry out their idea proved unsuccessful, in consequence of the unhealthiness of the site chosen; but in 1822 they purchased Cape Mesurado, upon which Monrovia, the capital (so called from President Monroe), now stands. Purchases of other territory were subsequently made, and in 1839 the several settlements were united as a commonwealth. In 1847 this gave place, with the desire of the settlers, and with the consent of the Colonization Society, to the present republic of Liberia. The state was first acknowledged by England (whose government made it a present of a corvette of war with four guns, its only navy), afterwards by France (who supplied its 1500 militia with muskets), Belgium, Prussia, Brazil, Denmark, and Portugal, and, in 1861, by the United States. The republic has the facility of almost indefinite extension into the interior. It is stated that the natives everywhere manifest the greatest desire that treaties should be formed with them, so that the limits of the republic may be extended over all the neighbouring districts. The Liberian territory has been acquired by more than twenty treaties, and in all cases the natives have freely parted with their titles for a satisfactory price. The chief solicitude has been to purchase the line of sea-coast, so as to connect the different settlements under one government, and to exclude the slave trade, which formerly was most extensively carried on at Cape Mesurado, Tradetown, Little Bassa, Digby, New Sesters, Gallinas, and other places at present within the republic. Many of the natives have become useful citizens, serve on juries, act as magistrates, and one of them has been elected and serves creditably as a member of the Liberian House of Representatives.

The constitution of the republic of Liberia is on the model of that of the United States of America. The

executive is vested in a president and a non-active vice-president, and the legislative power is exercised by a Parliament of two houses, called the Senate and the House of Representatives. The president and vice-president are elected for two years; the House of Representatives also for two years, and the Senate for four years. There are thirteen members of the Lower House, and eight of the Upper House; each county sending two members to the Senate. Every man above twenty-one years of age, who possesses a real estate of the value of 30 dollars, has a vote; and it is provided that, on the increase of the population, each 10,000 persons will be entitled to an additional representative. Both the president and the vice-president must be at least thirty-five years of age, and possess real property to the value of 600 dollars, or 120*l*. In case of the absence or death of the president, his post is filled by the vice-president.

For political and judicial purposes, the republic is divided into four counties, called Montserrado, Grand Bassa, Sinoe, and Maryland, which are further subdivided into townships. The townships are commonly about eight miles in extent. Each town is a corporation, its affairs being managed by officers chosen by the inhabitants. Courts of monthly and quarter sessions are held in each county, whose civil business is administered by four superintendents appointed by the president with the consent of the Senate. The county system of government is capable of indefinite extension over new districts of territory that may be acquired, giving to the inhabitants all the advantages which local self-government affords. The government of Liberia is entirely in the hands of the African race.

English is the official language, and is spoken by the negroes from the United States. All are Protestants, Popery being proscribed. There is a good supply of churches, and a system of common-school instruction is provided by the government. Several institutions of a more advanced character are supported by the benevolence of the American people. A college, erected at a cost of 20,000 dollars, is open at Monrovia, having a faculty of three (coloured) professors, and about twenty-five students. Newspapers are published, and there is a regular postal system. The number of immigrants from the United States, from 1820 to 1856, was 9562, of whom 3676 were free-born. In general, those who migrate from America are despatched into the interior, where the soil is better, and the climate more healthy than on the coast. Carysburg, White Plains, and other stations, have been thus established. In the year 1862 the public revenue amounted to 30,190*l*., and the expenditure to 29,973*l*. The Liberians have built and manned thirty coast traders, and they have a number of large vessels engaged in commerce with Great Britain and the United States. Systematic drainage and clearing the woods have greatly improved the climate.

Palm-oil, camphor, ivory, gold-dust, coffee, indigo, ginger, arrow-root, and hides, are exported. Cocoa and sugar thrive, and recently cotton has been grown. Mandingo horses and native cattle are used for draught, but much of the camwood exported is brought 200 miles from the interior on men's backs. It is estimated that 2,000,000 of the inhabitants of the interior now obtain supplies of European goods from the

republic and Cape Palmas; and that the Liberians exercise Christian influence over 480,000 natives. The church of Liberia was reorganized in 1862.

The seaport is *Monrovia*. The other chief settlements are Bexley, Edina, and Cresson—the latter situated on a fine bay, and affording abundant supplies of wood and water. *Edina* is named after Edinburgh, from which city considerable pecuniary aid was sent to Liberia in 1834. The increasing usefulness and universally admitted success of Liberia are adduced by the friends of the negroes as proofs that they are thoroughly capable of self-government under fair and proper conditions.

(*Statesman's Year Book*, 1866; *Malte Brun*; Parliamentary Papers; Private Information.)

LIBERTINUS. In the Roman polity persons were divided, with respect to status or condition, into freemen (*liberi*) or slaves (*servi*). Freemen, again, were divided into persons who were born in a state of freedom (*ingenui*), and libertini, or those who had been manumitted. A manumitted slave was called *libertus*, that is, *liberatus*, 'freed,' with reference to the act of manumission, and to his master, who, by manumitting him, became his patron (*patronus*): he was called 'libertinus' with reference to the class to which, by the act of manumission, he belonged.

A manumitted slave might either become a full Roman citizen or a *Latinus*, or he might obtain no higher privileges than the class called *Dediticii*. The grounds and conditions of this triple distinction are fully explained by Gaius (i. 12, &c.)

LIBERTY. This word is the Latin *libertas*. The corresponding Teutonic word is *freiheit*, or as it appears in English, *freedom*. [Law.]

LIBERTY. The general nature of a liberty, as a portion of the royal prerogative in the hands of a subject, has been already shown under **FRANCHISE**.

The fines paid to the Crown for grants or confirmations of liberties are shown by Madox to have formed no inconsiderable part of the royal revenue.

The form in which the Crown granted views of frankpledge [LEET] and other franchises may be seen in the charters granted by King Henry VI. to Eton College, and King's College, Cambridge.

A person exercising a franchise to which he has not a legal title may be called upon to show cause by what authority he does so, by a writ of *Quo warranto*, or an information in the nature of a *Quo warranto*; and parties disturbed in the lawful exercise of a franchise may recover damages against the disturber in an action on the case.

LIBOURNE. [GIRONDE.]

LIBRA (the Balance). In the older Greek writers the Scorpion occupies two constellations of the *ZODIAC*, or rather the body of the animal occupies one, and the claws, *chelæ* (*χελαι*), another. We say this, because, though the *chelæ* were certainly a part of the Scorpion, yet they are often mentioned (as by Aratus for instance) by themselves, as if they formed a distinct constellation. The word *chela* had several significations; so that it may have been by simple mistranslation that the Romans (according to Hyginus, Virgil, &c.) gave the name of *Libra* to the part of the heavens in question, and drew back the claws of the Scorpion to make room for the scales.

Libra is surrounded by Scorpio, Ophiuchus, Virgo, Centaurus, and Lupus.

LIBRA, among the Romans, a pound weight, equivalent to the *as*, or twelve ounces. It was also the name of a coin consisting of twelve ounces of silver, or ninety-six drachmæ, worth about 3*l*. of our money.

LIBRARIES. The word library signifies a collection of books arranged for use, and also the building or apartment in which such a collection may be kept. The term is sometimes applied to a series of works uniformly printed on a single or on several subjects, such as the 'Library of Old Authors,' &c.

In ancient times it is easy to suppose that when books began to be multiplied libraries would be founded, not only for purposes of study, but for the preservation of archives and other documents, which a barbarous system of warfare rendered it desirable should be kept in places of great security. The origin of libraries may thus be carried back to the Hebrews (Ezra vi. 1), whose care in preserving their sacred books became an example to other nations, particularly to the Egyptians. According to Diodorus Siculus (i. 58) Osymandyas, king of Egypt, had a library built in his palace with this inscription above the door, *Ψυχῆς Ιατρείον* ('the dispensary of the mind'), and sculptures on the walls representing 'a judge with the image of truth hanging from his neck, and many books lying before him.' What adds to the interest of this statement of Diodorus is the circumstance, that by recent discoveries in Egypt this building has been identified as the *Memnonium*—a palace temple near Thebes, believed to have been built in the fourteenth century B.C. In describing the apartments of this building, Osburn, in his 'Monumental History of Egypt,' says: 'The last of these halls was a library, and the approach to it was through a gilded doorway, according to the inscription that still remains upon it.'

The most famous library of Egypt, perhaps of the ancient world, was founded at Alexandria by Ptolemy Soter, about 290 years B.C. No expense was spared on the collection, which at length amounted to 500,000 volumes. After subsisting for 244 years, it was burned during the expedition of Cæsar to Egypt. Another collection existed at Alexandria till 642, when it shared the same fate.

Among the Greeks libraries were numerous. Pisistratus founded a library at Athens, which, after undergoing many vicissitudes, subsisted till the time of Hadrian. Polycrates founded one at Samos, and large collections of books were made by Euclid, Euripides, and especially by Aristotle, whose library was purchased by Ptolemy and incorporated with the Alexandrine. There was also a famous library at Pergamus, founded by Eumenes, which, according to Plutarch, contained 200,000 volumes.

The first library at Rome was that of Paulus Æmilius (167 B.C.), the contents of which had been carried off from Macedonia. The most celebrated were the Octavian and Palatine public libraries, established by Augustus, the latter of which continued until the time of Pope Gregory I.; the Ulpian library, erected in Trajan's Forum by the Emperor Ulpian Trajanus; besides others in the principal cities and colonies of the empire. In the fourth century there were twenty-eight public libraries in Rome; and the number of calcined volumes found at Herculaneum and Pompeii prove that collections of books were common in those cities.

Constantine erected at Byzantium, or Constantinople, a magnificent library, which under his successors reached the number of 200,000 volumes. It remained till the seventh century, when it was burnt by command of the Emperor Leo III.

During the Middle Ages the Moslems had an important library of Arabic books in Alexandria, and one at Bagdad, which included Greek MSS. In Spain they had seventy public libraries in the twelfth century, and that at Cordova contained 250,000 volumes. In the West, libraries were attached to nearly every large church, while the Benedictine, Franciscan, and other monks collected in their religious houses many volumes, which at the Reformation were dispersed, and found their way into the libraries of universities, cities, and princes.

The invention of printing brought about a new era in the history of libraries, the number of books being greatly increased. Shortly after this may be dated the foundation of several of the more famous libraries of Europe, a list of which is subjoined.

The taste for forming libraries has perhaps been more developed in England than in any other country. This may be accounted for partly by the wealth of the collectors and the laws of the country, which favour the preservation of property of every kind in the same family for a long time. Thus England possesses many ancient private libraries, while on the Continent, with the exception of Austria, there remain few or none.

Among the more important private libraries in England may be mentioned those of Earl Spencer, at Althorp; the earl of Ellesmere, at Bridgewater house; the duke of Devonshire, at Chatsworth; the duke of Marlborough, at Blenheim; Sir Thomas Phillipps, at Middlehill, Worcestershire; the earl of Leicester, at Holkham; and Lord Ashburnham, whose library contains a fine collection of MSS. Among the Scottish private libraries may be mentioned those of the duke of Hamilton, at Hamilton; the duke of Buccleuch, at Dalkeith and Bowhill; the marquis of Lothian, at Newbottle; the earl of Dalhousie, at Brechin castle; Mr. Hope Scott, at Abbotsford; J. T. Gibson Craig, Esq., J. W. Mackenzie, Esq., D. Laing, Esq., at Edinburgh; and W. Euing, Esq., and J. Smith, Esq., of Jordanhill, at Glasgow.

At the present time libraries are found so indispensable for the sustenance of learning, that they are still more attracting the attention of the public. In 1855 Mr. Ewart's Act (18 & 19 Vict., c. 70) was passed, for the establishment of libraries and museums in country towns in England. It extends to all boroughs whose population exceeds 10,000; but before it can be carried into effect, a public meeting of ratepayers must be called, and the consent of two-thirds of those present obtained. In England free rate-supported libraries have been already established in Manchester, Liverpool, Salford, Boston, Warrington, Oxford, Cambridge, Westminster, Norwich, Winchester, Sheffield, Lichfield, Kidderminster, Leamington, and Birkenhead. Preliminary steps have been taken in other towns for this purpose.

In Scotland and Ireland the Acts 17 & 18 Vict., c. 64, and 18 & 19 Vict., c. 40, make similar provision for the establishment of libraries. In Scotland, however, a poll for the purpose may be demanded by any five qualified voters, which poll must be taken

within two days after the meeting at which it shall have been demanded. As yet only the preliminary steps have been taken for the purpose of establishing free libraries in Edinburgh, Glasgow, and Aberdeen. In Ireland the towns of Ennis and Dundalk alone have taken advantage of the Libraries' Act.

The following tables show the extent of the principal libraries of Great Britain, Europe, and America:

1. GREAT BRITAIN.

	Name.	Founded	Printed Vols.	MSS.
ENGLAND.				
Cambridge.	University.	1475	200,000	3,200
"	Trinity College.	—	45,000	—
"	St. John's	1530	28,000	—
"	Queen's	—	27,000	—
"	Gonville	—	16,000	700
"	Emmanuel	—	19,000	—
"	Pembroke	—	12,000	—
"	Peterhouse	—	8,000	—
Liverpool.	The Public	1852	36,000	—
London.	British Museum.	1753	820,000	80,800
"	Land Institution.	1805	62,000	—
"	" Subscription.	1841	67,000	—
"	Royal Society.	1667	42,000	—
"	Sion College.	1631	42,000	—
"	Lincoln's Inn.	1522	29,000	900
"	R. Institution.	1803	29,000	—
"	Lambeth.	1610	27,000	1,200
"	Middle Temple.	1641	22,000	—
"	Inner Temple.	1707	17,000	500
Manchester.	Free Public.	1852	35,000	—
"	Chetham's.	1653	18,000	137
Oxford.	Bodleian.	1597	400,000	30,000
Salford.	"	1850	19,000	—
SCOTLAND.				
Aberdeen.	University.	1634	50,000	174
Edinburgh.	Advocates.	1689	200,000	2,000
"	University.	1580	133,000	700
"	Signet.	1790	54,000	100
"	R. Coll. of Phys.	1682	16,000	50
"	Medical Society.	1737	16,000	—
"	Free College.	1843	46,000	—
Glasgow.	University.	1473	110,000	242
"	Hunterian Museum	1781	—	—
St. Andrew's.	University.	1600	62,000	63
IRELAND.				
Dublin.	Trinity College.	1602	128,000	1,600
"	King's Inn.	1787	31,000	150
"	Dublin Society.	1731	25,000	—
"	Archbp. Marsh's.	1697	19,000	193
"	Irish Academy.	1787	11,000	500

2. EUROPE.

Paris.	Imperial.	1377	500,000	84,000
"	Arsenal.	1781	202,000	6,000
"	St. Genevieve.	1624	180,000	3,500
"	Mazarin.	1660	132,000	3,000
Munich.	Royal.	1550	800,000	18,600
Berlin.	Royal.	1661	500,000	10,000
Vienna.	Imperial.	1440	350,000	20,000
"	University.	1777	121,000	—
Dresden.	Royal.	1555	300,000	2,800
Gottingen.	University.	1736	310,000	5,000
Wolfenbuttel.	Ducal.	1604	210,000	4,500
Tübingen.	University.	—	210,000	2,000
Stuttgart.	Royal.	1765	210,000	1,800
Leipzig.	University.	1543	170,000	2,500
Hamburg.	Town.	1529	160,000	5,000
Gotha.	Ducal.	1640	190,000	5,000
Darmstadt.	Grand Ducal.	1760	310,000	4,000
Heidelberg.	University.	1703	210,000	3,000
Praque.	University.	1350	140,000	4,000
Breslau.	Royal University.	1811	360,000	2,000
Hanover.	Royal.	1640	130,000	—

	Name.	Founded	Printed Vols.	MSS.
Brussels.	Town.	1350	210,000	18,000
"	Royal.	1837	125,000	1,500
The Hague.	Royal.	1795	110,000	2,000
Rome.	Vatican.	1450	310,000	24,000
Bologna.	University.	1690	155,000	11,000
Naples.	Royal.	1780	160,000	4,760
Venice.	St. Mark's.	1468	114,000	10,000
Florence.	Magliabecchian.	1714	160,000	12,000
"	Laurentian.	1444	125,000	6,000
Milan.	Brera.	1763	125,000	1,000
Madrid.	Royal.	1712	125,000	2,500
St. Petersburg.	Imperial.	1747	450,000	25,000
"	Academy.	1726	110,000	—
Copenhagen.	Royal.	1550	420,000	18,000
"	University.	1731	110,000	4,000
Upsal.	"	1621	138,000	7,000
Christiania.	"	1811	125,000	600

3. AMERICA.

New York.	Astor.	1839	105,000	—
Albany.	State.	1818	55,000	—
Boston.	Athenæum.	1804	76,000	—
"	City.	1853	72,000	—
Philadelphia.	Library Company.	1731	66,000	—
"	Acad. of Nat. Sci.	1812	26,000	—
Washington.	Smithsonian Inst.	1849	27,000	—
Charleston.	Library Society.	1748	26,000	—

Library Economy.—This subject embraces all matters relating to the construction and management of libraries designed for the use of the public.

That a collection of books may deserve the name of a public library, it must be classed according to some system, and arranged for easy reference. A library, whether public or private, whether it contains a million or only a few hundred volumes, will only be useful so long as it is arranged and managed according to a plan in harmony with its purposes.

The more important matters pertaining to this subject may be shortly treated of as follows:—

1. *The Construction of Library Buildings.*—The essential conditions are preservation from fire and water, and a situation remote from a noisy or dangerous neighbourhood, but at the same time at the command of the public resorting to them; in their

Fig. 1.

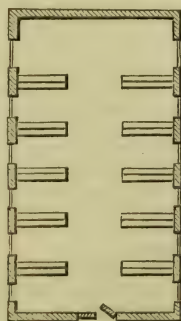
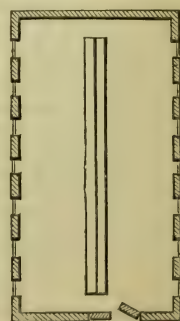


Fig. 2.



internal distribution to have respect to economy of space and the possibility of enlargement; and by a proper system of heating and ventilation, to seek the

preservation of the books from injurious influences, such as insects, dust, &c.

The design most suitable and convenient for a library hall is that of a long and large gallery lighted from above, or from the two sides, and intersected by cases placed back to back, thus forming recesses communicating with a passage in the middle (fig. 1); or this gallery may be divided lengthwise by a range of bookcases similarly back to back, which thus form parallel (fig. 2) rows of cases. Besides the hall intended to contain the library itself, there must be in addition a reading room and several smaller apartments for the general business of the library.

2. *Furniture*.—The most suitable height for library bookcases is from 8 to 10 feet, and if the apartment be lofty a light gallery of perforated iron, accessible by a small spiral staircase, may be continued above the first row of cases, with a light balcony in which a second set of cases may be placed. The shelves in these cases should commence about three or four inches from the floor, and may be placed at the following distances from each other:—Folios, 16 to 18 inches; 4tos, 10 to 11 do.; 8vos, 8 do.; 12mos, 7 do. Their depth should be about 15 inches, to allow the circulation of air. It is also necessary to know the sizes suitable for the reception of various classes of works. For instance, the fathers of the Church, Bibles, the councils, and schoolmen require more space for folios than for 4tos or 8vos; the belles-lettres, again, require in general only shelves of the height for 8vos or 12mos; natural history, geography, travels, antiquities, architecture, furnish 4tos and 8vos in equal proportions, but require a special place for the atlases ordinarily accompanying such works.

Ladders should be substantial, but light enough to facilitate their continual shifting. Oak is preferable to all other wood for library furniture, as it is less liable to the attacks of worms, and is easily kept clean.

3. *The Classification of the Books*.—Many systems of classification have been proposed. The most convenient, however, is that of Mr. Hartwell Horne, modified from the one originally proposed in France by Father Garnier, in 1678. It is as follows:—I. Theology; II. Jurisprudence; III. Philosophy; IV. Arts and Trades; V. History; VI. Literature.

Under these comprehensive divisions books of every kind may be classified, and the numbering and marking of the volumes may be made in accordance with them. The six divisions may be denoted by the letters A, B, C, D, E, F; each of these may have twenty-six subdivisions, Ea, Eb, Ec, to Ez; these again may have twenty-six subdivisions, Ea +, Ea Δ, Ea ±, and so on to almost any extent: for example, the first volume of 'The History of Europe,' by Sir A. Alison, 20 vols., 8vo, Edinburgh, 1847, would bear the mark—

Eh.	{E. Class <i>History</i> .
+	{h. Division <i>Modern History</i> .
9514	+ Subdivision <i>History of Europe</i> .
	9514. No., of Books in 8°.
1	1. No. of Volume.
8°	8° Size.

In the British Museum, and some other large

libraries, a system of arrangement called the *expansive* has been adopted. The library is divided into presses, each of which has a number; the shelves of each press are distinguished by a letter of the alphabet, and the place of each book on a shelf is indicated by a number; thus 573 c 13, means the thirteenth book on the third or c shelf of press 573. The numbers of the presses, however, are not in immediate sequence,—thus, supposing the first press to be numbered 1, and the works under the class Theology to occupy two presses, twenty numbers would nevertheless be allotted to this class. The first three numbers of the presses would then be 1, 2, 20. When a third press should come to be required for theological works, instead of placing them in another part of the library the books in the press marked 20, together with its number, would be moved on to the next press, and the press occupied by No. 20 would be called No. 3. By this process all the works belonging to one class are kept together for a longer period than under other systems. This arrangement, however, involves two indispensable conditions, viz., sufficient space, and that all the presses should be exactly of the same size.

4. *Catalogues*.—The catalogue of a large library should contain the transcription of the titles of the books in the following order:—The name of the author; the exact title, with the name of the editor or annotator; the number of volumes; the size; the name of the town where published, with the name of the publisher and printer; and the date. In addition, each entry in the catalogue should have the distinctive letters of the class and division to which the work described belongs, and also the running number in the library arrangement.

Besides the general catalogue, which should be constructed according to the authors' names in alphabetical order, there should also be shelf catalogues, or lists of the contents of a library shelf by shelf. These last are useful, when the books themselves are carefully classified, as furnishing to some extent a *catalogue raisonné* of a library.

5. *Stamping, Binding, &c.*—In every large library the stamping or marking of the books is an important matter. This should be applied at the beginning and end, and also on a certain leaf on the middle of each volume (in the Royal Library of Paris it is the 101st). Each plate and map should also be stamped, but in such a way as not to be injured. The binding of the books [BOOKBINDING] should in every case be made suitable to the importance and value of the books.

6. *Classification of Manuscripts, Prints, and Coins*.—Many libraries contain, besides books, collections of manuscripts, prints, and coins. The first may be arranged according to the six divisions indicated above, s. 3. For the classification of prints the twelve following heads may be adopted:—

1. Sculpture, architecture.
2. Religion, morals, sacred emblems, and devices.
3. Fiction, Greek and Roman antiquities, &c.
4. Genealogy, chronology, heraldry, coins, numismatics.
5. Public festivals, cavalcades, tournaments, and carousals.
6. Geometry, machines, mathematics, military art, music, arts and trades.

7. Romances, facetiæ, buffooneries, caricatures.
8. Natural history, anatomy.
9. Geographical and historical maps.
10. Ancient and modern monuments, and topography.
11. Portraits.
12. Fashions, costumes, manners.

Each class is divided into schools, and each school into its masters.

For coins, the following is the classification adopted in the principal cabinets of Europe:—

1. Ancient coins of—1, kings; 2, cities; 3, of Roman families (consular); 4, emperors; 5, deities, heroes, and illustrious men.

2. Modern coins of—1, Europe; 2, other parts of the world; 3, tokens.

Each series may be divided into gold, silver, bronze.

For full details of the matters which fall to be treated of with regard to libraries in general, see Edwards' 'Memoirs of Libraries,' 2 vols., 8vo, published in 1859, which is the best work on this interesting subject.

LIBRARIES, MILITARY. For several years past a sum of four or five thousand pounds has annually figured in the army estimates of Great Britain for supplying and maintaining our troops with libraries. The charge for 1865 was 4560*l*. Military libraries are of two kinds, *garrison* and *regimental*. The former comprises a large collection of books, with newspapers, games, and a commodious reading and lecture-room; and the latter merely collections of books which accompany regiments in their various movements. The introduction of these libraries has been found to improve the *morale*, without injuring the efficiency of our soldiers.

LIBRATION, (Latin *libratio*, from *libra*, 'a balance') a balancing motion, in which there is a position on one side and the other of which a body vibrates, being in fact the same in meaning as oscillation. This term is, however, particularly applied to a small irregularity, compounded of the moon's rotation round her axis, and her orbital motion, by means of which her visible hemisphere is not always quite the same.

The mean revolution of the moon round her axis is the same period of time as her mean revolution in her orbit. If both motions were equable, the moon would always present the same face to a spectator placed at the centre of the earth, on condition that the plane of her equator passed through the centre of the earth. None of these conditions being exactly fulfilled, and the variation being small and periodic, the consequence is that a small portion of the moon's surface in the eastern and western edges, and also in the northern and southern, is alternately visible and invisible.

LIBYA. [AFRICA.]

LIBYAN DESERT. [DESERT.]

LICENSES are grants of permission by the state, allowing subjects to vend or deal in exciseable articles, and to exercise various callings from which the country derives a revenue. Most of these will be found fully described in the various articles to which they refer, as **ALCOHOLE**, **AUCTIONEER**, **GAME**, **MARRIAGE**, &c.

The subjoined table enumerates all the different kinds of licenses now granted in the United Kingdom, the number issued, and the amount of duty

accruing to the exchequer therefrom in the year ending March 31, 1865:—

Description of License.	Number issued in				Amount of Duty.
	Eng-land.	Scot-land.	Ire-land.	United King- dom.	
Brewers, ...	No. 37,855	No. 299	No. 107	No. 38,261	£ 332,851
Distillers and Rec- tifiers, ...	108	131	63	302	3,171
Maltsters, ...	5,470	495	147	6,112	17,181
Auctioneers and Appraisers, . .	7,246	721	415	8,382	55,452
Dealers in Beer, .	2,581	76	622	3,279	10,845
“ “ ad- ditional licenses to retail, ...	842	—	457	1,299	1,432
Dealers in Spirits, “ “ ad- ditional licenses to retail, ...	3,710	383	479	4,572	48,006
Retailers of Beer (Publicans), . .	1,587	—	—	1,587	4,997
“ “ Spirits, “ “ Wine, “ “ Beer & Cyder (not Pub- licans), ...	66,830 79,535 29,418	496 12,955 3,653	15,404 107,933 4,476	82,730 107,933 37,547	176,596 567,796 82,903
Refreshment Houses, ...	48,929	823	—	49,752	145,402
Dealers in Wine, .	5,151	—	85	5,236	4,222
Wine Retailers, .	2,322	57	135	2,514	26,397
Sweets, ...	3,109	1,592	100	4,801	10,142
Packet Boats, . .	9,774	114	92	9,980	11,496
Methylated Spirits	209	92	41	342	359
Stage and Hack- ney Carriages, .	132	34	4	170	424
Postmasters, . .	25,999	1,073	—	27,072	16,949
Game, ...	8,499	892	1,888	11,279	152,049
Grocers' Spirits (Ireland), . . .	44,104	5,001	3,402	52,507	144,707
Tobacco Dealers & Manufacturers, .	—	—	270	270	2,930
Tea Dealers, . .	224,101	19,090	22,174	265,365	76,182
Hawkers, ...	124,020	18,816	22,736	165,572	65,543
Dealers in Gold & Silver Plate, . .	17,123	1,600	13	18,736	49,961
Pawnbrokers, . .	6,795	964	388	8,147	24,841
Makers & Sellers of Playing Cards, Vendors of Patent Medicines, . . .	2,699	327	619	3,645	30,728
Other Licenses, .	5,898	798	583	7,279	924
	10,188	734	—	10,922	6,125
	1,214	163	159	1,536	4,268
Total, ...	775,448	71,379	90,302	937,129	2,074,879
Licenses for frac- tional parts of a year and sur- charges, ...					84,925
					2,159,840

LICENTIATE IN MEDICINE is a physician who has a license to practise granted by the College of Physicians. There are two classes: licentiates who are authorized to practise in London and within seven miles thereof; and extra-licentiates, who are only privileged to practise in the country at a greater distance from the metropolis. The former class are authorized exclusively by the College of Physicians, but medical graduates of Cambridge or Oxford may practise in the provinces independently of the college license.

LICHANOTUS, Illiger's name for a genus of Cheilopeds or Quadrumanes (*Indris* of Lacépède, Geoffroy, and others) belonging to the *Lemurida*.

The *Indris* are inhabitants of Madagascar, and two species only seem generally recognized, namely,

Indri brevicaudatus of Geoffroy, *Lemur Indri* of Gmelin; and *Indri longicaudatus* of Geoffroy, *Lemur laniger* of Gmelin, *Indri laniger* of Fischer.

A specimen of the Short-tailed Indri, in the Paris Museum, presented the following particulars. Anterior part of face nearly naked; forehead, temples, and throat, white; ears, occiput, shoulders, arms, and hands, black; lower part of back brown, dividing on the haunch into two lines, which run down the buttocks and spread on the thighs, leaving the croup, the tail, and the posterior part of the thighs, white; feet and anterior part of thighs deepened into black; heels white, with an anklet of grayish white; chest brown; abdomen white, as is also the inside of the arms; the thumbs, especially those of the hind paws, very large and powerful; fore toe small, and tied to the next, almost to the last, joint; nails small, flat, sub-keeled and pointed; first toenail long, flat, and sharp; fur beautifully soft and woolly. Length of head and body, $24\frac{1}{2}$ inches; of tail, 3 inches; of hind foot, $7\frac{1}{2}$ inches.

A Lemurine animal termed *Envahis laniger*, would seem to be identical with the *Indri longicaudatus* of Geoffroy, and *Lemur laniger* of Gmelin. Its characteristics are—Hind limbs extremely long, and hind thumbs of extraordinary size; fur peculiarly soft, delicate, and curly, finer than wool; ears small, round, and buried in the fur; colour, rusty brown gray, the hairs of a leaden tint at the base; face, brighter red brown; on the knees and forearms a decided tinge of red brown; throat, chest, abdomen, gray; a spot on the haunches over the hip joint, and the back of the thighs white; tail round, bright rufous or chestnut red. Length of head and body of the most perfect specimen, 15 inches; of tail, 14 inches; of hind foot, $4\frac{1}{2}$ inches. Fore hands long and slender; thumb, thin and feeble. [LEMURIDÆ.]

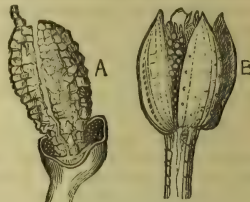
LICHENIN, a peculiar vegetable product, sometimes called Lichen Starch. It is obtained from the *Cetraria islandica*, or Liverwort. When pure, it is white, and it retains water; but on drying it becomes yellowish. In thin plates it is transparent. It is tough, tasteless, nearly inodorous, swells up when put into cold water, but dissolves sparingly in it. It is composed of nearly equal equivalents of oxygen, hydrogen, and carbon.

LICHENS (Gr. *leichen*), a large and important natural order of imperfectly organized plants, containing numerous species employed in the arts as pigments, and as articles of food. It is principally in the former respect that they are of economical interest, in consequence of the great consumption of orchal, or archil [ARCHIL], Cudbear (*Lecidea tartarea*), and others by the dyer.

Lichens are perennial plants, requiring free access to light and air, of the most simple organization, forming irregular patches upon the surface of stones, trees, the earth, and other bodies. They are distributed over all parts of the world, forming in the polar and similar regions a food for animals and man. *Cladonia rangiferina* supports the reindeer, *Cetraria islandica* furnishes the nutritious Iceland moss of the druggists' shops; and various species of *Gyrophora*, under the name of Tripe de Roché, form a part of the supply of food scantily furnished by nature for the Canadian hunter. In warmer countries they acquire a firmer consistence, and appear

to form secretions of a peculiar kind in much greater abundance than in the northern parts of the world. (See Plates.)

Lichens are directly opposed to Fungi, as they are perennial, and consist of a lobe and leaf-like thallus. They are usually found in those northern regions where more delicately-formed plants cannot exist. The annexed is the representation of a lichen, called the *Jungermannia*, the fructification of which is here represented.



Fructification of the *Jungermannia*.

A is a very young spore-case, still covered by the calyptra; B, the same quite developed in the hyaline, ripe and bursting, and presenting to view the inclosed spores.

The *Promelia perforata* is a beautiful variety of lichen with projecting shields.



Promelia perforata.

Dr. Lindley, in his 'Natural System of Plants,' places the *Lichenales* among the Asexual or Flowerless plants (Class I., *Thallogens*), and describes them as 'Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in air; propagated by spores usually inclosed in asci; and always having green gonidia in their thallus.' He estimates the number of genera at 58, and the species at 2400. He also classifies the family under the natural orders, *Graphidaceæ*, or Letter lichens; the *Collema*ceæ, or Jelly lichens; and the *Parmellaceæ*, or Leaf lichens.

LICHFIELD. [STAFFORDSHIRE.]

LICHTENBERG, a principality of 220 square miles, with 38,000 inhabitants, formerly called the lordship of Baumholder, and now included in the Prussian Rhein-Provinz. It was ceded in 1816 by Prussia to the duke of Saxe-Coburg, who gave it the rank of a principality, and who held it till 1834, when it was again given up to Prussia for an equivalent of 80,000 dollars a year.

LICHTENSTEIN, a sovereign principality, the smallest of all the states composing the German con-

federation, is situated between the Rhine, Switzerland, and the Tyrol, on the northern slope of the Rhetian Alps, the highest summits of which rise to an elevation of 5610 feet. Its area is 63 square miles, or about one-third of the county of Rutland; its population is little over 7000, of the Roman Catholic religion. The country is very mountainous; but it produces corn, flax, wine, fruit, and timber, sufficient for the consumption of the inhabitants, who have also a good breed of horned cattle.

The capital, *Vaduz* or *Lichtenstein*, is a market town on the right bank of the Rhine, with a population of 1700. A new constitution was given to the principality on October 15, 1862, in consequence of some popular agitation. By the terms of the new fundamental law, the whole legislative power is vested in one House of Representatives, comprising fifteen members, three to be chosen by the reigning prince, and the other twelve by the people in public election. A vote is given to all inhabitants who can read and write; but to become a deputy a small property qualification is required. The chamber assembles every year in regular session, without being summoned by the prince. The latter is bound by the constitution to reside in the country for part of the year, and to appoint a governor in his absence.

There exists no public budget, all taxation being of a local kind. The total revenue for 1862 amounted to 55,000 florins, or 5500*l.*, and the expenditure to very nearly the same. Lichtenstein has no public debt. To the army of the confederation the principality has to contribute 91 foot soldiers; but no troops are kept under arms.

The princely family of Lichtenstein is said to derive its origin—together with the reigning houses of Great Britain, Hanover, and Brunswick—from the Longobard marquis d'Este, who married Cunizza, a Suabian heiress, at the commencement of the eleventh century. Partly on account of this antiquity of the family, and partly because of its immense wealth, the congress of Vienna, which sequestrated or 'mediatized' territories of much larger extent, left the principality of Lichtenstein a sovereign state, governed by its hereditary rulers. This diplomatic verdict, however, has not been ratified by the royal families of Europe, from whose circle the princes of Lichtenstein have hitherto been excluded. There are no blood alliances between any German or other reigning houses and the sovereign family of Lichtenstein. The members of the latter, all of them strict Roman Catholics, have allied themselves almost exclusively with the upper nobility of Austria, in which empire, and chiefly in the province of Moravia, the immense private estates of the family are situated. They embrace an area of over 2200 English square miles, with 350,000 inhabitants—or thirty-four times the extent, and forty-eight times the population of the principality of Lichtenstein—and yield an annual revenue of two millions and a half of Austrian florins, or 250,000*l.* From the principality itself the prince derives no income, but has been frequently under the necessity of advancing money to his subjects; the last time in 1847, when he made the state a loan of 36,000 florins. Formerly, the reigning prince resided entirely at Vienna, or at his castle of Eisgrub in Moravia; but the present

ruler has consented to reside part of the year at Vaduz, the capital of Lichtenstein.

LICINUS (Latreille), a genus of coleopterous insects included in the great group *Carabus* of the older authors. The genus *Licinus* is placed by Dejean in his section *Patellimanes*, and together with the genera *Dicalus*, *Rembus*, and *Badister*, constitutes a little section or sub-family, distinguished from other *Patellimanes* by the want of the tooth-like process in the emargination of the mentum. Three species of *Licinus* are British, and about twelve are known, most of which inhabit Europe.

LICTOR, a public officer who attended on the principal Roman magistrates. The kings, and afterwards the consuls, were attended by twelve lictors, the dictator by twenty-four, and the master of the horse by six. The duty of the lictor was to see that proper respect was paid to the magistrates, and to inflict punishment on those who were condemned. The lictors carried on their shoulders rods bound in the form of a bundle, with an axe in the middle.

LICUALA, a genus of Palms of the tribe *Coryphineæ* of Von Martius. A species, *L. peltata*, is described by Dr. Roxburgh as a native of the mountainous and woody parts near Chittagong. He mentions the narrow leaves of this tree as being formed into pipes for smoking tobacco, while the broader ones are employed for wrapping up fruit, and for other domestic uses.

LIÈGE, a province of Belgium, is bounded N. by Limburg, E. by Prussia, S. by Luxembourg, and W. by Namur and South Brabant. Its area is 1120 square miles, and the population in 1861 was 537,218, most of whom are Wallons. The southern portion of the province is hilly and undulating. The Ardennes mountains cover a great part of the south. The soil differs much in quality. On the west side of the Meuse, and on the east side towards Limburg, the plains, valleys, and low hills are fertile, well cultivated, and afford rich pasturage; on the east side of the Meuse, where it is joined by the Ourthe, especially towards Luxembourg, the ground is rocky and stony. In this part of the province there are extensive forests. The principal river is the Meuse, which comes from Namur, and forms at first the boundary between the two provinces. After receiving the Ourthe, it flows between high, steep, and often perpendicular rocks to the city of Liège, where it becomes broader; below this it flows N. by E. into the province of Limburg. The climate is healthy. The country produces hops, corn, and a little wine; the pastures maintain great numbers of horned cattle and sheep. The mineral wealth of the country is considerable; there are valuable mines of lead, zinc, and iron; but more important than all these together are the numerous coal mines of the provinces. Of the mineral waters those of Spa are the most celebrated. The manufactures, which are very important, consist of all kinds of steam machinery for railroads and factories, mill-castings, fine woollens, merinoes, linen, cotton stuffs, cutlery and surgical instruments, fire-arms, glass, hardware, &c. The province is crossed by the Liège-Namur Railroad, and by the line from Ostend to Cologne.

The capital is LIÈGE. *Glons*, a small place of 2000 inhabitants, 7 miles N. of Liège, is the centre of a great straw-hat manufacture. *Herstal*, or *Heristal*, on the left bank of the Meuse, has important

iron and coal mines, iron and steel works, iron-foundries, and 6000 inhabitants. Pepin-le-Gros took the name of de Heristal from having resided here. *Herve*, a few miles E. of Liège, has 3600 inhabitants, who manufacture woollen cloth, stockings, and shoes, and trade in cattle, cheese, and butter. *Huy*. [HUY.] *Limburg*, a small fortified town, which has nearly 2000 inhabitants, stands 16 miles N.E. from Liège, on the railway to Aix-la-Chapelle, and has manufactures of fine linen and woollen cloth. *Seraing* is 3 miles S.W. of Liège, on the right bank of the Meuse, and on the railway to Cologne. It is celebrated for its extensive iron and coal works, and for the manufactures of steam machinery, locomotives, and spindles, instituted by John Cockerill, an Englishman, in 1816, employing upwards of 5000 persons. This place has an ancient episcopal palace, and a suspension bridge, near which is the steam-packet station. Population (in 1864), 20,084. *Spa*, a well-built little town, famous for its mineral springs and baths, is situated in a pretty valley among the Ardennes mountains, in the south-east of the province, 17 miles S.E. of Liège. The heights around it are covered with plantations, and laid out in delightful walks, which present at several points prospects of great beauty. The principal spring, called Pouhon (over which Peter the Great of Russia built the pump-room in 1717), is situated in the town; six others are in the environs. The ordinary population is about 5000, who live chiefly by the profits derived from visitors to the waters. In 1860 it had 10,895 visitors, of whom 5334 were Belgians. The bath-buildings, the several pump-rooms, and the Redoute, a handsome building which includes a café, theatre, gambling-rooms, &c., are the most interesting structures in Spa. The Spa springs are chalybeate; they are chiefly recommended in cases of relaxation of the bowels and obstruction of the liver. About 150,000 bottles are annually exported from the Pouhon spring, which is the strongest. Spa is famous also for the manufacture of elegant wooden toys, workboxes, writing-desks, &c. The mountains near the town contain many beautiful and extensive grottoes. *Theux*, S.E. of Liège, on the railway to Aachen, has black marble quarries, woollen-yarn factories, iron-works, and 3000 inhabitants. *Verviers*, a flourishing manufacturing town of 29,000 inhabitants, is situated on the Vesdre, about 20 miles by railway E. from Liège. It is irregularly built; but some of the suburbs are pretty. The town-house, theatre, the new church, and the college, are the most remarkable public structures of the town. Verviers is famous for the manufacture of fine and ordinary woollen cloths, cassimirs, and yarn, giving employment to 40,000 hands in the town and neighbourhood; the Belgian army is clothed principally from the looms here, the total produce of which is estimated at 350,000 pieces, value 80,000,000 francs annually. For these, steam and water mills are employed. Flannels, serges, tickings, coverlets, mousselines de laine, merino, &c., are also manufactured. The dyes of Verviers are said not to be surpassed in Europe. There are also establishments for the manufacture of steam machinery, ironmongery, soap, beer, &c.

LIÈGE (*Lüttich*, *Luik*), the capital of the Belgian province of Liège, is situated in a valley at the junc-

tion of the Ourthe with the Meuse, in 50° 39' N. lat., 5° 31' E. long.; population, 97,500. It is the seat of a bishop, and of the supreme court of justice for Liège, Limburg, Namur, and Luxembourg. The Meuse, on entering the city, divides into several branches which form islands, bordered by handsome quays and connected by seventeen bridges. Liège is divided into the old and the new town, and has besides ten suburbs. Most of the streets are very narrow, dark in consequence of the height of the houses, and not clean. There are, however, a few broad streets, some good squares, and promenades. The city was formerly fortified, but at present it is defended only by a citadel, erected on St. Walbuge's Mount on the north side of the town, and by a great outwork on the west side. The most remarkable buildings are—the cathedral, built in the eighth century; the palace of justice, formerly the palace of the episcopal prince; the theatre; the church of St. Jacques; and the university, which was founded in 1817. There are a gymnasium, a bank, and numerous learned and charitable institutions. Amongst the latter are schools for the blind and for deaf mutes. The extensive coal mines near the town, which employ upwards of 10,000 miners; its numerous iron-works, royal cannon-foundry, and establishments for the manufacture of fire-arms, hardware, broad-cloth, glass, paper, watches, jewellery, and leather; its engine-factories, zinc-rolling mills, and naileries; its linen and cotton factories, steel-works, breweries, distilleries, and sugar refineries; together with a flourishing commerce in colonial produce and manufactured goods—render it one of the most important towns in Belgium, and one of the most industrial in Europe. It supplies fire-arms to nearly all the governments in the world, the exports of these only having doubled since 1859. It has a chamber of commerce and manufactures, cabinets of chemistry and natural history, a botanic garden, and a school of mines. It was the capital of the French department *Ourthe* from 1793 to 1814. In 1702 it was besieged and taken by the duke of Marlborough.

LIEGNITZ, one of the three governments into which SILESIA is divided, comprises the most north-westerly part of that province, and that part of Upper Lausitz which now belongs to Prussia. Its area is 4000 square miles, and the population in 1862 was 956,813.

Görlitz, a well-built fortified town, is situated on the left bank of the Neisse, 60 miles by railway E. from Dresden, and has a population of 26,534 civil, and 1449 military (1861). It contains thriving and extensive manufactures of linen and woollen cloths, bell foundries, steel and iron factories, lithographic-printing, and bleaching establishments. The town has also a considerable transit trade. It contains several churches, a citadel, a town-hall, high school, libraries, an orphan asylum, hospitals, a house of correction, a Protestant college, and a philosophical society, with a library and several MSS. *Görlitz* is walled, entered by eleven gates, and has three suburbs.

Glogau, a strong fortress on the left bank of the Oder, is situated in 51° 38' N. lat., 16° 7' E. long., 50 miles by railway E. from the Hansdorf station on the Frankfort-Breslau line, and has 16,000 inhabitants, including the garrison. An island in the Oder is strongly fortified, and connected with the town by

a wooden bridge. There are in Glogau many Roman Catholic and some Protestant churches, a synagogue, a citadel, and a garrison, Roman Catholic and Protestant colleges, &c. The principal articles manufactured are beet-root sugar, tobacco, paper, woollen and cotton fabrics, and straw hats. There is also a considerable corn market.

Liegnitz, the capital of the government, stands at the junction of the Schwartzwasser and the Katzbach, in 51° 12' N. lat., 16° 12' E. long., 180 miles by railway S.E. from Berlin, and has 18,600 inhabitants. The inner and older part of the town is surrounded with a moat and rampart of earth, which is laid out in gardens and planted with trees; it is entered by four gates. The chief buildings of the town are—two Lutheran and three Roman Catholic churches, a ducal chapel, an ancient council-house, an academy, an orphan asylum, and a workhouse. The manufactures are cotton and woollen stuffs, silk, linen, leather, and tobacco; and its vicinity is famous for horticulture. Formerly it was fortified; and here, on the 16th August, 1760, the Prussians, under Frederick the Great, totally defeated the Austrians.

Goldberg, situated on an eminence on the banks of the Katzbach, has double walls and gates: it is 11 miles S.W. of Liegnitz, and has 7500 inhabitants, most of whom are engaged in manufactures of woollen cloth, hosiery, and gloves. About six miles to the east is the hamlet of Wahlstadt, where the Prussians defeated the French, August 26, 1813. *Grünberg*, a walled town, with gates, has 10,700 inhabitants, and flourishing manufactures of woollen cloths and straw hats. The vine is extensively cultivated. *Herschberg*, S.W. of Goldberg, is the centre of a great linen manufacture, and has 7080 inhabitants. *Jauer*, or *Jauerbach*, stands 10 miles S. of Liegnitz on the Neisse. It is a well-built town, surrounded by a double wall and a ditch, and has 8000 inhabitants, who manufacture broad-cloth, linen, hosiery, and leather, and trade in corn and flax. *Lauban*, on the Queis, a walled town, with four gates, has 6800 inhabitants, who manufacture calico, tobacco, and linen. *Sagan*, on the Bober, is a strongly fortified town, with three gates, a very fine ducal palace with a beautiful park, one Lutheran and five Roman Catholic churches, hospitals, and manufactures of woollen cloth, linen, stockings, lace, sealing-wax, looking-glasses, &c. The population is a little over 8000. The railway from Glogau to Berlin runs through the town. The Prussians were defeated here by the Russians in 1759.

LIEN (from the French *lien*, 'a tie,' or 'band.') The following definition is perhaps as correct as any that has proceeded from the judges:—A lien is a right in one man to retain that which is in his possession belonging to another till certain demands of the person in possession are satisfied. (Grose, J., in 'Hammond v. Barclay,' 2 East, 227.) The definition therefore includes possession (in some sense) by the party claiming the lien; and an unsatisfied demand by him against the owner of the property.

It has been said that 'liens only exist in three ways; either by express contract, by usage of trade, or where there is some legal relation.' (Bayley, J., 1 Ba. and Ald., 582.)

When lien arises by express contract, it is simply mortgage, pawn, or pledge, which are then the more

appropriate terms; or it is an agreement (such as may exist in the case of principal and factor) that goods intrusted by one person to another for the purpose of sale, or for some other purpose than pledge, may be retained by the party intrusted with them as a security for any debt or balance due to him from the other; or it is an agreement that he may retain the proceeds of things intrusted to him to sell, for the same purpose.

Where two parties have so dealt with one another that one has claimed and the other has allowed the right of lien in respect of any their mutual dealings, lien may exist in all cases of like dealings between them, if there be no verbal or written agreement to the contrary. The acts of the parties are here the evidence of the contract.

The 'lien by usage,' and that 'where there is some legal relation between the parties,' belong to one class, and are not distinguishable. They are both included under liens which arise from implied contract. The 'usage of trade' is merely evidence from which contract is to be implied: parties who mutually act in conformity to a custom, have in effect, though not in form, made a contract. The term 'legal relation' is only another mode of expressing the mutual rights and duties of the same parties, who by their acts have brought themselves within the limits of a custom, and so given evidence of an intention to make a contract. Thus an innkeeper has a lien upon the horse of his guest which he takes into his stable to feed.

Lien, unless there be an express contract, or a custom to the contrary, must from its nature be *particular*, that is, must have reference to a particular transaction and to a particular thing. When it is *general*, that is, where the right to retain a particular thing is not limited to a particular transaction, but exists with respect to other transactions also, there must be express contract, or the dealings of the parties must be such as to create that implied contract which arises from acts done in conformity to well-known usage.

Lien may be lost by voluntarily parting with the thing, by express agreement, or by agreement to be implied from acts. In general, when a person has a lien for a debt, he waives it by taking security for the debt.

In Equity, the vendor of an estate, though he has executed a conveyance and parted with the possession without being paid, still has his estate as a security for such part of the purchase-money as is unpaid. This security is generally, though not with strict propriety, called the vendor's lien. The ground of this so-called lien lies in the nature of the contract: one party contracts to give land for money, and the other contracts to give money for land; and both parties must perform their engagement.

The practical questions which arise under the general doctrine of lien are numerous, and sometimes not easy of solution; many of them are of the greatest importance to the mercantile community. The chief cases in which lien exists may be referred to the law of Agent, Attorney, Bailment, Carrier, and Factor. Montagu's work 'On Lien' contains a collection of a considerable number of particular instances. The law of lien is known in Scotch law under the name of *Retention*; and the practical results of the doctrine are almost the same in both countries.

LIERRE. [ANTWERP.]

LIESTALL. [BASEL.]

LIEUTENANT, any officer who discharges the duties of a superior in his name and during his absence, and who acts immediately in subordination to him when he is present.

Thus, in military affairs, the lieutenant-general and the lieutenant-colonel respectively superintend the economy and the movements of the army and the battalion under those who hold the chief command. For many years past, however, the lieutenant-colonel has been the officer actually in command of a regiment—the colonelcy having gradually become a sinecure appointment. The lieutenant of a company is also immediately subordinate to the captain, in whose absence he has the same powers. In the British service the lieutenants of the three regiments of foot-guards have the rank of captain: in the royal regiment of artillery, the royal corps of engineers and marines, there being no ensigns, the subaltern officers were formerly distinguished as first and second lieutenants; but they are now all styled lieutenants—the juniors receiving only the pay of a second lieutenant. The pay of a lieutenant in the army varies from 10s. 4d. a day in the Life Guards to 6s. 6d. in the line.

A lieutenant in the royal navy takes rank as a captain in the army, and the number appointed to ships of war varies with their rate. Their full pay is 10s. per day, and their half-pay ranges from 4s. to 7s., according to their length of service. At least six years' service are required before a lieutenancy can be obtained in the navy.

LIEUTENANT-GENERAL. [GENERAL.]

LIEUTENANT, LORD. [LORD LIEUTENANT.]

LIEUVIN. [CALVADOS; EURE.]

LIFE. Organic matter, in which alone the phenomena of life are cognizable to our senses, is distinguished from common or inorganic matter by several peculiarities of composition and structure. Twenty elementary substances occur in organic matter, viz., oxygen, hydrogen, nitrogen, carbon, phosphorus, sulphur, iodine, bromine, chlorine, fluorine, potassium, sodium, calcium, magnesium, silicon, aluminum, iron, manganese, copper, and lead. Of these the first four, on account of their universal presence in organic matter, have been called organic elements. But although the elementary substances of which organic matter is composed are the same as those of common matter, their mode of combination is peculiar. In minerals, the elements are generally united in pairs, or according to a binary mode of combination; but in organic matter, three at least, and usually four elementary principles, are combined in each simplest substance or proximate principle. In organic compounds again, the elements are not generally united in any simple ratio one to another, as 1 atom of one to 1, 2, or 3 of another, as in inorganic bodies, but several (as 10 or 12 of one) are united with several of each of the others to form one compound atom.

In respect of structure, it is observed that all organic bodies, plants as well as animals, have a more or less rounded and cylindrical, branched or membered form, bounded by curved lines, and by convex or concave surfaces very distinct from the crystalline, the only regular form of inorganic matter.

All the parts of an organic body are, both in their origin and in their continuance, more or less dependent upon one another. In their original formation, the production of one part induced that of another; and, when formed, the action of one influences the actions of all.

The maintenance of the living being, during a certain length of time, by the mutual changes which take place between it and the external world, is the most general phenomenon observed in organic bodies during life. It is a compound process, consisting—1st, Of the reception of materials from the external world as nutriment, which is taken up by absorption and carried on by a peculiar motion in vessels, or through the interstices of the tissues; 2nd, Attraction of aeriform substances from without, and separation of other aeriform substances from within, constituting respiration; 3rd, Conversion of the nutriment and aeriform substances imbibed into the peculiar fluids of the body—assimilation; 4th, The motion of these fluids through the body by a circulation or other means; 5th, Conversion of the fluids into a solid form, or the combination of them with the solids, so as to maintain the peculiar properties of the latter, constituting nutrition properly so called; 6th, The preparation and separation of fluids of peculiar kinds from the assimilated fluids, or the formation of secretions. These processes, which are called the nutritive functions, occur in a more or less distinct manner in all living bodies, plants, as well as animals, and are essentially characteristics of Life, to which nothing analogous is ever observed in inorganic bodies.

LIFE ANNUITY. [ANNUITY.]

LIFE, DURATION OF. [MORTALITY, LAW OF.]

LIFE-BOAT; LIFE-BUOY; LIFE-PRESERVER. Many ingenious plans, more or less practicable, have been proposed for saving from drowning those who may be in peril by shipwreck or otherwise. These contrivances may be classed as *Life-Boats* and *Life-Buoys*, or *Life-Preservers*.

Life-Boats.—A life-boat is a boat constructed with great strength to resist violent shocks, and at the same time possessing sufficient buoyancy to enable it to float, though loaded with men and filled with water. Such boats are maintained at most of the ports of this kingdom, always ready to put to sea when vessels are seen in danger of shipwreck, and provided with means for being conveyed to the shore, and launched as rapidly as possible. As early as the year 1785, a patent was granted to Mr. Lukin for a life-boat with projecting gunwales and hollow cases or double sides under them, as well as air-tight lockers or inclosures under the thwarts: these contrivances increased the buoyancy of the boat, and the air-tight cases under the gunwales, by their weight when raised above the surface of the sea, and their resistance, when depressed beneath, greatly prevented rolling. Mr. Lukin's boat was strong and buoyant, but it was liable to be disabled by having the sides staved in. This defect was obviated in Mr. Greathead's boat, which was invented soon after; its prevailing feature was that of being lined inside and outside with cork. His boat was instrumental in saving the lives of 300 persons in five years, near Tynemouth.

From time to time other inventors came forward with improvements and plans. Boats of various powers and dimensions were constructed, but some

were found to fail in the moment of trial. In 1850 the late duke of Northumberland offered a prize of 100 guineas for the best model of a life-boat. The

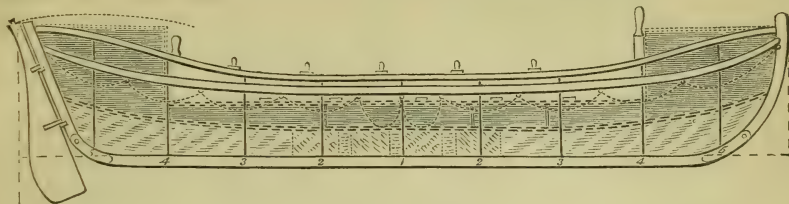


Fig. 1.—Sheer Plan.

committee appointed to adjudicate upon the merits of the designs sent in laid down the following among the requisite qualities:—A life-boat must be good in

rowing, good in sailing, good in launching through a surf; it must have small internal capacity for water, and easy means of riddance of any it may receive;

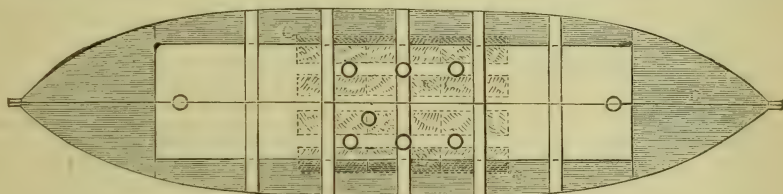


Fig. 2.—Deck Plan

it must be buoyant, and possess self-righting power; it must be adapted for beaching, light for transport along the shore, roomy for passengers, and possess good access to stem or stern, &c. The model which was found to possess the greatest number of these good qualities was one sent in by Mr. Beeching, of Yarmouth, to whom the prize was consequently awarded. Mr. Peake, the master shipwright at Portsmouth, who was one of the committee, designed a boat which comprised many of the features of the competitive boats, and added others suggested by his experience. This boat, gradually improved in later years, is the one which now constitutes the recognized English model, and is adopted, to the exclusion of all others, by that highly useful society, 'The National Life-boat Institution.' Many boats of the same kind have also been sent to foreign countries.

In the annexed cuts we give plans and sections, showing the construction of the life-boats of the Institution. The boats are each 33 feet in length, and 8 feet in breadth. In fig. 1 the general exterior form of the boat is shown. The dotted lines indicate the position and dimensions of the air-chambers; the relieving tubes, with self-acting valves, for allowing the water which may enter to escape; and ballast. The festooned lines represent exterior life-lines attached round the entire length of the boat, to which persons in the water, by stepping on them, may climb into the boat; the two central lines are festooned lower than the others, to be used as stirrups, so that a person in the water, by stepping on them, may climb into the boat. In fig. 2, A represents the deck, B the relieving tubes (six inches in diameter), C the side air-cases, D the end air-chambers, E ballast, F ventilators to admit of a free current of air

under the water-tight deck, G ventilator to receive pump. In fig. 3 the exterior form of transverse sections, at different distances from stem to stern, is shown.

Fig. 4 represents a midship transverse section, A being sections of the side air-cases, B the relieving-tubes, of the same depth as the space between the deck and the boat's floor; C, C, C, are spaces beneath the deck, 9 feet in length, placed longitudinally, at the midship part of the boat, with solid chocks of light wood, or cases

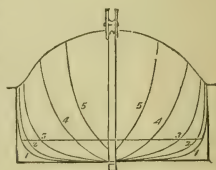


Fig. 3.—Body Plan.

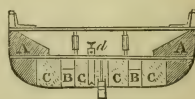


Fig. 4.—Midship Section.

packed with cork, forming a portion of the ballast; D is a ventilator, having a pump fixed in it, by which any leakage can be pumped out by one of the crew whilst afloat.

The chief peculiarities of the boats of the 'National Life-boat Institution' are (1), that they are rendered unsubmergeable by attaching to them, chiefly within board, water-tight air-cases, or fixed water-tight compartments under the deck; (2) the capability of self-discharging in a few seconds any water which may be shipped by the breaking over of a sea, or by a boat being suddenly thrown on her beam ends. This is accomplished by tubes fitted with self-acting valves, which open downwards only, so that they

will allow any water shipped to pass out; whilst none besides a trifling leakage can pass upwards through them. The greater the quantity of water within, the faster it will run out. (3) The power of self-righting—which is accomplished chiefly by attaching an iron keel, weighing from 4 cwt. to 8 cwt. When the boat is upset, she is floated unsteadily on the two air-chambers at the bow and stern, whilst the heavy iron keel and other ballast being then carried above the centre of gravity, an unstable equilibrium is at once effected, and the weight of the iron keel falling over on one side, immediately restores the boat to her proper position.

Most of the life-boats in the United Kingdom now belong to, or are under the superintendence of, the National Life-boat Institution, a society well deserving generous support. It was incorporated by royal charter in 1824, and from that time to the end of 1865 it had been the means of saving several hundred vessels and no less than 14,992 lives. It has now 153 boats stationed at those parts of the coast where experience has proved they will be most useful. The following extracts from the rules will give a good idea of the plan of operations pursued by the society:—

‘Each life-boat to have a coxswain superintendent, with a fixed annual salary of 8*l*., and an assistant coxswain with a yearly salary of 2*l*.

‘The life-boat to be regularly taken afloat for exercise once every quarter, fully manned and equipped, so that the crew may be familiar with her qualities and proper management. On every occasion of exercise, the men are to be paid 5*s*. each in stormy weather and 3*s*. each in fine weather; and on every occasion of going off to a wreck to save life, each man of the crew to receive 10*s*. by day, and 1*l*. by night. These payments to be doubled on occasion either of extraordinary risk or of long exposure.

‘The life-boat to be kept on her carriage, in the boat-house, with all her gear in her ready for use. Signals are agreed upon for calling the life-boat’s crew together; and immediately on intimation of a wreck, or vessel in distress, the coxswain is to muster his crew, who are to put on their life-belts, launch his boat, and proceed to her assistance.

‘The local committee to make quarterly inspection, and report to the Institution as to the behaviour of the boat during exercise, pointing out any defect that may be remedied, and offering any suggestion that may conduce to the efficiency of the service.’

The expense of a life-boat station is 620*l*. Its cost is made up as follows:—

Life-boat and her equipment, including	
life-belts for the crew, ...	£320
Transporting-carriage, to take the boat	
from the boat-house to the sea, ...	100
Boat-house (average cost), ...	200
Total, ...	£620

The crews are formed by the coast-guardsmen, fishermen, and sailors on the coast, and are unflinching, brave, and unselfish in the hour of peril. In 1865 the Institution expended 21,374*l*. on its various life-boat establishments on the coasts of England, Scotland, and Ireland. For the services rendered in saving lives since its formation 82 gold medals, 751 silver medals, and 21,111*l*. in cash, have been paid

in rewards. The Institution also expended 128,859*l*. on its life-boat establishments from 1824 to 1865.

Most large vessels now carry one or more life-boats; but as the size of the ordinary life-boat renders it inconvenient for stowage on shipboard, a collapsing boat is used, the sides of which are connected by hinges, and which are thus readily expanded. It possesses great strength, and many of the advantages of the ordinary life-boat.

Life-Buoy or Life-Preserver.—Anything lighter than water, used as a means of personal safety on account of its buoyancy, may be considered a life-buoy. Various substances have from time to time been tried for this purpose, but cork is now most generally preferred; and the buoy which has of late years most successfully won its way into the favour of seamen consists of a kind of hoop, composed of slices of that material, about 32 inches in diameter and 6 inches in width, with a thickness of about 4 inches. It contains altogether about 12 lbs. of cork, is compactly covered with painted canvas, and furnished with lines, to afford a more convenient hold, and under ordinary circumstances will support at least four men. In fact, it has been estimated that one pound of cork is sufficient to support a man of ordinary size and make. Many varieties of life-buoys have been made of india-rubber inflated with air, including mattresses, jackets, and waistcoats, but the general objection to them is that they are liable to be rendered altogether useless by being punctured or torn, and are also often subjected to decay by being put away while damp. The crews of the National Life-boat Institution wear a life-belt composed of cork, and tied over the shoulders and around the waist. Many lives have been saved by this apparatus, as it is quite sufficient to keep a man afloat; and, on the other hand, it does not at all interfere with the action of the arms either in swimming or rowing. The Society has of late years endeavoured to procure the more general adoption of these belts in merchant vessels; and although sailors were at first prejudiced against them, they are every year becoming more generally used, as it is felt it is no imputation on the courage of a brave man that he seeks to protect his life.

Empty casks, well bunged up, form good life-buoys; and a patent life-raft consists of a square frame buoyed up by a cask at each corner. A 36-gallon cask is quite sufficient to sustain ten men under ordinary circumstances, and in tolerably smooth water. Frames of bamboo and inflated goat and seal skins are used as life-preservers in some foreign countries, and in China gourds are employed for a similar purpose.

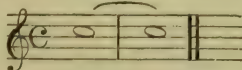
LIFE GUARDS. A military term, applied to those squadrons of cavalry which act as the body-guard of a sovereign prince. In every nation the sovereign has invariably been protected by some such special force. In England, the present cavalry establishment was formed by Charles II., shortly after his restoration, and became, as Macaulay says, the germ of that great and renowned army which has, in the present century, marched triumphant into Madrid and Paris, into Canton and Candahar. The Life Guards, who now form two regiments, were then distributed into three troops, each of which consisted of two hundred carabineers, exclusive of

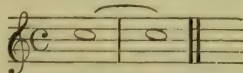
officers. The privates were well paid, clothed in a superb uniform, and designated as gentlemen of the guard. The Blues received their name from their blue coats and cloaks. The Dragoons, now included in the heavy cavalry, were originally light horsemen. The Scots Greys, a regiment raised after the Union, received their appellation from their uniform, but are now mounted on gray horses. The *pay per diem* of a lieutenant-colonel in the Life Guards is 29s. 2d.; of a major, 24s. 5d.; of a captain, 15s. 1d.; of a lieutenant, 10s. 4d.; of a cornet or second lieutenant, 8s.; and of an adjutant, 13s. In the Dragoons the emoluments are about four-fifths of these amounts. A lieutenant-colonel's commission in the Life Guards is valued at 7250*l.*; a major's, 5350*l.*; a captain's, 3500*l.*; a lieutenant's, 1785*l.*; and a cornet's, 1260*l.* Each of the Life and Horse Guard regiments now consist of 343 men, 64 non-commissioned officers, and 33 commissioned officers, making a total for the three regiments of 1320 men of all ranks.

LIFE INSURANCE. [INSURANCE, LIFE.]

LIFE-PRESERVER, an ingenious apparatus, invented by Captain Manby, for rescuing persons from shipwreck. It consists of a long rope, attached to a shot, which is discharged from a mortar over the stranded vessel. A communication having been thus effected between the shore and the wreck, little difficulty remains in rescuing the passengers by the means of boats, or otherwise. Connected with this apparatus are night-balls, which are provided with hollow cases of thick pasteboard, with a fuze and quick match, and charged with sufficient powder to inflame them. The fuze is so graduated that the shell explodes at the height of 300 yards; and the balls spread a brilliant light for about a minute, and give a clear view of every surrounding object. This apparatus has been the means of preserving hundreds of lives.

LIFERENT, in Scotch law, is the right to use and enjoy a subject during life, without wasting its substance, Ersk., 'Inst.' II., 9, 39. Its origin is attributable to the servitude of *usus fructus* in Roman law, from which it differs rather in the nature of the subjects of which it may consist than of the use permitted of them. In Scotch law the subject of liferent may be either heritable subjects or money. The proprietor of the subject is named the *fiar*, and the person enjoying the use of it the *liferenter*. There are two liferents established by the mere disposition of the law, of which the one called *tora* consists in the right of a widow who has produced a living child to the liferent of one-third of the heritable estate of which her husband died *fiar*; and the other, called *courtesy*, is the right of the surviving husband of an heiress, when the marriage has produced an heir to the estate, to a liferent of the whole heritable estate of his wife to which she may have succeeded by inheritance.

LIGATURE, in modern music, a binding, indicated by a curved line, . If two notes of the same pitch are thus joined, only the first is to be struck, but the second to continue its full time. *Ex.*—



In vocal music all the notes which are set to one syllable are bound together.

LIGHT. It was once generally assumed that light consists of particles emitted from a luminous body; and this hypothesis may yet be conveniently adopted in explaining many of the phenomena of light and vision. A series of particles proceeding in a line constitute what is called a *ray* of light; and a small number of rays parallel to one another, or diverging from a point, form a *pencil* of light. In vacuo, and also in a uniform medium, the rays are conceived to be straight lines; but at the surfaces and in the interiors of bodies, light suffers modifications, which generally produce deflections from the rectilinear direction.

The rays being supposed to diverge in every direction from a luminous object, it follows that, if a small cone of rays were intercepted by any plane surface, which may be considered as part of the concave surface of a sphere having the radiant point for its centre, the intensity of the light on the surface will be inversely proportional to the square of its distance from that point. It is also evident that two luminaries are equal in absolute light when, being placed at equal distances from, and in similar situations with respect to a given smooth white surface, or two equal and precisely similar white surfaces, they illumine it or them equally. This appears from Plate 1, fig. 1. ABCD is a section of a small rectangular box open at both ends, and blackened within. On the inside, inclined at angles of 45° to its axis, are placed two rectangular pieces of plane looking-glass, FC, FD, exactly alike, and fastened so as to meet at F, in a narrow slit, EFG, covered with a slip of fine tissue paper. To compare the powers of the lights, PQ, place them at such distances from each other and from the instrument between them, that the light from every part of each shall fall on the reflector next it, and be reflected to the corresponding part of the paper, EF or FG. The instrument is then to be moved nearer to the one or the other, till the paper on either side of the division F appears equally illuminated.

Certain astronomical phenomena (aberration, and the eclipses of Jupiter's satellites) prove that the propagation of light through space is not instantaneous; and that it takes place, in round numbers, at the rate of 192,000 miles per second. The phenomenon of aberration illustrates this. Let a ray of light from a star, S (Plate 1, fig. 2), be received on a small screen, A, having an extremely minute opening, A, in its centre; and let that ray which passes through the opening be received at any distance, AB, on a screen, B, perpendicular to its direction; and let B be the point on which it falls. If, then, we join the points AB by an imaginary line, that line will be the direction in which the ray has really travelled, and will indicate to us the direction of the star. But let us suppose the apparatus carried along in the direction AC, BD, the ray passing through the aperture at A will now have the appearance of having fallen from *a*, in the direction *aB*.

By investigations purely mathematical it has been found that, if a small object be placed between two lights of different intensities, the point at which the object receives the least illumination from both is at a distance from either light directly proportional to the cube root of the intensity of that light, and inversely to the sum of the cube roots of both inten-

sities. And when a given object is enlightened by a luminous surface of small but sensible size, the degree of its illumination is proportional to the area of the luminous surface multiplied by the intensity of its illuminating power, and divided by the square of the distance of the surface illuminated. (See Plate 1, fig. 3.)

A convenient method of comparing the intensity of the light from two luminaries is illustrated by fig. 4, Plate 1. Before a screen, CD, of white paper in a darkened room place a blackened cylindrical stick, S, and let the flames *Ll* be so placed as to throw the shadows, AB, of the stick on the screen. Then move the lights till the two shadows appear of equal intensity. Their total illuminating powers will be in the direct ratio of the squares of their distances from the screen.

Again, if light from any luminous object pass through a small aperture and fall upon a screen in a darkened room, there will be formed an inverted image of the object (Plate 1, fig. 5), its magnitude being inversely proportional to the square of the distance of the object: now the intensity of light on the image, which is inversely proportional to the square of that distance, is also inversely proportional to the magnitude of the image; and it follows that the brightness of the image is constant, whatever be the distance of the luminous object. The eye is such a darkened room, and therefore a luminous object should appear of equal brightness at all distances; but the absorption of light in the atmosphere causes the greater dimness of distant objects. Again, in fig. 6, let A be a small aperture through which light falls from the sun, S, on the screen, B, in which there is also an aperture through which the light passes to another screen, C; it is evident that it will then not dilate itself as at B, and form an image of the whole sun, but only an image of that very minute portion of it which corresponds to the space occupied in its images on the first screen by the hole made there.

If a body on which light falls be unpolished and opaque, a portion of the light enters into it for a small depth, and is there partially absorbed; the complementary portion is scattered in all directions; the surface therefore becomes itself, to that extent, a source of light, but the composition of the differently coloured rays may be widely different from that of the incident light. When the body on which parallel rays of light fall is polished, the rays which do not enter the body are reflected from it principally in one direction; this, for a single ray, is in a plane passing through the ray perpendicularly to the reflecting surface (this is called the plane of reflection). By experiments made for the purpose, it has been found that the angle which the reflected ray makes with a line perpendicular to the surface is equal to that which the incident ray makes with the same line. This is an important law concerning the reflection of light, and it may be equally well accounted for on the theories of emission and undulation.

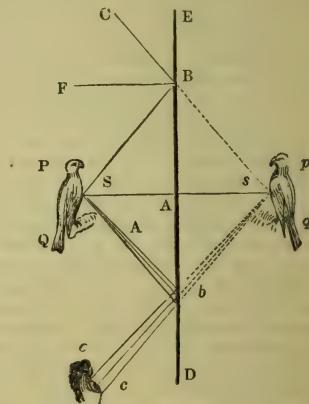
The *deviation* of a ray of light, after it has undergone any alteration in its course by the action of media, is the inclination of the primitive and final directions of the ray taken in the sense in which they are moving. This deviation by one reflection

on any surface is the supplement of double the incidence, or is the double of the inclination of either ray to the medium.

When there are successive reflections, the inclination of the plane of the first to that of the last reflection is the *deviation in plane*; the last ray being then in a different plane from the first, the first kind of deviation, or that of direction, is the angle between the first ray produced beyond the incident point (which is the course the ray would have pursued if unreflected), and a parallel to the last ray drawn from the same incident point.

When light is reflected by two parallel planes, there will be neither deviation in plane nor in direction; more generally there will be no deviation in plane when the first incident ray is in a plane perpendicular to the intersection of the two reflecting planes.

When light diverging from any luminous point falls on a plane reflecting surface, it will, after reflection, diverge accurately from a point similarly situated at the opposite side of the mirror. Let S be the luminous point, DE the mirror; draw SA perpendicular to the mirror, and produce it until $As = AS$; let SB be an incident ray, join sB, and produce it to C; then it is evident that $\angle SBA = \angle sBA = \angle CBE$. Now BC, being in the normal plane, SAB, and making, with the normal BF, an angle, CBF, equal to the angle, SBF, of incidence, must therefore be the reflected ray. The position of *s* being independent of that of B, the point of incidence, it



follows that every other reflected ray, *bc*, will diverge from the same point. Thus the reflected light will appear to an eye, *c*, as if proceeding from a point, *s*, behind the mirror similarly situated with S.

Hence, if any body, PQ, be placed before a mirror, DE, the light which emanates from P will appear after reflection to proceed from the similarly situated point, *p*, behind the mirror, and thus an *image*, *pq*, exactly similar to the body, PQ, will be seen by looking at the mirror; the common looking-glass is a familiar example.

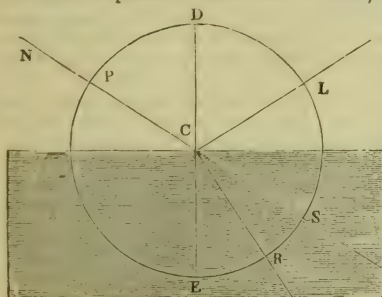
When light diverging from a point falls on a surface, after reflection it generally does not again converge to a point, or diverge from one accurately, but each infinitesimal pencil after reflection con-

verging to or diverging from a point, the locus of all such points forms an illuminated surface called a caustic by reflection, or catacaustic. This may be well illustrated by the following simple experiment by Sir David Brewster, shown in Plate 1, fig. 7:—Bend into a concave form a narrow strip of polished steel, and place it upright on a sheet of white paper. If this is held so that the plane of the paper passes nearly through the sun, the caustic will be seen brightly traced on the paper.

When light is incident on a transparent medium of greater density than that of the medium in which it originally moved, a portion of the light enters the medium, and then proceeds generally in one straight course in the plane of incidence, but not in the original direction, having a deviation *in course* though not *in plane*; and sometimes, as in certain crystallized media, it splits into two rays, one in the plane of incidence as before, the other in a plane determined by the nature of the crystal. The same phenomena take place when light passes from a dense to a rarer medium, except that in this case the whole of the light may under a certain incidence be totally reflected.

This alteration of the path of light passing from one medium to another, which is familiarly observed in the apparently bent form of a straight stick partially immersed in water in an oblique direction, is called refraction, as in Plate 1, fig. 8, where ACB is the refracting surface, PCp the perpendicular to it at the point of incidence C, SC the incident and Cs the refracting ray. That portion which is in the plane of incidence is called the *ordinary ray*, and the other portion, which occurs in the double refraction of uni-axal crystals, is called the *extraordinary ray*. We shall first attend to the laws of single refraction.

Let NPC represent a solar beam in vacuo, and



incident at C on a transparent medium (as water), to the surface of which DCE is normal. When the medium is fluid, place a graduated circle, DSE, in the plane of incidence, with its centre at C; a portion of the light will be reflected in the direction CL, and another entering the medium will be refracted in the direction CR. If uninfluenced by the medium, its direction would have been CS. The angle, RCE, is the angle of refraction, DCN or ECS of incidence, and SCR of deviation. The arcs DP, DL, are equal by the law of reflection, and if we compare the arcs DP, ER, their sines will be found in a constant ratio, depending on the nature of the medium, but independent of the angle of incidence. Thus, if I be the

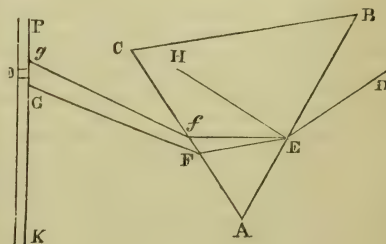
angle of incidence, and R that of refraction, the two are connected by the simple relation $\sin I = \mu \sin R$. The constant μ peculiar to the medium is called its *index of refraction*.

The reflection which accompanies refraction may be familiarly illustrated by filling a glass with water, and holding it above the level of the eye (fig. 9, Plate 1) in the direction Eac, when we shall see the whole surface shining like polished silver, and a spoon, ACB, immersed in it will be reflected on the surface as on a mirror. In this case, almost the whole incident light is reflected. A ray of light refracted through a medium with parallel plane surfaces, will have its final direction after both refractions the same as before entering the medium. See Plate 1, fig. 10, in which ABDF is the medium, and SET the ray of light. Again, a ray SB, fig. 11, incident on a compound medium consisting of two media, ACDF and DFGI, of different refractive indices, and with parallel external surfaces, will emerge in a direction HT, parallel to the incident ray. Pp, Qq, and Rr, show the amount of refraction in each medium.

The formation of foci and images by reflection and refraction are described in OPTICS; and the instruments constructed to take advantage of the properties of light, in MICROSCOPE; MIRROR; OPTICS, PRACTICAL; TELESCOPE.

Light, as we receive it from the sun or from other sources, as a star, a fire, a candle, &c., appears to the senses as a simple element; and, judging from our early impressions, we might consider the peculiar colours of bodies as inherent in those bodies; but we are enabled to trace the immediate cause of the colours of bodies, whether permanent or transient, by the analysis of light furnished by the well-known experiments of the glass prism.

The triangular prism used for this purpose is a solid, terminated by two equal and exactly similar triangles, and having besides three plane faces of a rectangular form, contained by the sides of the triangles and by right lines or edges joining corresponding angles of the two triangular bases above mentioned; and any imaginary right line within it parallel to these edges around which the prism is capable of revolving is called the *axis of the prism*.



In the annexed figure the triangle, BAC, represents a section of the prism parallel to its basis or perpendicular to its axis. DE we shall suppose to be a ray or exceedingly narrow beam of solar light passing into a darkened room through a small circular hole in a shutter, and incident on the prism at E; this ray of white light enters the prism at that point,

and having undergone refraction by the dense medium of the glass, no longer proceeds as a simple ray EF , but is *dispersed* or divided into various rays of different colours over the space represented in the figure by $f'EF$, and emerging at $f'F$ from the prism, undergoes another refraction, such that the portion, $f'g$, of the ray proceeding from f' is still more refracted than the portion, $F'G$, from F' , since the sines of the angles of incidence and refraction being in a constant ratio, that portion will be most refracted which has the greatest incidence: let now this dispersed beam, gf' , $F'G$, be intercepted by a screen or wall, $P'K$, and from which extraneous light is as much as possible excluded, we shall then find the elongated space or spectrum, $g'G$, brilliantly painted over with tints passing gradually and insensibly from deep red to an attenuated violet, in the following order, as described by Newton, and since very generally concurred in—red, orange, yellow, green, blue, indigo, violet.

Suppose, now, that a small orifice, O , is made in the screen at some point of the spectrum, so that rays of any particular colour, green for example, may be transmitted through it; and let the transmitted portion be again subjected to refraction through another prism, this beam being supposed very small, to ensure its purity or near uniformity of colour. It will not, after refraction, be again decomposed, or undergo any alteration of colour, except in respect to brilliancy, arising from absorption by the second prism: thus showing that light incident on the first prism, when once decomposed into homogeneous elements by refraction, is then, at least by refraction, not further decomposable.

If the original prism, BAC , be turned gradually round its axis, preserving always to the incident light the same refracting angle, A , the spectrum, Gg , may be made to descend towards K ; but after arriving at a certain point where the deviation, that is, the inclination of DE produced to FG , is a minimum, it then reascends, and it is usual to make the chromatic experiments in this definite position of minimum deviation. This occurs when the position of the prism is such that the angles of incidence and emergence, or their complements DEB , GFC , are equal to one another. The course of a ray after the second refraction differs according to the media from which it passes, and into which it enters. Let the ray, S (Plate 1, fig. 12), pass through a prism denser than the surrounding medium, and the ray is bent towards the thicker part of the prism. If the prism be rarer than the medium the contrary is the case (fig. 13). The same state of things is also illustrated by figs. 14 and 15.

We have seen that compound light, the sun's, for example, may be decomposed into its homogeneous constituent rays by refraction through a transparent prism. Conversely it may be recomposed into light similar to the original, merely by making the rays, thus separated, by another refraction to occupy the same place. This may be effected by placing a prism of exactly similar material and form to that already used, with its refracting angle turned in a direction opposite to that of the former, so that the near faces of both prisms may be parallel; for the rays entering the second prism are in the same condition as if we supposed their direction inverted, that they may repossess through the first; and therefore

they emerge in a similar compound ray with the original, which may also be easily confirmed by experiment.

The rays issuing from the second face of the refracting prism may also be collected by means of a double convex lens, so as all to meet very nearly in its principal focus, where, if the image be received on a sheet of paper, the original compound light will be reproduced.

Many of the prismatic colours may be imitated by mixing colours taken as in the spectrum of greater and less refrangibility, as orange from red and yellow, &c., but such compound colours are not identical with the homogeneous light of the same colour, being immediately decomposable when viewed through a prism.

It would be difficult, if not altogether impracticable, to judge of the *dispersive powers* of transparent media by measuring the length of the spectra which they produce in a prismatic form, in consequence of the indefiniteness of their *termini*. Fortunately, Nature has herself furnished a scale of definite limits in the beautiful discovery made by Wollaston and Fraunhofer of the existence of dark spaces, bands transverse to the length of the spectrum, and now generally designated Fraunhofer's lines.

These bands are best observable by forming the spectrum of a luminous line instead of a point, by means of a prism of great purity, and viewing it through a telescope of good magnifying power, though some of them may, when carefully pointed out, be recognized by the unassisted eye, and after one recognition are in future easily found.

Substances which have not a great difference of refractive powers possess frequently very different dispersive powers, and the angular dispersion by a medium is not proportional to the angular deviation, and therefore by a system of prisms, two or more, white light incident on the first may be reproduced from the last, though on the whole refracted from its original direction. Such a system is called *achromatic*.

Conversely, by forming an achromatic system experimentally, where the angles of the prisms are small, and in the position of minimum deviation, if the dispersive power of the material of one of them be taken as a standard, that of the other may be readily obtained, the dispersion being measured

by $\frac{\delta \mu}{\mu - 1}$, μ being the index of refraction, and $\delta \mu$

the difference of its extreme values for any class of rays.

The rainbow is a beautiful natural exhibition of the dispersion of light into the spectral colours. [RAINBOW.]

Much has of late years been done in examining the nature and properties of light, and great advances have been made in the knowledge of its actinic properties. One of the most important of all modern discoveries on the subject is that by Dr. Faraday, who made a ray of polarized light rotate under the influence of an electric current. The analysis of light has recently led to the determination of certain of the substances existing in the sun.

LIGHT, BAROMETRICAL, is a luminous appearance in the vacuum over the mercury in some

barometers. It appears to be an electrical phenomenon, but we are not aware that any satisfactory explanation has been given of it.

LIGHT, CHEMICAL AGENCY OF. There are several cases in which light exerts direct chemical agency without its being referrible to the heat which usually accompanies it when intense. Thus, if a mixture of equal volumes of chlorine and hydrogen gases be kept in the dark, no combination takes place between them; but in the light of day they unite slowly, and form hydrochloric acid gas; while if exposed to the direct solar rays, the combination occurs instantaneously, and with loud explosion. Chlorine gas and oxide of carbon, when mixed, unite by the direct action of the sun's rays. If colourless nitric acid be exposed to the sun's rays, it becomes yellow, and afterwards red, and a quantity of oxygen is liberated by the partial decomposition effected by the solar rays. The action of light on the chloride of silver is very remarkable, and it occurs very quickly. This substance, as long as it is kept from the light, even though it be exposed to heat, remains perfectly colourless; but the sun's rays, and even diffused daylight, by their peculiar action, blacken it speedily. Chemistry presents many such examples as these.

LIGHT-BALLS, for military purposes, are hollow cases, either spherical, or in the form of cylinders terminated at each extremity by a hemisphere: they are filled with a combustible composition, and being thrown by night in a burning state from mortars, or in some cases from the hand, they serve to discover the working parties or troops of the enemy. The composition consists of pulverized saltpetre ($6\frac{1}{2}$ lbs.), pulverized rosin ($1\frac{1}{2}$ lbs.), ground sulphur ($2\frac{1}{2}$ lbs.), and linseed oil ($\frac{1}{2}$ lb.). The balls are propelled from mortars varying from $4\frac{3}{4}$ to 10 inches calibre, and correspond to the size of the mortar employed. Spherical cases of paste-board or canvas, filled with a composition which, while burning, emits a great quantity of smoke, are frequently discharged from mortars in order to conceal a movement of troops from the view of, or to suffocate the enemy: these are called *smoke-balls*.

LIGHTFOOT, JOHN, born 1602, died 1675, one of those English divines who belong peculiarly to the class called *commentators*. His works are collected in two large folio volumes. He was the son of a clergyman at Uttoxeter in Staffordshire, studied at Cambridge for the church, was ordained, and settled early in life on the living of Stone in his native county.

In the disturbed times he took part with the Presbyterians, became a member of the assembly of divines, accepted the living of St. Bartholomew beside the Exchange, and was made master of Catherine Hall by the parliamentary visitors of the University of Cambridge. He had also the living of Great Munden in Hertfordshire, which was presented to him in 1644. On the restoration of King Charles II., Dr. Lightfoot complied with the terms of the Act of Uniformity.

LIGHT-HORSE, cavalry lightly armed, and intended for active service and desultory warfare. Of this description are the light dragoons, mounted yeomanry, fencible cavalry, &c.

LIGHTHOUSES are buildings erected along the sea-shore, or upon rocks, from which lights are

exhibited at night for the direction of mariners. Floating lights perform a similar office, being shown from the masts of vessels moored in certain positions, generally as beacons to enable ships to avoid shoals or sunken rocks in the estuaries of great rivers. The most celebrated lighthouse of ancient times was that erected about B.C. 283, in the reign of Ptolemæus Philadelphus, on the island of Pharos opposite to Alexandria. [ALEXANDRIA.] It is from this building, or rather from the island on which it stood, that lighthouses have in many countries received their generic name of Pharos. This light tower endured for 1600 years. The oldest existing is that at Corunna, in Spain, said to have been erected in the reign of Trajan, and now fitted with one of the finest modern light apparatus. The celebrated Colossus of Rhodes has also been supposed by some to have had a light at its summit, but on no certain evidence. Various ruins of towers on the coasts of Great Britain, and on the shores of Europe, may be the remains of ancient lighthouses. The most celebrated lighthouses of modern times are the Bell-Rock Lighthouse, opposite to the Frith of Tay; the Eddystone Lighthouse, opposite to Plymouth Sound (see Plate 1); the Skerry-Vore Lighthouse, completed in 1844, on one of the rocks of a dangerous reef about 14 miles S.W. from the island of Tiree, on the coast of Argyleshire; the Tour de Cordun, near Bordeaux; the Fastnet-Rock Lighthouse; and the Maplin Sands Lighthouse (see Plate 3). [BELL-ROCK; PLYMOUTH; SKERRY-VORE.]

The erection of lighthouses in this country has not proceeded upon any systematic plan, but in every instance they have been constructed simply because of the disastrous losses that had occurred for want of them. The character of the buildings in which the beacon-lights are placed is dependent on their situation. They may be placed on lofty cliffs at a considerable height above the sea, as at Flamborough Head and the North and South Forelands, in which case the building itself need not be lofty, but only of such peculiar shape and colour as to make it conspicuous from the sea by daylight, and to make it easily distinguished from the dwelling-houses or other buildings in its neighbourhood. Or they may be situate on low promontories but little above the sea level, as on the flat beds of shingle at Orfordness and Dungeness, where they must be raised to a considerable elevation, that the light by night, and the building by day, may be discernible at long distances from the land. Or they may be fixed on the isolated and even sunken rock, as the celebrated Eddystone in the English Channel, in which case the whole skill and science of the engineer must be expended, not only on their foundations, but on their entire structure, to enable them to stand the mighty shocks of the waves. Or, lastly, they may be required to stand in the very midst of the 'great deep' itself, where not even a sunken rock will afford a foundation on which to build; and then they must be either erected on open work of piles, or on a floating vessel strongly moored to the ground below, many of which invaluable though non-locomotive craft may be seen around our coasts, warning the mariner from the treacherous sandbanks that are so numerous in our tidal seas.

A novel class of towers has been designed and

erected by Mr. Alexander Gordon, consisting of iron plates bolted together. There are several fine examples of his light-towers at Jamaica, Bermuda, the Bahamas, and other places. They are well adapted for positions and countries where skilled labour and suitable materials are wanting.

Another description of light-tower, or lighthouse, deserving of notice, is that on the ingenious plan of Mr. Alexander Mitchell, supported on screw piles. Buildings of this class are especially applicable to shallow waters, at the estuaries of rivers, and similar situations, over flat soft ground of mud or sand. The Maplin, at the mouth of the Thames, begun in 1838, was the first of this description. It stands on nine piles, secured to as many iron screws, which are screwed down to a depth of 22 feet into the sand. These screws consist of a single turn of a flange, 4 feet in diameter, on the lower end of the iron pile. They were fixed in nine consecutive days, under the personal direction of the blind inventor. The piles are secured in place and bound together by suitable ties, and the dwelling-room and lantern are placed above the reach of the sea, which breaks harmlessly through the open work of iron piles, &c., beneath (see Plate 3). Similar buildings have been constructed at Fleetwood, Belfast, and other places.

Floating lights are never placed where a suitable position can be had for a fixed building—the reason being that their lights must be comparatively small; that they are liable to drag their anchors in violent storms, and thus, by their change of position, to mislead instead of guiding, although this does not often happen; that they are much more expensive, requiring eleven men to work them, whereas three men are all that are necessary to occupy a first-class light-tower—the cost of management of the former being about 1800*l.* per annum, and of the latter 350*l.*; also that they are much more troublesome, requiring to be periodically taken into dock to refit, on which occasions they have to be replaced by similar vessels. There are fifty-one floating lights on the coasts of the United Kingdom, being a greater number than appear in any other country, the United States of America having only thirty-nine. These craft are in general ordinary-shaped vessels, and are now expressly built for the purpose. The floating light-vessels of Mr. George Herbert's design are, however, circular, and are moored from their centre of gravity. They have immense stability and are comparatively motionless; they have been found to answer admirably where adopted for floating beacons, &c. Light-vessels are ordinarily painted of a dark red colour, to make them readily distinguishable from all other craft, and that colour, which is the opposite of green, being more conspicuous than any other on the surface of the water. The greatest depth of water in which any of these vessels at present ride is about 40 fathoms, which is the case with the one at the station of the Seven Stones, between the Scilly Islands and Cornwall. Light-vessels on the English shores are generally provided with gongs, which are kept sounding in foggy weather.

The lights on land, or lighthouses which are at the highest elevation, with the distances they command in clear weather, are given in the following table, compiled from the general return published by the Admiralty:—

	Year when erected.	Height of Lantern above high water.	Distances at which the lights are seen.
Lizard, ...	1751	224	20 miles.
Needles, ...	1786	469	27 "
Beachy Head, . .	1828	285	22 "
South Foreland, .	1793	372	25 "
Cromer, ...	1719	274	22 "
Flamborough Head,	1806	214	19 "
Inchkeith, . . .	1804	220	18 "
Isle of May, . .	1816	240	21 "
Dunnet Head, . .	1831	346	23 "
Sumburgh Head, .	1821	300	22 "
Cape Wrath, . .	1828	400	25 "
Barra Head, . . .	1833	680	32 "
Kintyre, ...	1787	297	22 "
Mull of Galloway,	1830	325	23 "
Calf of Man, . .	1818	375	22 "
St. Bee's Head, .	1718	333	23 "
Lundy Island, . .	1820	540	30 "
Cape Clear, . . .	1817	455	27 "
Clare Island, . .	1806	349	27 "
Skellig's Rock, .	1826	372	25 "

The lighthouse establishments of the United Kingdom were until recently conducted under entirely different systems, but gradually private rights in light dues have been extinguished, and the whole of the duties connected with the lighting and buoying the coast of England and Wales are now discharged by the authorities at the Trinity House, in London. In the article relating to that corporation full particulars will be found of the powers and privileges they at present possess. In Scotland they are under the management of the Commissioners for the Northern Lighthouses; and in Ireland, under the Port of Dublin Corporation. There is a second class of lighthouses, consisting of local or harbour lights, which are managed by corporations and local trustees, subject to the general control of the Trinity Board. The lighthouses are maintained by dues levied on all vessels which leave the harbours of the United Kingdom, at so much per ton per vessel, according to the number of lighthouses which the vessels pass.

There are in the United Kingdom about 420 lights of all kinds, the coast line being 9392 miles. Of these, England and Wales, with 2405 miles of coast, has 220; Scotland, with 4469 miles, 120; and Ireland, with 2518 miles, 80. The income and expenditure connected with them, and other matters under the control of the Trinity Board, in the year 1864, was as follows:—

INCOME.			
For Fees, &c., received under the	£	s.	d.
Merchant Shipping Act, . . .	54,366	17	9
For Light Dues received, viz:			
Per Trinity House			
Corporation, 206,775	4	8.	
Per Port of Dublin			
Corporation, 14,369	0	2	
Per Commissioners of Northern			
Lighthouses, 25,935	4	7	
	247,079	9	5
For Ballastage Rates received, per			
Trinity House Corporation . .	42,765	8	7
	£344,211	15	9

EXPENDITURE.

	£.	s.	d.
For Salaries and Expenses at the Mercantile Marine Offices at the various Ports of the United Kingdom, including salaries and fees paid to Surveyors of Steam Ships,	45,156	11	5
For Expenses paid for the maintenance of Lighthouses, viz.:			
By the Trinity House Corporation, . . .	167,383	7	3
By the Port of Dublin Corporation, . . .	48,451	6	2
By the Commis. of Northern Lighthouses, . . .	36,213	2	8
	252,047	16	1
For Expenses paid on Ballastage Rates by the Trinity House Corporation, . . .	38,813	19	10
Balance of Income over Working Expenditure, . . .	8,193	8	5
	£344,211	15	9

A principal object in the establishment of these buildings is to give intimation to vessels approaching the coast during the night as to the place in which they are. It is therefore of importance that the lights exhibited on the same line of coast should have some essential differences, so as to be readily distinguished by mariners. The different appearances thus required are given by having two lights placed either vertically or horizontally with respect to each other, or three lights, as at the Casket rocks, or by causing the lights to revolve or to appear only at certain intervals, and to remain in sight only for a given number of seconds at each appearance; or by the employment of lamps of different colours, as in some of the harbour-lights, which do not require to be seen at a great distance.

The mode of illumination adopted in the lighthouses of the ancients seems to have been either an open wood or coal fire, or the combustion of torches dipped in tar. No improvement was made in these systems for several hundred years, and so recently as the latter half of the last century the sea-lights of this country consisted of open coal fires. At that period however, this imperfect means of illumination was replaced by reflectors having lamps in their foci. These were gradually improved, in many variations of the catoptric or reflecting system, but the dioptric-holophotal plan, invented by Mr. Thomas Stevenson in 1849, is the one now almost universally adopted both in Europe and America (see Plate 2).

Attempts have several times been made to increase the power of the light itself, by the introduction of gas, and the Drummond and Magneto-electric Light, but as yet without much success, although sanguine hopes are entertained of the latter being some day made practically efficient. At present oil is the material employed, the variety known as colza being that universally used in the United Kingdom. The regulation standard of consumption in a first-class dioptric apparatus is 785 gallons per annum. In England the average consumption of all classes of

lights is below this standard, but in Scotland it is above it. In the former country and in Ireland the lamps of lighthouses are lighted from sunset to sunrise: in Scotland they are lighted at the commencement of the darkness and extinguished at dawn, according to a calculated table.

In 1825 the French government undertook the comprehensive scheme for thoroughly lighting their coast, and have since carried it into execution with the greatest possible care, introducing the most recent improvements throughout. They class the lights on their shore in four divisions, according to the power and range of visibility. The first class is visible at thirty miles; the second at twenty-five; the third at fifteen; and the fourth at six.

A few words of explanation respecting the accompanying plates seem desirable. Plate 1 is devoted to an illustration of the details of the Eddystone Lighthouse, showing, in fig. 2, a semi-elevation of the entire structure as seen from the south, and a semi-section of the same from east to west. The numerals vii., viii., ix., &c., refer to the different courses of masonry, whose mode of construction is explained in the accompanying diagrams (figs. 1, 3, 4, 5, 6, 7, and 8). In fig. 1, the italic letters, *a*, *b*, *c*, &c., show the different layers of masonry employed.

Plate 2 presents a view of a *Dioptric Revolving Lighthouse*, of which many examples now exist upon the British coast. By this means a more powerful illumination is obtained, and it is readily distinguished from a fixed light.

Plate 3 illustrates various new inventions in Light-house apparatus. Fig. 1 shows the section of the new *Facet Reflector*, and its action in throwing the diverging rays of the lamp into a beam of parallel rays; but much of the light by this mode is scattered and lost.

In fig. 2 we have a section of the *Holophotal Reflector*; *a a* being portions of a paraboloidal reflector which concentrates the divergent rays into a direct line of light, and *b b* a hemispherical reflector for sending forward all the light that radiates backward from the lamp. *L* is a glass lens for refracting into a parallel beam the central mass of the diverging light.

Fig. 3 is a section of Mr. Thomas Stevenson's *Dioptric Holophote*, invented in 1850. *LL* is a polyzonal lens; *pppp* are totally reflecting annular glass prisms; *a a a a* a hemispherical mirror composed entirely of prismatic rings of glass, so formed as to reflect totally the light that radiates in a backward direction from the lamp. See the action of the prism illustrated in fig. 4, where *fr r'* marks out the course of a ray of light thrown off from the prism *a b c*.

The *Central Burner* system of illustration, invented by Augustin Fresnel, is shown in figs. 5, 8, and 9. Fig. 8 is an elevation of the 'Beehive' apparatus; *ll* being lenticular rings acting by refraction, and *pp*, prisms acting by reflection. The effect of the combination is to concentrate nearly the whole sphere of light into a flat zone. On a similar principle is constructed Stevenson's *Revolving Apparatus* (fig. 1), where the light is received and collected into eight horizontal beams by lenses, &c.

Fig. 7 represents the model of a beacon for an *Apparent Light*. Here a rectangular lantern receives from the lighthouse on shore a beam of parallel

rays, *r*, which are totally reflected by the glass prisms, *P*, and concentrated by the lens and prisms, *B*, to a linear focus, whence they diverge as if from an actual lamp. Such an apparatus is fixed at Stornoway Bay, the beacon being erected on an exposed rock, 200 yards distant from the lighthouse. It was designed by Mr. Thomas Stevenson in 1855.

Plate 4, fig. 1, shows Peacock's *Refuge Buoy Beacon*, which of course is only employed in comparatively shallow water. It consists mainly of a semi-oval hull of plate-iron, *A*, with lopsides and a deck, surmounted by a cage-like framework of iron bars, *B*, inside of which is hung a bell rung by the rolling of the buoy. The frame carries on the top a three-sided pyramid, *D*, faced with looking-glass, to reflect the rays of the sun or moon. Inside the cage are seats capable of holding fifteen persons in the event of their taking refuge there from a wreck. The sign-plate, or label, *C*, gives the name of the locality where the buoy is moored.

In Plate 4, fig. 2, we supply a sectional elevation of the Fastnet-Rock Lighthouse, which stands on an isolated rock off Cape Clear, about 90 or 100 feet above the sea. It is built of cast iron.

	Ft.	In.
Total height, ...	93	9
Height of lantern, ...	30	0
Outside diameter at base, .	43	0
Do. of gallery, ...	19	10½

Fig. 3 represents the Maplin Sands Lighthouse, which stands on nine piles of wrought iron, 26 feet long, supporting a house, platform, and light-room.

LIGHT INFANTRY, a company of young active men, who are always selected from the rest of the regiment, and occupy the left of the battalion until called for separate service. The object of the light infantry movements, whether in battalion or in company, is to protect the advance and retreat of the troops, and to cover and assist the manœuvres or formation of larger bodies. There are several light infantry regiments in the British service distinguished for their gallantry in the field.

LIGHTNING. The general circumstances attendant on a thunder-storm are familiar to most persons. It will, however, be useful to state some of the most prominent, with a view to their explanation when regarded as electrical phenomena.

At first we see light clouds forming with jagged edges, the relative motions of which are frequently opposite and variable. The atmosphere at the surface of the earth enjoys a stillness and calm, accompanied with some elevation of temperature, as well as considerable barometric and hygrometric changes, which produce on the human system the sensations of closeness, faintness, and oppression, and appear even to the brute creation indicative of some awful and impending changes. Some of these light clouds appear stationary, as if the forces which produced contrary motions in the others made an equilibrium in them. A sound of distant thunder is heard, after which the lower region of the atmosphere is refreshed with light breezes. The calm returns, but the thunder-clouds approach nearer, and flashes of lightning are perceived at short intervals. The course of these is sometimes zigzag, when it is called forked lightning; the aberrations in its course show that it is near terrestrial objects, and is therefore justly

regarded as dangerous. In a few seconds after the discharge, heavy showers of rain or hail descend, and the atmosphere is again cooled. The blackness now becomes universal, and the thunder is heard in a loud and sudden clap almost at the same instant that the lightning is seen descending towards the earth with immense velocity, and resembling a globe of flame.

The colour of the lightning is a variable yellow, depending much on the density and composition of the strata of air through which the discharge takes place.

The identity of lightning with the discharge of an ordinary electrical machine is now well known. [ELECTRICITY, ATMOSPHERIC.] Both can dissolve metals, inflame combustibles, reverse the poles of a magnet, and destroy animal life. Professor Richman of St. Petersburg, having attached a species of electrometer to his apparatus for measuring the electric intensity of a thunder-cloud, immediately after a loud clap proceeded to read off the indication of his instrument, when a globe of electric fire was discharged through his body; he fell instantly quite dead, and decomposition ensued within forty-eight hours (in 1753).

When the electric discharge permeates generally the surrounding masses of weakly electrized vapour, the appearance then is that of a sudden and wide illumination, as in summer or sheet lightning. This lightning is harmless, and even beneficial, as indicating the restoration of atmospheric and electric equilibrium after it has been destroyed by the rapid succession of cold to heat.

A third kind of lightning is the globular, which appears like a luminous ball or globe of fire; it moves through the air at a comparatively slow rate, while forked and sheet lightning exist but for a moment. Lightning of this kind sometimes obtains the name of fire-balls: it rolls along the surface with a hissing noise, and often terminates in a disruptive discharge.

The changes of temperature, the electricity of the earth in contact with the air, and that produced by the chemical changes of the various matters of the globe, are the great causes of atmospheric electricity: thus earthquakes, volcanic eruptions, &c., are generally accompanied by violent thunder-storms. [THUNDER-ROD.]

LIGHTNING CONDUCTOR. [THUNDER-ROD.]

LIGHTS, ANCIENT. A light is a right to the enjoyment of free access of light to a man's premises or buildings, which right must not be impaired by the building or erection of any object in such way as to obstruct the light. By the 2 & 3 Will. IV. c. 71, s. 3, an absolute right to light may now be acquired by twenty years' uninterrupted enjoyment, unless the use has been enjoyed by some consent or agreement made or given by deed or writing.

The right to the free enjoyment of light belongs in the Roman law to the class of *Servitutes*, among which were the *Servitus altius non tollendi*, ne luminibus officiat, ne prospectui officiat ('Dig.' 8, tit. 2, s. 11, 12, 15-17).

LIGHTS, ARTIFICIAL. The modes of illuminating large buildings are explained in **BUILDING LIGHT**; **DRUMMOND LIGHT**; and **GAS**; while the articles **ARGAND LAMP** and **CANDLE** illustrate the common modes of domestic lighting.

We shall here confine ourselves more particularly to the various kinds of lamps in use in ancient and modern times. In all ages lamps have been articles of important consideration, especially among the Egyptians, Jews, Greeks, and Romans, and have been generally executed with much taste and magnificence. A lamp, in its simplest form, may be defined as a vessel of metal or earthenware, containing oil or fat, and supplied with a lighted wick; but its different forms and constructions have been as varied as the purposes to which it has been applied. Its first invention is assigned to the Egyptians, and Herodotus describes a feast of lamps held annually in Egypt. A similar custom is celebrated even at this time, with great magnificence, among the Chinese. Lamps were very extensively used by the Jews in all their religious ceremonies and public festivals. The lamp, or candlestick, with seven branches, placed in the sanctuary by Moses, and those lamps prepared for the temple by Solomon, were of crystal, fixed upon branches, and filled with oil. Among the Greeks and Romans lamps were sometimes burned in honour of the dead. In the early ages of Rome they were of a very simple construction, and made of terra-cotta or bronze; but in her more luxurious periods they were formed of Corinthian brass, silver, or gold, and arranged in stages, so as to produce a brilliant illumination. Among the discoveries of Roman remains no articles are more common than lamps, and they are found of all sizes and forms, and in every kind of material, of which a vast variety may be seen at the British Museum and in other antiquarian cabinets. Etruscan lamps are very rare; but those of Herculaneum and Pompeii, of a rich and elegant description, are abundant. In later ages we find the classical *bilychnis lucerna*, the *pharus*, and others, sometimes made of silver, and sometimes in the form of a crown or cross, with numerous branches.

In modern times the lamps have been as varied as the purposes for which they were intended. The old table and shop lamps of our forefathers emitted a brown and half-smoky light, owing to the absence of all scientific appliances. The Argand lamp, however, was a very ingenious contrivance, which, by means of a round and hollow wick, gave admission to a free current of air to the flame, and caused a clear combustion. [ARGAND LAMP.] A more extended knowledge of chemistry and mechanism has largely contributed to the improvement of modern lamps. Among others may be mentioned the *Soho* lamp, which is adapted for burning fat or tallow, instead of oil; the *Carcel* lamp, invented by a Frenchman, in which the oil is raised through tubes by clockwork, so as to overflow at the bottom of the wick, and thus keep it saturated; the *Meteor* lamp, which burns rape-oil; the *Solar* lamp, that consumes seal-oil, and in which three separate currents of air are brought to bear upon the flame; the *Camphine* lamp, of which there are various sorts, the fluid employed being camphine, which is distilled from common American turpentine; the *Benzole* lamp, the light of which is produced by a hydro-carbon called benzole; the *Bude* light, whose excellence depends on the mode of admitting air to an ordinary oil or gas flame. But the lamp now most in use amongst the more wealthy families is the *Moderator*,

which is very handsomely constructed, with ornamental pedestals, pillars, and glass globes. They are constructed on a very ingenious principle. The oil is contained in a reservoir within the pillar of the lamp, and is pumped upwards when required, while the wick, which is inclosed within a circular and hollow tube, is raised or lowered by a little knob or screw. Yet these lamps are found to be expensive in the long run, owing to their liability to get out of repair, and the expense of the oil, which should be pure colza, costing about 5s. per gallon; and the usual consumption being about half a gallon a week. The lamps in almost universal use amongst the humbler classes are such as are constructed to burn camphine, or rectified oil of turpentine, and the various kinds of naphtha, petroleum, and paraffine oils. They are exceedingly cheap and of remarkably simple construction; the chief requisite being to insure perfect combustion of the material. For this purpose the reservoir of fluid is placed much below the flame and the wick passes into it and sucks it up by capillary attraction. The glass chimney is made very narrow at the top and bottom, with an enlargement round the flame. By this shape such a great indraught of air is secured at the bottom, that in a well made lamp the smoke is imperceptible. These lamps give a brilliant light at a very little cost; but care should be exercised in the selection of the fluid to be burned, as some of the recently discovered rock oils are so inflammable and explosive that their use is dangerous.

In chemical experiments the Spirit-lamp has long been a valuable piece of apparatus.

Dr. Fyfe, in comparing gas, oil, and candles together, assumed an Argand gas-flame as a standard of intensity and price, and procured the following result in respect to the ratios of relative cheapness, the intensity of light being uniform:—

Argand gas-flame, ...	1·00
Naphtha, ...	2·00
Petroleum, ...	2·08
Paraffine, ...	2·21
Solar oil in Argand lamp, ...	3·98
Whale-oil, ...	5·00
Lard-oil, ...	5·08
Sperm-oil, ...	8·00
Tallow candle (two wicks), ...	12·70
Cocoa candle, ...	13·10
Tallow candle (one wick), ...	13·50
Composite, ...	14·50
Palm, ...	18·90
Wax, ...	25·90
Diaphane, ...	27·10
Margarine, ...	28·40
Spermaceti, ...	29·20
Composition, ...	29·20

According to this table, composition candles are nearly thirty times as costly as gas for an equal intensity of light.

Dr. Faraday has introduced an important arrangement for carrying off the products of combustion in gas and oil lamps. Air is admitted to feed the flame nearly in the usual way; but when the products of combustion have arrived at the top of the glass chimney, their progress is arrested by a covering of talc, and they are compelled to pass down between the chimney and another larger glass chimney concentric with it. The open space between the

two chimneys communicates with a pipe which is conducted in any convenient way into the open air; the carbonic acid, aqueous vapour, smoke, and other emanations from the flame, have no means of escape except through this tube, and they are thus wholly cut off from contact with the air of the room. The mode of carrying out the arrangement may be varied in its details; but the general result is said to be that the light is brighter, the space around the lamp cooler, and the air of the room less vitiated, than when common open burners are used. Many other ingenious arrangements have been adopted by different inventors, either to lessen the production of smoke, or to carry off the products of combustion without allowing them to mix with the air of the room.

LIGHTS, NORTHERN. [AURORA BOREALIS.]

LIGNIN, or vegetable fibre, is the substance which remains after a plant has had its soluble matter dissolved out of it. Lignin, properly speaking, constitutes the skeleton of the trunk and branches of the tree. It varies in different kinds, as to its colour, hardness, texture, and specific gravity. The texture of lignin is always porous; these pores, when fresh, contain the juices of different substances; during the drying of lignin the water evaporates, and leaves the matters dry which it held dissolved. When dry, lignin is a non-conductor of electricity. When exhausted of air in its pores, it is much heavier than water. When kept entirely dry, or entirely immersed in water, it resists decay for centuries; but when alternately wet and dry, it gradually decomposes. The wood inclosing Egyptian mummies is found in good preservation, although some of it must be about 3000 years old.

Concentrated sulphuric acid in the cold converts lignin into gum; and if the mass thus obtained be boiled with water, it is changed into grape-sugar. When wood (or lignin) is heated in iron cylinders, a great variety of important substances are obtained, besides charcoal—such as pyroligneous acid, pyroxilic spirit, creasote, and tarry matter.

LIGNITE. Fossil wood carbonized to a certain degree, but retaining distinctly its woody texture, is thus designated: a greater degree of change constitutes cannel and common coal, in which the original structure of the constituent plants can only with difficulty be traced; a less change belongs to peat, so that lignite occupies a place between coal and peat. Jet, Surturbrand, moor coal, Bovey coal, Cologne earth, and basaltic coal are considered to be varieties of lignite. Lignite often occurs in beds of considerable thickness and extent, and supplies to particular districts a bad substitute for coal. In general, lignite is most plentiful in the tertiary strata, and coal among the older rocks of the secondary series. Lignite is found in various parts of England, France, Italy, and Switzerland.

LIGNUM-VITÆ or GUAIACUM WOOD, the wood of a genus of trees of the natural order *Zygophyllaceæ*, natives of the tropical parts of America, but chiefly obtained from Jamaica and St Domingo. This wood is remarkable for its hardness, heaviness, and exceeding toughness. The heart-wood, which is the part used, is of a dark, greenish-brown colour, rarely more than 8 inches in diameter. The tree itself grows 30 or 40 feet high, and has generally a crooked stem and knotty branches. Lignum-vitæ is

much valued, and used for many purposes, chiefly by turners, and for making ships' blocks, rulers, pestles, bowls, and wheels for pulleys. Shavings, raspings, the bark, and a resin obtained from the stem, are used in medicine.

In the year 1864 there were 2074 tons of lignum-vitæ, valued at 14,729*l*, imported into the United Kingdom.

LIGNY. [MEUSE.]

LIGULATE, in botany, a term used to describe the form of the *corolla*, or flower leaves, in many plants which belong to the natural order *Compositæ*, and other orders. When the corolla of one petal splits and spreads out in the form of a tongue, the flower is said to be ligulate.

LIGUORI, ALPHONSO, MARIA DE, a celebrated writer on casuistry, and founder of the religious order of Liguorians or Redemptorists, was born at Marianella, near Naples, in 1696. He practised as a lawyer with success till 1722, when he suddenly relinquished the profession, and assumed the monastic habit. Ordained a priest in 1726, he preached every day to the common people with so much zeal and emotion, that he was called the apostle of the poor and ignorant. In 1732 he founded the order of the Holy Redeemer at Villa Scala, which was approved by the pope in 1749, and exists to this day in various parts of the world. Contrary to his own wish, Liguori was made a bishop in 1762, an office which the infirmities of age compelled him to resign in 1775, when he retired to Nocera de Pagani, the principal house of the order he had founded, where he died in 1787, and was solemnly canonized in the Roman Catholic Church in 1816.

The works of Liguori fill seventy volumes 8vo, and embrace almost every department of theological learning. They have been translated entire into French and German, and in great part into other European languages. He was one of the principal advocates of the doctrine of probability, so strongly condemned in Pascal's sixth letter.

LIGURIA (called by the Greeks *Ligyctia* and the inhabitants *Ligyes*, and *Ligustini*), a division of ancient Italy, on the west, corresponding nearly with Genoa and Nice. It was separated in the time of Augustus from Etruria by the river Macra (*Magra*), and was bounded on the north-east by Gallia Cisalpina, and on the west by the province of Gallia. The most important places in Liguria were Albium Intemelium (*Vintimiglia*), a place of some importance, and a municipium, the capital of the Intemelii; Albium Ingaunum (*Albenga*), the capital of the Ingauni; Genua or Genoa; Dertona (*Tortona*), in the interior, a Roman colony, surnamed Julia; Alba Pompeia (*Alba*); Asta (*Asti*); and Pollentia (*Polenza*).

The Ligures in more ancient times extended as far as the Rhône in France; and they also appear to have inhabited part of Spain and Corsica. The Ligurians of Italy were finally subdued by the Romans B.C. 166.

LIGURITE, a crystalline mineral, of which the primary form is an oblique rhombic prism. Colour, yellowish green or apple-green, and translucent. As a gem it is superior to chrysolite in colour, transparency, and hardness.

LIGUSTRUM, a genus of plants belonging to the natural order *Jasminaceæ*.

L. vulgare, Common Privet, is a bushy sub-evergreen shrub, growing in hedges and thickets in Great Britain, and a native of the south-west of England. In point of utility and ornament few shrubs exceed the privet. Its chief use is to form hedges either for shelter or ornament. It bears cutting well, and is not liable to be disfigured by insects. Having fibrous roots, it robs the ground less than almost any other shrub. It is one of the few plants that will grow in the smoke of London; it also thrives under the dripping of other trees. The wood is hard and fit for timber. From the pulp of the berries a rose-coloured pigment may be prepared; with the addition of alum, they dye wool and silk of a good durable green.

LILAC. [SYRINGA.]

LILIA'CEÆ, an important natural order of Endogens, containing many of the most beautiful plants of that class of the vegetable kingdom. A large proportion, especially of those of cold countries, consists of bulbous plants, producing annually a stem which perishes after having produced its leaves and flowers; others have an annual duration with perennial fleshy roots; and a few acquire, in warm countries, a stem of very considerable size, as the dragon-tree, *Dracena draco*, of which there is an ancient specimen in Teneriffe, with a stem many feet in diameter. The principal garden flowers of this order are tulips, lilies, fritillaries, day-lilies, tuberoses, and dog-tooth roses. *Hyacinthus Orientalis* is the common hyacinth, of which the Dutch florists at one time had more than 2000 varieties.

The greater part of this family are of no known use: we find, however, among them aloes, yielding the valuable purgative medicine of that name; squills (*Squilla maritima*), whose bulbs secrete a viscid substance much employed as an emetic, diuretic, and expectorant; and several plants which yield a tough and valuable fibre, such as *Phormium tenax*, or New Zealand hemp, *Sansevieria zeylanica*, or bowstring or African hemp, *Yucca filamentosa*, &c. What are called alliaceous plants, such as the onion, garlic, &c., are species of this order, of which between eighty and ninety genera are known. Lindley enumerates 155 genera in this order, including 1250 species.

LILIUM, a genus of plants, the type of the natural order *Liliaceæ*. *L. candidum*, common White Lily, blossoms early in the summer, and has been cultivated in our gardens from time immemorial. The roots are the only parts of the plant available in medicine, and they are frequently employed as emollient poultices, owing to the mucilaginous matter which they contain. It is, however, doubtful whether they are more efficacious than poultices formed of bread or farina. This species, as well as others, is cultivated in Siberia, and eaten like the potato. The scent of the lily is exceedingly powerful, and peculiarly distressing in some cases. Murray mentions an instance of death ensuing from exposure to the odour of this plant. *L. martagon*, Turk's Cap Lily, though not a native of Great Britain, is naturalized in copses in many places.

All the species and varieties of *Lilium* are valuable as plants of ornament for the beauty of their flowers, which have a noble appearance. They are proper for the pleasure-ground, and if planted with judg-

ment, succeed each other in blooming upwards of three months. The common White Lily, the Orange



Syrian Lily.

Lily, and Martagon will thrive under trees. The Syrian Lily has recently been cultivated with success. The orange lily also answers well for small gardens and confined situations in towns and cities.

LILLE, the capital formerly of French Flanders, now of the department of Nord, is situated in 50° 38' 44" N. lat., 3° 3' 37" E. long., at a distance by railway of 155 miles N.N.E. of Paris, 67 miles S.W. from Calais, and had, in 1861, a population of 131,827. It stands in a fertile and level country, at the junction of the Haute-Deule and the Basse-Deule, as the two cuts of the canal that unites the Scarpe and the Lys are called. These two cuts are united by a third, called Moyenne-Deule, which passing west of the town conveys barges too heavily laden, or too large, to pass through any of the numerous channels that traverse the city for purposes of commerce, or to drive the machinery of the numerous factories. The town is well-built; the streets are regular, wide, and provided with foot-pavements; the houses are in general three or four stories high, and built of brick or limestone. It contains thirty-four squares and market-places, thirty bridges of all sizes, about 200 wide streets, and many factories and mills, which, together with a far greater number in the environs, announce to the traveller by their lofty chimneys that he is approaching one of the great hives of industrial activity. Lille, which is entered by seven gates, is surrounded by very strong fortifications and wet ditches, and defended by a citadel, said to be the masterpiece of Vauban. Its shape is nearly oval, its length within the walls being 2560 yards, and its breadth 1278 yards. The citadel is a regular pentagon of 426 yards' diameter; it is situated south-west of the town, and separated from it by a wide esplanade, which, crossed by the Moyenne-Deule, and planted next the town with

several avenues of trees, forms a fine promenade, close to which is the handsome Pont Royal. There are also barracks and magazines on the north-western side of the town.

The most remarkable public structures of Lille are the churches of La Madeleine, St. Maurice, and St. Paul; the town-hall, which, built by John the Bold in 1430, was for a long time the palace of the dukes of Burgundy; the Mont-de-Piété, founded in 1610; the Paris gate, which is a triumphal arch in honour of Louis XIV.; hospitals; the large corn-stores at the end of the Rue Royale; the theatre, the concert-room, one of the finest in France; the museum, established in a fine old abbey, and containing the public library of above 20,000 volumes, a gallery of valuable paintings, and the archives of the town; and the Napoleon bridge across the Moyenne-Deule, which unites the part of the esplanade that serves for a promenade to the part next the citadel where the troops are drilled. There are also a bourse; medical school, formerly the palace of Richebourg, with a famous collection of drawings by Raffaele and others, now comprising the chief municipal offices; Hotel de Ville; several other Roman Catholic and Protestant churches, Jew's synagogue, prefecture, exchange, prisons, mint, &c., an academy of music and architecture, and a botanic garden.

The manufactures of Lille are very important; they consist of all kinds of cotton goods; linen and linen thread, lace, tulle, blankets and other woollen stuffs; velvets, paper, leather; steam machinery and ironmongery; gin, beer, glass, soap, tape, hats, carpets, chemical products, mineral acids, &c. There are also government establishments for the manufacture of tobacco and gunpowder, and an extensive gold coinage. The vicinity is studded with bleaching grounds, rape-seed oil mills, and beet-root plantations, the last-named being very extensive. Railways and canals connect the town with all parts of France and Belgium.

Lille is the seat of tribunals of first instance and of commerce, and the head-quarters of the Third Military Division; it has a bank, a council of prud'hommes, a college, a school of painting, various establishments for the gratuitous instruction of working manufacturers, and a great number of charitable institutions. Lille belonged to the counts of Flanders, kings of France, and earls of Burgundy, and was finally annexed to the crown of France by Louis XIV., in 1667. It was taken by siege by the allies, under the duke of Marlborough, in 1708, and unsuccessfully bombarded by the Austrians in 1792.

LILLEBONNE. [SEINE-INFÉRIEURE.]

LILLY, WILLIAM, was born May 1, 1602, at Diseworth, in Leicestershire. He removed to London in 1620, where he became servant to a mantua-maker. This situation he exchanged in 1624 for one of a less menial character. In 1627 his master died, whereupon Lilly married the widow, with whom he received the sum of 1000*l.*, and on her death within a few years immediately took another wife, and thus augmented his fortune by 500*l.* In 1632 he began the study of astrology under one Evans, a clergyman who had been expelled from his curacy for practising numerous frauds under pretence of discovering stolen goods. The fame which Lilly soon acquired for casting nativities and foretelling events was such that

he was applied to, in 1634, to ascertain, 'by the use of the Mosaical or Miners' Rods,' whether there was not extensive treasure buried beneath the cloisters of Westminster Abbey. Permission having been obtained from the dean, on condition that he should have his share of whatever might be found, 'Lilly and thirty other gentlemen entered the cloisters one night, and applied the hazel rods;' but after they had disinterred a few leaden coffins, a violent storm arose, which so alarmed them that they all took to flight, and ran home. In 1644 he published his first almanac, by the title of 'Merlinus Anglicus, Junior;' and such was the avidity with which the people received his prognostications, that the whole edition was sold in a few days.

During the contest between Charles I. and the Parliament, Lilly was consulted by the Royalists, with the king's privy, as to whether the king should sign the propositions of the Parliament, and he received 20*l.* for his opinion. At the same time he was employed by the opposite party to furnish them with 'perfect knowledge of the chiefest concerns of France,' for which he received 50*l.* in cash, and an annuity of 100*l.* per annum. The latter he enjoyed only two years. Until the affairs of Charles declined, he was a royalist; but after the year 1645 he engaged heartily in the cause of the Parliament, and was one of the close committee to consult upon the king's execution. He died of palsy, June 9, 1681, and was buried at Walton-upon-Thames. The character of Lilly has been faithfully drawn by Butler under the name of Sidrophel, although some authors have supposed that character to have been intended for Sir Paul Neal. After the Restoration he made several applications to the ministry to be employed as a prophet, in which capacity he had been liberally patronized by the previous government, but in every instance he had the mortification of being refused.

LILY, or LILLY, WILLIAM, was born at Odiham in Hampshire, about 1468, and at eighteen years of age was admitted a demy of Magdalen College, Oxford. Having taken the degree of B.A., he quitted the university and travelled in the East. He certainly remained five years at Rhodes, and thence he went to Rome, and studied. On his return to England in 1509, he set up a private grammar-school in London, and became the first teacher of Greek in the metropolis. In 1512, Dean Colet, who had just founded St. Paul's school, appointed him the first master. He followed this useful and laborious employment for twelve years. Lily died of the plague in February, 1523, and was buried in the north churchyard of St. Paul's. His principal literary production was the 'Brevissima Institutio, seu Ratio Grammaticæ Cognoscendæ,' 4to, London, 1513. The English rudiments were written by Colet, and the preface to the first edition by Cardinal Wolsey. The Latin Syntax was chiefly the work of Erasmus. Lily numbered Erasmus and Sir Thomas More among his intimate friends.

LIMA, the capital of the republic of Peru in South America, is situated in 12° 2' 34" S. lat., and 76° 58' W. long., about 6 miles from its port, Callao, which is on the shores of the Pacific, and with which it is connected by a railway. [CALLAO.] Lima is built in a spacious and fertile valley, traversed by a small river called the Rimac. The river washes the northern

walls of Lima, and over it there is a handsome stone bridge leading to the suburbs of St. Lazaro, and to the Alameda, or public walk. Elsewhere the city is inclosed by a bastioned wall, entered by six gates. It is about two miles in length, and one and a quarter in its greatest breadth. The houses are low and have rarely more than one floor: they are lightly built, on account of the frequent earthquakes, which have repeatedly reduced the city to ruins. The streets are regular and wide, but the pavement is bad. The city occupies a nearly triangular space, the base extending along the banks of the river. A fine street leads from the bridge to the Plaza Mayor, or great square, in the midst of which is a large fountain. On the north side of the square is the government palace, a large but gloomy-looking edifice; on the east side are the cathedral and the archiepiscopal palace, now partly occupied by the Peruvian senate—the former is a handsome building of considerable extent; on the west side is the town-hall and the city prison; the south side is occupied by private houses. The other principal edifices are the parish church; the former residence of the viceroy (now the court-house); numerous churches, a convent, the founding asylum, eleven public hospitals, a university, partly appropriated to the meetings of the North Peruvian chamber of representatives; a national and a public museum, a public library with rare books; ecclesiastical, Lancastrian, naval, and other schools; a theatre, a bull-ring, a cock-pit; and outside of the walls are a public cemetery and baths.

Lima is of Spanish origin, and is the most handsome city in South America, its numerous domes and spires giving it a magnificent appearance. Its vicinity is fertile, and large quantities of provisions and live stock are produced. The climate is pleasant and reputed to be healthy, the elevation being 453 feet above the sea; but the mortality is high, partly owing perhaps to great neglect of drainage and disposal of refuse. There are abundant dews, but no rain. The mean temperature of the year is 73·3°; in winter, 68·1°, and in summer, 77·6° Fahr.

This city was for a long period the grand commercial depot for all the western coast of South America, and it still has a large trade, its exports consisting of silver, copper ore, bark, soap, vicuña wool, chinchilla skins, nitre, sugar, &c.; and the imports of manufactured goods, wines, silks, and brandy.

The population is estimated at about 70,000, consisting of free mulattoes, slaves, Indians and mestizos, and a few Europeans. The manufactures are neither numerous nor extensive. The principal manufactured articles are utensils and vessels of silver, gilded leather, cotton cloth, gold lace, and epanettes. A glass factory has also been established. Among the creole inhabitants are many rich families, who owe their fortunes to the mines, and are now large landed proprietors.

LIMACINEA, M. de Blainville's name for his third family of *Pulmobranchiata*, the first order of his second sub-class, *Paracephalophora monica*. M. de Blainville adds, as an observation, that all the animals of this family are terrestrial, and that all feed on vegetable substances. *Testacella*, however, feeds chiefly on earth worms. [HELICIDÆ, LIMAX.]

LIMAX, the Latin name for those air-breathing,

naked, gastropodous molluscs so injurious in the garden, and known vernacularly by the name of *Slugs*. Cuvier says, the slugs (*les Limaces*) have an elongated body, and for a mantle a fleshy compact disc, which occupies the anterior part of the body alone, and covers the pulmonary cavity only. This disc contains, he adds, in many species a small oblong and flat shell, or at least a calcareous secretion in lieu of it. The orifice of respiration is on the right side, towards the front, and the anus is pierced at its posterior border. The four tentacles are put forth and withdrawn by unrolling themselves like the fingers of gloves, and the head itself can be withdrawn in part under the disc of the mantle. The organs of generation open under the right upper tentacle. There is but one jaw (upper), in the form of a dentilated crescent, which serves them to gnaw with much voracity the herbs and fruits to which they do so much damage. Their stomach is elongated, simple, and membranous.

Cuvier then notices the following genera—*Arion*; example, the Red Slug: *Limax*; example, the great Gray Slug, often found in damp cellars; the small Gray Slug, and others: *Vaginulus*, *Testacella*, and *Parmacella*.

The slugs of our fields and gardens often commit devastations of serious consequence. Gardeners are constantly racking their invention to free themselves from their devouring hosts. Quicklime, soot, fine coal ashes, and saw-dust, have been used as defences for young and tender plants. The virtue of the first is soon exhausted, and the slugs after a while do not care much for the second; but if the soot be plentifully and frequently renewed, it will keep them away in great measure. Coal-ashes, not too coarse, and saw-dust, annoy them by sticking to their feet and impeding them. A stout, coarse horsehair line, such as is used for hanging clothes out to dry, coiled round the stems of wall fruit-trees and stretched along the wall, will operate as a protection to the fruit from both snails and slugs, in consequence of the bristly surface presented to them, and which they shrink from encountering. Care must of course be taken that they do not get under it. Watering evening and morning with strong fresh lime-water is said to have a good effect, for it penetrates about the roots of the plants and into the earth, where they lie hid. Thin slices of any vegetable of which they are more fond than of the crop to be protected will allure them, and they may be thus killed by scores early in the morning by dividing them suddenly with a sharp instrument. The dead bodies should be left on the spot as a bait, for we have seen the living slugs preying upon the exposed bowels of the dead ones, most probably attracted by the half-digested vegetable matter. Ducks destroy great numbers of these pests, and thus fatten themselves, but they are apt to trample down a young and delicate crop of vegetables.

LIMB. (Astronomy.) The edge of a planet is called its limb; also the edge of any circle which forms part of an astronomical instrument.

LIMBER, in artillery, a two-wheeled carriage for carrying the ammunition in field practice. It forms one-half of the field-equipage, the mounted cannon forming the other. To *unlimber* is to unhook from the gun the part of the equipage which has the ammunition box, and thus to leave it free to be *served*.

To *limber up*, on the other hand, is to join both together again.

LIMBURG, a province of Belgium, lying between 50° 44' and 51° 18' N. lat., 5° 2' and 5° 52' E. long., is bounded N. by North Brabant, E. by the duchy of Limburg, from which it is separated by the Maas, S. by Liège, and W. by Antwerp and South Brabant. The area is 934 square miles, and the population in 1861 was 196,816. The surface is flat, except in the south, where there are a few hills. The east of the province, along the left bank of the Maas, is fertile in corn, hemp, flax, tobacco, madder, fruits, &c. The district also between the Jaar and the Demer possesses a fertile soil. The rest of the province consists of a sandy soil, presenting towards the north extensive barren heaths, and many marshes. The pasture-lands are extensive, and cattle-feeding is more attended to than tillage; there is a good breed of horses, and bees are carefully tended. The principal rivers are the Maas, which receives the Jaar on its left bank at Maastricht; the Demer, which, rising W. of Maastricht, runs westward past Hasselt, and having received several small feeders from both banks, enters South Brabant on its way to join the Dyle, a feeder of the Scheldt; and the Dommel, which rises in the north of this province, and flows through North Brabant, where it enters the Maas at Crèveceur. Iron, calamine, coal, and turf, are the chief products of the province.

Hasselt, the capital, is a well-built town of 9895 inhabitants, on the Demer. It has some manufactures of linen, leather, tobacco, beer, spirits, point lace, salt, &c. A branch railroad leads from Hasselt through St. Trond to the Liège-Malines line, which it joins at Landen.

St. Trond, 10 miles from Hasselt, stands on the Messelbeck, a feeder of the Demer, and has 9400 inhabitants. It is joined by a branch railroad to the Liège-Malines line. The chief manufactures are soap, tobacco, and lace; and there are also breweries and distilleries.

Bilsen, a small place of 3085 inhabitants, on the left bank of the Demer, has iron mineral springs and potteries, with manufactures of cutlery and earthenware. *Tongres* or *Tongern*, on the Jaar, is a well-built town with 6180 inhabitants, who manufacture chicory, leather, and hats. It has besides a trade in corn, and some breweries. It was ruined by Attila in his retreat from Chalons. In a valley near the town there is an iron mineral spring, which has been described by Pliny. *Maaseyk* or *Mazeik*, a town of 4000 inhabitants, stands in the north-east of the province, on the left bank of the Maas, and has manufactures of leather, paper, hats, tobacco, pottery, beer, spirits, and ropes. This was the birthplace of the brothers Van Eyck, inventors of painting in oil.

LIMBURG, a Dutch province with the title of duchy, extending between 50° 45' and 51° 47' N. lat., 5° 35' and 6° 13' E. long., is bounded on the east by Rhenish Prussia, on the other sides by the provinces of North Brabant, Liège, and Belgian Limburg. The area is 855 square miles, and the population in 1862 was 218,775. It extends 71 miles from N. to S., with an average breadth of 14 miles, but at some points the width does not exceed 3 miles. In the southern part, extending along the right bank of the Maas, the soil is fertile, but in the

north bogs, moors, and marshes cover a great part of the surface. Cattle-breeding and agriculture are the chief occupations of the inhabitants; the products are similar to those of the Belgian province of LIMBURG. The principal rivers besides the Maas are its feeders from the left, the Roer and the Neisse.

Maastricht (*Trajectum ad Mosam*), the capital of the province, stands on the left bank of the Maas, at the head of a branch railway from Cologne, 110 miles S.E. of Amsterdam. The inhabitants numbered 28,080 in 1862. The part of the town that stands on the right bank of the Maas is properly a suburb, and called *Wyck*. The town is regularly and well-built, and contains several spacious squares, one of which, the parade, is inclosed by an avenue of trees. The town-hall, in the great market-place, and the church of St Gervais, are the most remarkable buildings. There are several Roman Catholic and Calvinist churches, two hospitals, two orphan asylums, and a lyceum. The manufactures consist of woollen cloth, flannel, cotton, paper, leather, fire-arms, soap, beer, and spirits. The town is very strongly fortified; the citadel is erected on a hill called Petersberg, on the west bank of the Maas. Underneath this hill is a stone quarry of great extent, abounding in many curious and interesting petrifications; it is said to be intersected by above 20,000 passages, forming a most intricate labyrinth. Maastricht was taken by the French in 1648, 1673, 1748, and 1794. From 1795 till 1814 it was the capital of the French department of Maas-Inférieure.

The other towns are *Sittard*, 13 miles N. by E. from Maastricht; population, 4200; *Roermonde*, or *Euremonde*, a fortified place at the entrance of the Roer into the Maas, with 9246 inhabitants, who manufacture woollen cloth, leather, beer, soap, and vinegar. It has also a considerable general and transit trade. The fortifications were dismantled under Joseph II., but it is still the residence of a military commandant. *Vaels*, a frontier town, a little W. of Aix-la-Chapelle, with 3300 inhabitants; *Venloo*, a fortified town on the right bank of the Maas, and near the Prussian frontier, which has 7000 inhabitants, several breweries, distilleries, tile works, tobacco-factories, vinegar works, tin and lead foundries, tan yards, and spinning mills; the fort St. Michael, which forms part of the defences, stands on the left bank of the Maas, and is joined to the rest of the town by a bridge; and *Weerd*, which is situated in a marshy district, near the borders of North Brabant, on the Bree, and has 6690 inhabitants, who manufacture hats, cloth, tobacco, chocolate, candles, leather, and stockings.

LIMBURG. [LIÈGE.]

LIME. [CALCIUM; MANURE.]

LIME, MEDICINAL PROPERTIES OF. Though lime exists in almost all plants, yet it is more particularly the characteristic element of animal structures, into which it is introduced with the food, as well as often by the water drunk, especially when hard. A deficiency of lime in the body causes a softness of the bones to result; while an excess of it occasions preternatural induration of the bones, morbid growths from them, or exostoses, ossifications of the cartilages, of the heart and arteries, as well as depositions of calcareous concretions in various glands and cavities, such as the urinary bladder. [CALCULUS.] The

action of lime on the human system varies considerably, according to the state in which it is when introduced into or applied to it. Thus quick-lime is violently escharotic, causing inflammation, and often decomposition, of the part which it touches, and is never employed save when the actual destruction of the part is intended. In a state of great dilution, such as that of lime-water, or when rendered mild by combination with carbonic acid or phosphoric acid, it scarcely produces any immediate or direct action beyond what results from its combining with the acids of the stomach, and if in considerable quantity absorbing the mucous and other secretions. It likewise checks the secretions of mucous membranes with which it is not brought into contact, such as those of the bronchia. After its absorption into the system, it augments the secretion of the kidneys, and at the same time hinders the excessive formation of uric acid.

LIME-TREE. [TILIA.]

LIMERICK, an inland county of the province of Munster, in Ireland, bounded N. by the estuary of the Shannon, W. by Kerry, S. by Cork, and E. by Tipperary. It lies between $52^{\circ} 17'$ and $52^{\circ} 47'$ N. lat., and between $8^{\circ} 5'$, and $9^{\circ} 22'$ W. long. The greatest length E. to W. is 54 miles; the greatest breadth N. to S. is 35 miles. The area is 1061 square miles, or 680,842 acres, of which 526,876 are arable, 121,101 uncultivated, 11,575 in plantations, 2759 in towns, and 18,531 under water. The population in 1861 was 217,277, of whom 205,728 were Roman Catholics, and 9886 belonged to the Established Church. The inhabitants in 1851 numbered 262,136.

The general surface of Limerick is an undulating plain, sloping towards the Shannon on the north, and surrounded on its southern and western borders by a margin of mountain groups and hilly uplands. A mountainous tract occurs also in the north-eastern extremity of the county. The north-east mountains are the Slieve Phelim, and the Bilboa groups. The country between the western declivities of the Slieve Phelim hills and the Shannon is mostly flat and boggy. The principal rivers of the county are the Shannon, the Maigue, Deel, and Mulcair.

Although the Shannon does not lose the character of a river until after passing beyond the bounds of this county, yet for all the purposes of commerce it is equivalent to an equal length of sea-coast from Glin to Limerick, a distance, including the windings of the river, of about 35 miles.

The level part of the county consists of carboniferous limestone. The mountain groups and detached eminences of its eastern and southern margins are formed by the protrusion of older rocks; and the high lands on the west consist of more recent series superimposed. The Slieve Phelim and Bilboa groups, in common with the extensive range of which they form a part, consist of a nucleus of clay-slate supporting flanks of yellow sandstone and conglomerate disposed in conformable beds. Small portions of old red sandstone, crystalline green, flinty limestone, and other rocks, appear at various parts of the surface. Pallas Hill is distinguished by the presence of columnar basalt, which overlies the amorphous trap of its northern brow. The mountainous district on the west of the county belongs to the great Munster

coal tract, which is probably the most extensive in the British islands; but the coal is slaty, and the mines difficult to work on account of the great inclination of the beds. Fine dark-coloured marble, and small quantities of iron, copper, and lead are met with in the county.

A tract of extraordinary fertility, called the 'Golden Vale,' occupies the greater part of the centre of the county. The soil is a rich, mellow, crumbling loam, and is equally suited to grazing or tillage: it is chiefly in pasture. A still richer soil is that of the 'Corcasses,' which extend for fifteen miles along the southern bank of the Shannon, from a little below Limerick to the embouchure of the Deel. They yield the greatest wheat-crops raised in Ireland; and their produce of potatoes is also large. The soil of the remainder of the limestone plain is very good for tillage, and yields an excellent pasture for dairy cattle and sheep. Pasture and dairy farming are the staple occupations of the people. Tillage was formerly little attended to, but is now increasing, and much bog and mountain land has been reclaimed. Horned cattle, sheep, and pigs of a very superior description, are bred in large numbers by the dairy farmers. Great quantities of butter are made and exported. The trade in corn, cider, and other articles of produce, is also very extensive.

The climate of the county is mild, but humid.

There is a small manufacture of coarse woollens for home consumption, and the bleaching of linen is carried on, but on a contracted scale. There are paper-mills, and large and powerful mills for the grinding of corn.

Divisions and Towns.—Limerick is divided into 13 baronies and 131 parishes, and is in the dioceses of Limerick and Emly, with small portions in Cashel and Killaloe. It is in the Cork or south-western military district; in the Munster circuit, and the assizes are held in the city of Limerick. The county returns two members to Parliament. The number of electors in 1865 was 6318.

The following are the principal towns, with the population of each in 1861:—

Askeaton, 18 miles W.S.W. from Limerick, is situated on the river Deel, about two miles above its confluence with the Shannon. The Deel is navigable for vessels of 60 tons up to the town, which contains a church and Roman Catholic chapel. Population, 1637, including 1532 Roman Catholics.

Kilmallock, 20 miles S. by E. from Limerick, is situated on the small river Labach. It is a very ancient town, and was formerly very important on account of its strength and a monastery founded there in the sixth century. It was the chief town of the Desmond branch of the Geraldines, was surrounded by a wall, of which considerable portions remain, and was fortified; but the fortifications were destroyed by Cromwell, and again in 1690 by the duke of Berwick, after they had been partly restored. The town consists chiefly of a street of stone houses frequently three stories high, with mullioned windows and arched doorways of cut stone. The ruins of this place, both civil and ecclesiastical, are very interesting. Population, 1393.

Limerick. [LIMERICK.]

Newcastle, a market town, 25 miles S.W. from Limerick, is situated on the Arra, a beautiful stream,

which flows through the town in its progress to the Deel. Coarse cloths are manufactured in the town, which contains a neat modern church, a Roman Catholic chapel, infantry barracks, a union workhouse, and a market-house. Population, 2452, of whom 2354 were Roman Catholics.

Rathkeale, a market town and municipal borough, 17 miles S.W. from Limerick, is situated on the west bank of the Deel, and is the largest town between Limerick and Killarney. It contains many good houses and shops, and has a good retail trade. From the various ruined castles in the immediate vicinity, and the remains of a priory in the town, it appears to have been a place of considerable antiquity. It contains a court-house, union workhouse, and seven places of worship. Population, 2751, of whom all but 164 are Roman Catholics. The population of the entire parish is 5152, including many descendants of German Protestants, termed 'Palatines,' established here by the Southwell family, whose seat, Castle Matress, is immediately south of the town.

History and Antiquities.—Prior to the arrival of the English, Limerick constituted part of the petty kingdom of Thomond, or North Munster. Donald O'Brien was prince of this territory at the time of the English invasion; and in order to carry out a feud with a rival chieftain, he was among the first to tender his homage and receive an English garrison into his city, in 1172. But he did not long continue loyal, and after many conflicts a considerable portion of Limerick was given by King John to the Fitzwalters, the Fitzgeralds, and other great families. These new settlers brought in a colony of English, chiefly from Bristol and Chester, who took up their residence in the city and towns near the river. The greater portion of the county was possessed by the powerful family of the Fitzgeralds, earls of Desmond, until their final forfeiture by Gerald, the sixteenth earl, in 1586. The estates of this unfortunate nobleman in Limerick alone consisted of 96,165 acres, which were divided among twelve individuals, most of whose names are now extinct in the county. The war which ensued throughout Munster was an obstinate and disastrous one. On the breaking out of the rebellion in 1641, the city of Limerick and all the chief castles of the county, with one or two exceptions, fell an easy prey to the insurgents, in whose hands they for the most part continued until the capture of Limerick by the parliamentary forces under Ireton, in 1651. The forfeitures which ensued embraced almost the entire county, and introduced a numerous new proprietary. The war of the Revolution terminated in further forfeitures. From this time until the latter end of the last century the county continued undisturbed; but many outbreaks occurred in the earlier part of the present century.

Limerick is among the richest of the Irish counties in antiquities. There are extensive Cyclopean remains on the hill of Knockfennel, near Loch Gur. The fort on the western pinnacle of the hill is a circle of 360 feet in circumference, with a wall ten feet thick, composed of massive blocks of dry stone, and with other walls of similar construction. Military earthen works are numerous in all parts of the county. At Carrigeen, near Croom, are the remains

of a round tower fifty feet in height; and there are indications of two others. The ruins of religious houses are very numerous. Adare, Kilmallock, and Askeaton are peculiarly interesting from the number and extent of their ecclesiastical remains. The river Cernaigue alone has the ruins of seven religious houses on its banks. Manister-Nenagh, the chief of these, is the most extensive pile of monastic ruins in Munster. Of the castles of the early proprietors, nearly one hundred still remain. Of these the most remarkable are Croom Castle, Shanet Castle, Cappa Castle, Castle Connel, and Carrick-agonniel. The last-named, a stronghold of the O'Briens, is boldly situated on a basaltic rock rising suddenly from the plain to a height of several hundred feet over the southern bank of the Shannon; it was blown up by General Scravenmore in the war of the Revolution; but although eighty-four barrels of gunpowder were exploded under it, two of the towers are still tolerably perfect. There are several stone circles, and other supposed remains of Druidical worship, throughout the county.

LIMERICK, a city and county of a city, a port, and a parliamentary borough, is situated at the interior extremity of the estuary of the Shannon, 50 miles from the Atlantic Ocean, and 119 miles W.S.W. from Dublin, 52° 40' N. lat., 8° 35' W. long. The population in 1851 was 53,448; in 1861 it had fallen to 44,476, of whom 39,689 were Roman Catholics. There are about 1900 electors in the parliamentary borough, which returns two members to the House of Commons.

Limerick is connected by railway with Dublin and all parts of the country. It is the fourth town in importance in Ireland, and is the capital of the west, as Dublin is of the east, Belfast of the north, and Cork of the south. The city is chiefly built on the county of Limerick side of the river. The island on which the old town of Limerick stands was probably selected as the site of a city from the circumstance of this being the first point at which the Shannon is fordable above its estuary. The island, called King's Island, is about a mile in length, by from a quarter to half a mile in breadth, and lies nearly north and south, having the main stream of the Shannon, about 500 feet in width, on the western side, and a smaller branch, called the Abbey River, of an average breadth of 200 feet, on the east and south. This portion of Limerick is named Englishtown. Another portion known as Irishtown occupies the southern bank of the river, and another suburb called Newtown Perry, entirely of modern erection, occupies elevated ground parallel with the river, below the union of its two branches, and derives its name from the Perry family, who were owners of the land. A suburb called Thomond Gate is situated on the county of Clare side of the river, at the end of Thomond Bridge, which was formerly the only entrance to the ancient city, and was defended by a strong castle. There are five bridges over the river, one of which, the Wellesley bridge, a magnificent structure crossing the harbour, cost 85,000*l*. The streets and houses in Englishtown are said to resemble those of the city of Rouen, but its general appearance is that of decay and misery. The streets of Irishtown are wider and the houses more modern. Newtown Perry in many parts is scarcely inferior to the best districts of

Dublin, with spacious streets, handsome houses, and well-stocked shops.

The most noteworthy public buildings are—the cathedral (founded in 1180, and rebuilt in 1490) a new Roman Catholic cathedral, the fine church of the Redemptorist order, five Protestant churches, four parochial and four conventual Roman Catholic chapels, five dissenting places of worship, several public schools, the county and city court-houses and prisons, the custom-house, Barrington's hospital, fever and lock hospital, district lunatic asylum, Mount St. Vincent orphanage, chamber of commerce, model school, town-hall, flax factory, lace factory, corn and butter markets, and barracks. The manufacture of linen, which had nearly expired, is revived; that of gloves continues, but is not so important as formerly. Limerick is also celebrated for the manufacture of lace and fishing hooks. There are distilleries, breweries, tanneries, foundries, flour mills, a patent slip for vessels of 500 tons, and three ship-building slips. The harbour extends about 1600 yards in length and 150 in breadth, with from two to nine feet at low water, and nineteen at spring tides; which latter enable vessels of 600 tons to moor at the quays. Nearly in the middle of the harbour the Wellesley bridge has a portcullis for admitting vessels. The port is under the control of commissioners. The number of vessels registered as belonging to it in 1866 was 44 (5452 tons). The entries in 1865 were 383 (92,903 tons), and the clearances 285 (64,154 tons). The customs revenue in 1865 was 123,325*l*. The trade of the port—consisting of imports of British manufactures, coal, turf, continental and colonial produce, and exports of corn, meal, butter, beef, and pork—is large, and still increasing. By the inland navigation of the Upper Shannon, and the Grand Canal and Royal Canal, the city has communication with Dublin, as well as with the country, for 230 miles along the course of the Upper Shannon. The corporation of Limerick consists of eight aldermen, and thirty-two councillors, elected by eight wards. The assizes for the county and city are held here, as are also quarter (county) and petty sessions. The mayor holds a Court of Conscience for pleas under 40*s*., and the assistant-barrister a Civil Bill Court for the county and city. The city is the head-quarters of the Limerick or south-western military district.

Limerick lays claim to high antiquity, and is said to have been of some importance as early as the fifth century. It was a royal seat of the kings of Thomond before the Conquest; was in the possession of the Danes for some time, and was afterwards held by the O'Briens, kings of Munster, till the first hostile landing of the English in 1170. From this time, down to 1691, when it capitulated to the troops of William III., under Ginkell, the city had its full share of the vicissitudes and calamities caused by the wars, feuds, and rebellions to which the country was subject.

The bishopric of Limerick, comprising eighty-eight parishes, is now joined with the ancient sees of Ardferret and Aghadoc, thus forming the united bishopric of Limerick, Ardferret, and Aghadoc.

LIMESTONE. This term is applied to a great variety of earthy compounds, in which carbonate of lime is the predominant ingredient. In regard to the chemical composition of limestones, we may notice

that some, as statuary marble, are nearly pure carbonate of lime; others, as the dolomitic rocks of the Alps, contain a certain proportion of carbonate of magnesia; and some are penetrated by bituminous matter, as the black marbles of Yorkshire. Limestones also vary in quality, and become debased by admixture with sand, clay, oxide of iron, pyrites, &c.; so that there is in fact a real gradation from limestone to schist, to sandstone, to shale, to ironstone, &c. Limestones have a crystalline aggregation, as statuary marble, and generally the limestones mixed with primary systems of strata; or they are composed of small crystalline grains, as the magnesian limestone of Mansfield in Nottinghamshire; full of round concretionary parts, as the oolites of Portland, Bath, and Oxford; earthy, as chalk, and some magnesian limestones; or compact, as the lithographic stone of Solenhofen. The beds of calcareous rocks are of every thickness, from a mere lamina to some yards thick. The colours of limestone vary indefinitely. When argillaceous matter is mixed with the calcareous basis of the rock, the colour generally approaches to blue; magnesian and oolitic limestones are often yellow; primary limestone and chalk are generally white; the Tisee marble is red; some of the Derbyshire and Kilkenny marble is black; and there are many-veined and party-coloured marbles, as those of Babilcombe, Sienna, &c. Limestones are rich in organic remains.

LIMIT; LIMITS, THEORY OF. The word limit implies a fixed magnitude to which another and a variable magnitude may be made as nearly equal as we please, it being impossible, however, that the variable magnitude can absolutely attain, or be equal to, the fixed magnitude. Thus the sum of the series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$ approaches nearer and nearer to 2 as the number of terms are increased, but they can never become equal to 2, for the difference, though steadily diminishing, still exists. Under these circumstances 2 is said to be the limit of the sum of the series.

The method of limits is in reality nothing more than one way of evading the use of the word infinite in an absolute sense.

LIMITATION. [STATUTES OF LIMITATION.]

LIMITED LIABILITY. [JOINT STOCK COMPANY.]

LIMMA; in ancient Greek music, may, for all practical purposes, be considered as the minor semitone of the modern scale.

LIMNE'ANS, in French, *Lymnéens*, or more properly, *Limnéens* (λίμνη, *limnē*, 'a marsh, pool, or lake'), Lamarck's name for a family of fresh-water testaceous molluscs, consisting of the genera *Planorbis*, *Limnea*, and *Physa*. The family name now in general use is *Limnæidae*.

Lamarck collected these three genera in the following order: *Planorbis*, *Physa*, and *Limnea*, under one family, his *Lymnéens*, with the following definition:—

Amphibian Trachelipods, generally deprived of an operculum, and having flattened tentacles. They live in fresh water, and come to respire the air at the surface.

Their shell is spirivalve, most frequently smooth on the external surface, and always having the right edge of its aperture sharp, and not reflected.

The *Limnæidæ* are very common in ponds, ditches,

rivers, and streams. They deposit their eggs enveloped in a glairy substance like clear jelly, on the leaves of water-plants, or on stones, but generally on the former, and these are often to be found on the leaves of water-cresses brought to the table. The shells of the *Limnæidæ* are very delicate and fragile, and their external border treacherous. The molluscs have only two tentacles carrying sessile eyes at the internal side of their base; the eyes are never at their summit.

Fossil Limnæidæ.—Fossil *Limnæidæ* occur in various fresh-water formations, both in our island and the Continent, and in some places they are abundant, and some of the species are identical with those yet existing.

LIMNORIA (*Leach*), a genus of marine *Crustacea* belonging to the order *Isopoda* and family *Assellidæ*. This form is, on the one hand, closely related to the well-known fresh-water *Assellus* or Screw, as it is popularly named; and, on the other, to the *Oniscus* or Sceler, so frequently met with in old walls, caves, cellars, among garden rubbish, and other damp places. Only one species belongs to this genus, the *Limnoria terebrans*, so named from its habit of boring into timber and wood-work of all kinds immersed in the sea. It is very small, being seldom met with larger than about two-tenths of an inch. Like all the members of this family, the *Limnoria* can, when touched, roll itself into a ball. The body consists of fourteen segments. The mouth is furnished with a pair of strong mandibles, which it uses in boring. [*ISOPODA*.]

LIMOGES, the capital of the French department of Haute-Vienne, is situated on the summit and slope of a hill, on the right bank of the Vienne, which is here crossed by three bridges, 236 miles S. by W. from Paris, in 45° 49' 52" N. lat., 1° 15' E. long., and has 51,053 inhabitants. It takes its name from the *Lemovices*, a Celtic tribe whose capital it was. By the Romans it was called *Augustoritum*, and under them it was a place of considerable importance. It was taken after a revolt, in 1870, by the Black Prince, who put 3000 of the inhabitants to the sword. The older part of the town consists of narrow and steep streets, with timber-framed houses: the more modern part contains broad and straight streets, and two handsome squares. Of the public edifices the principal are the town-hall, the cathedral of St.-Étienne, a fine Gothic edifice of the thirteenth century; the churches of St.-Michel-des-Lions, and St.-Pierre-du-Queyroix; the episcopal palace, and the beautiful fountain of Aigoulène. The hôtel de ville, bourse, mint, public library of several thousand volumes, the cavalry barracks, the prefect's residence, the theatre, and the hospitals, also deserve notice.

Limoges is the seat of a bishop, whose diocese includes the departments of Creuse and Haute-Vienne; and of a Cour Royale and University Academy, the jurisdictions of which comprehend the departments of Haute-Vienne, Corrèze, and Creuse. In the city are societies of agriculture, arts, and sciences, and a school of commerce; it has an amphitheatre, and various other antiquities. It was once strongly fortified. A great number of books are printed in Limoges; and the manufacture of fine and coarse woollen cloths, paper, porcelain, and crucibles, is important. Flannel, cotton handkerchiefs, glue, nails,

woollen yarn, room paper, articles in papier-mâché, &c., are also made. There is, besides, a considerable commerce in corn, chestnuts, wine, brandy, liqueurs, iron, copper, tin, kaolin, &c.

LIMO'NIA, a genus of plants of the natural family of *Aurantiaceæ*. Most of the family abound in essential oil, and the leaves of some of the *Limonias* are fragrant. The fruit, though small, of *L. acidissima* and *L. crenulata* is very acid. [*CITRUS*.]

LIMOUSIN, one of the old French provinces which now form the departments of *CORRÈZE* and *HAUTE-VIENNE*. Limousin was united to the French crown by Henry IV., who inherited it from his mother, Jeanne d'Albret.

LIMOUX. [*AUDE*.]

LIMPET (*Patella*), the name of a genus of well-known gasteropodous mollusca. The British limpet (*Patella vulgata*) has not fewer than 160 rows of teeth, with twelve teeth in each row. The limpets are found adhering to rocks and stones which lie between tide marks; they are left dry twice a day. They are used by fishermen as bait.

LIM'ULUS (Lat. *limus*, 'mud'), a genus of *Entomostraca*, commonly known by the name of the King Crab. It is furnished with six pairs of prickly feet, and a long, sharp-pointed tail, sometimes sufficiently strong to be used by savages as a spear-head.

LINA'CEÆ, a small natural order of plants, related to *Cistaceæ*. The whole order contains only two genera, *Linum* and *Radiola*: the former comprehends many species, the most important of which is common flax, *Linum usitatissimum*, the woody tissue of whose stems is so valuable for its toughness and fineness, and whose seeds furnish linseed oil.

LINACRE, or *LYNACER*, THOMAS, one of the most eminent physicians and scholars of his age, was born at Canterbury about 1460. He received his first education in his native city, under William Tilly, or De Selling, and afterwards entered at Oxford, where he was chosen a Fellow of All Soul's College in 1484. He studied also at Bologna, and afterwards at Rome, under Politian and Demetrius Chalcondyles. He applied himself particularly to the works of Aristotle and Galen, and is said to have been the first Englishman who made himself master of those writers in the original Greek. He also translated several of Galen's treatises into elegant Latin, and with Grocyn and William Latimer undertook a translation of Aristotle, which was never completed. On his return to England, he was created M.D. at Oxford, a degree he had taken at Padua, and he gave temporary lectures in physic, and taught the Greek language at Oxford. His reputation became so high that King Henry VII. called him to court, and intrusted him with the care both of the health and education of Prince Arthur.

Linacre now stood at the head of his profession, and showed his attachment to its interests by establishing two lectures on physic in the University of Oxford, and one in that of Cambridge. He may also be considered the founder of the College of Physicians in London; for in 1518 he obtained letters-patent from King Henry VIII., constituting a corporate body of regularly bred physicians in London, in whom was vested the sole right of examining and admitting persons to practise within the city and seven miles round it, and also of licensing practitioners through-

out the whole kingdom, except such as were graduates of Oxford or Cambridge, who by virtue of their degrees were independent of the college, unless within London and its precincts.

Highly as Linacre was esteemed in his profession, he became desirous to change it for that of divinity, or rather to combine the two pursuits. In 1518 we find him possessed of a prebend in the cathedral of York, where he was also for a short time precentor, and he had other preferments in the church. He died October 20, 1524, and was buried in St. Paul's Cathedral, London.

Besides his translation of Galen, he published a translation of Proclus, 'De Sphæra,' which was printed in the 'Astronomi Veteres' of 1499. Of his other works one of the most learned was his treatise 'De Emendata Structura Latini Sermonis libri sex,' printed at London immediately after his death in 1524, and frequently reprinted.

LINARIA, a genus of plants belonging to the natural order *Scrophulariaceæ*. *L. cymbalaria*, the Ivy-leaved Toad-flax, is a native of Europe, chiefly on old walls. It grows abundantly in Italy and Sicily, and is found in Great Britain. There are several varieties of this species. *L. elatine* is a native of Europe and Africa, and is found in chalky corn-fields in Great Britain. *L. spuria*, *L. minor*, *L. repens*, *L. pelerissima*, and *L. Italica*, are all natives of Great Britain. *L. vulgaris* in some places is called 'Butter and Eggs.' Gerard names it Wild-flax, Toad-flax, and Flax-weed. It abounds in an acrid oil which is almost empyreumatic. Taken inwardly, it induces nausea. It has been advised in dropsy, but most authorities disapprove of it. When united with milk, the juice is a poison to flies. The whole of the species of Linaria have an elegant appearance, and are therefore suited for flower gardens.

LINCOLN. [LINCOLNSHIRE.]

LINCOLN, ABRAHAM, President of the United States of America during the most momentous period of their history since the time of Washington, was the grandson of Abraham Lincoln, killed by Indians in 1784, and the son of Thomas Lincoln, of Virginia, by his wife, Nancy Hanks. He was born, February 12, 1809, in Harden County, Kentucky. His father, Thomas Lincoln, when the young Abraham was about eight years of age, removed with his family to Spencer County, Indiana. There for the next twelve years Abraham shared in the ordinary pursuits of a settler, living in the log hut which they had built when they first came to the neighbourhood. He had not, however, during all these years the guiding hand of his mother, for she died shortly after they took up their residence in Indiana. In course of time, a Mr. Crawford came to settle in the neighbourhood, and opened a school in his own cabin, and Abraham Lincoln was his pupil. Abraham was a youth of manifold qualifications: he had perseverance, a desire for knowledge, truthfulness, and earnestness. The books which he loved to peruse at this period were Bunyan's 'Pilgrim's Progress,' 'Æsop's Fables,' a life of Henry Clay, afterwards his model of an upright statesman; and Weem's 'Life of Washington.' When he was nineteen he made a trip to New Orleans in a flat-boat, with the son of one of his neighbours, with a cargo for the New Orleans market. In addition to a long voyage down

the river Ohio, which bounds Indiana on the south, the young voyagers had at least 1000 miles of the Mississippi to traverse before they arrived at their destination. The voyage was successful, and raised the character of Abraham Lincoln in the vicinity as a youth of energy and promise. In 1830, when about twenty-one years of age, he migrated once more with his father to Decatur, Illinois. Here he helped to build the family log-hut; and with a single assistant performed the feat of splitting 3000 rails in a day, which obtained him the popular *soubriquet* of the 'Railsplitter.' He afterwards started on his own account, hiring himself out first of all as a farm hand, and occasionally acting as a clerk in a store. When the war with the Indians broke out in 1832, commonly called the Black Hawk War, Mr. Lincoln was elected to the command of a company of volunteers. After his military career, Lincoln kept a store; and then took to the business of a surveyor. In 1834 he was sent to the local Legislature, and during the time the House was not sitting he applied himself with vigour to the study of law. In 1836 he obtained a license to practise; and in 1837 went to Springfield, the chief town in Illinois, and commenced as a lawyer, in partnership with the Hon. John F. Stuart. He rose rapidly in public favour, and is said to have been very successful as an advocate in jury trials. In 1846 he was returned to Congress, and took his seat as the only Whig member from Illinois. He continued to belong to Congress till 1849. The Whigs were the forerunners of the present powerful Republican party, the chief point of difference being that of slavery. Lincoln was for freedom, and on that ground opposed the Mexican war. He supported a bill abolishing slavery in the district of Columbia. When the Wilmot proviso was discussed to exclude slavery from those territories which had been captured from Mexico, Mr. Lincoln voted for the proviso; and he afterwards stated that, in one way or another, he had cast his vote about forty times in favour of the abolition of slavery. In 1849 he stood, and was defeated, for the office of United States senator for Illinois, and consequently remained at home from that period until 1854 in the practice of his profession. In that year the Kansas Nebraska Bill was passed by the slaveholding party, aided by some of their supporters in the North. Mr. Stephen A. Douglas stood for United States senator from Illinois, and Mr. Lincoln opposed him; the two champions ultimately holding seven joint debates in different towns of the state for the purpose of informing the people of the grounds of difference of policy upon which they were called to decide. Upon his discussions with Douglas, however, the eyes of the whole country were fixed, and the ability and quaint humour which Mr. Lincoln exhibited, and the success which he gained for the party, made him very popular among the Republicans. The immediate practical question which then agitated the people, and which came to be the turning-point of the presidential election of 1860, was whether or not slavery ought to be permitted in the new territories, as one by one they were included in the Union. Mr. Lincoln believed that slavery ought to be excluded from the territories, although he did not see his way to interfere with slavery in those states where it existed. The Republican Convention, which met at Chicago,

nominated Mr. Lincoln as their candidate for the presidency. The contest lay between him and Mr. Seward. The canvass was carried on with the usual good humour in the North, but amid threatenings and mutterings in the South in the prospect of their defeat. The polling resulted in the return of Mr. Lincoln—the numbers being, for Lincoln, 1,857,910; for Douglas, 1,291,574; for Breckenridge, 850,082; and for Bell (a Whig of long standing), 646,124. The election, in 1860, of Mr. Lincoln was hailed with delight by the people of the Northern states, and when he proceeded to Washington to execute the functions of president, the whole country watched his progress with intense satisfaction. He was installed in the president's chair, 4th March, 1861. His election by a sectional vote and on a sectional issue hostile to the South, was followed by the secession of eleven Southern states, and a war for the restoration of the Union. Mr. Lincoln's policy was to woo the South to submission to the constitutionally-expressed will of the people by every argument which would be supposed to have weight with American citizens. His appeal was vain, and he had no choice but to enforce the laws and to use all the powers of the Constitution for the suppression of the South. For the details of the terrible civil war that followed, the reader is referred to the article UNITED STATES. As a military measure, Mr. Lincoln proclaimed (January 1st, 1863) the freedom of all slaves in the rebel states, and afterwards the absolute freedom of the negroes throughout the country. He was re-elected as President in 1865, and after conducting the war to a successful issue, and witnessing the complete defeat of the Confederate or Southern forces, he fell the victim of one of the foulest and most daring acts of assassination whose record has ever disgraced the pages of history. President Lincoln died on the 15th April, 1865, from the effects of a shot fired at him by John Wilkes Booth, in Ford's Theatre, Washington, on the previous evening. He left a widow and family. His moderate views, high principle, and homely wisdom, had obtained for him the respect of the civilized world; and his cruel death, at the moment when he was engaged in attempting to heal the wounds made by civil war, was profoundly lamented.

LINCOLN COLLEGE, Oxford, was founded in 1427 by Richard Flemming, bishop of Lincoln, for a rector and seven fellows; it was afterwards greatly augmented by Thomas Rotherham, bishop of Lincoln, who added five fellowships, and gave a body of statutes to the foundation, in which he limited the election of the fellows to the old dioceses of Lincoln and York, with the exception of one to the diocese of Wells. This was in 1479. Lord Crewe, bishop of Durham, in 1717 made an addition to the emoluments of the rector and fellows, and in 1718 endowed twelve exhibitions of 20*l.* a year a-piece. The scholarships and exhibitions received a further augmentation at a later time by the will of Richard Hutchins, D.D., rector from 1755 to 1781.

The original limitations were abolished by authority of Parliament (17 & 18 Vict.). The foundation at present consists of a rector, twelve fellows, and eighteen scholars. The buildings of Lincoln College retain much of their original character. They consist of two quadrangles, besides six sets of rooms

erected at a later period. The largest quadrangle includes the rector's lodgings, library and hall, built in the fifteenth century; the library was originally the chapel. The smaller court was in part built about 1612 by Sir Thomas Rotherham. The present chapel, upon its south side, was built in 1631 by Archbishop Williams. The windows are rich in painted glass procured by the archbishop from Italy in 1629. In 1818 the whole front of the college was repaired.

LINCOLNSHIRE, an English county, is bounded N. by the estuary of the Humber, N.W. by Yorkshire, W. by Nottinghamshire, S.W. by Leicestershire and Rutlandshire, S. by Northamptonshire, S.E. by Cambridgeshire and Norfolk, and E. by the German Ocean. The greatest length N. to S. is 75 miles; the greatest breadth E. to W. is 52 miles. It is comprehended between 52° 39' and 53° 45' N. lat., and between 0° 22' and 0° 58 W. long. The population at the census of 1861 was 412,246—204,644 males, and 207,602 females—being an increase of 5024, or 1 per cent. since 1851. The number of inhabited houses in the county was 86,626; uninhabited, 4289; building, 530. The total area is 1,775,457 acres, of which nearly 1,300,000 are said to be cultivated, and about 450,000 inclosed fen land.

Coast-line and Surface.—The coast, from the Welland to the Humber, forms a tolerably regular curve convex to the sea, and is low and marshy except about Clea Ness, near Grimsby, where it rises into cliffs. A belt of sand of varying breadth skirts the land. From the mouth of the Welland to that of the Nene the coast is so low as to require the protection of a sea-wall or bank. The estuary of the Wash is occupied for the most part by sand-banks, dry at low water. Between these banks the streams which flow into the estuary have their channels; and two portions of deeper water, named Boston Deepes and Lynn Deepes, also occur between them.

A considerable part of Lincolnshire consists of alluvium, constituting a vast extent of flat or marsh land, from the border of which the subjacent strata rise and form comparatively elevated tracts. The alluvial soil occupies nearly the whole of the coast; and in some places it extends half across the width of the county.

From Barton-upon-Humber, to Burgh, near Wainfleet, stretches a line of chalk downs, called the Wolds of Lincolnshire. These downs sink on the north and east beneath the alluvium described above. Along the coast north and south of Saltfleet are natural outlets of water called provincially 'blow wells,' deep circular pits, which furnish a continual flow of water, and are vulgarly reputed to be unfathomable; they are presumed to communicate with the chalk. The green-sand forms a narrow belt, skirting the chalks on the west side of the Wolds; and the iron-sand occupies a narrow belt adjacent to it. Westward of the iron-sand extends a wide flat, occupied mostly by the Oxford clay; this district forms a large central valley separating the Wolds, with the adjacent hills, from the higher grounds formed of the oolitic strata, which extend southward through the county from the marshes which line the Humber. These higher grounds form part of what have been termed the Stonebrash hills, and separate

the valleys of the Ancholme and the Lower Witham from those of the Trent and the Upper Witham. The remaining part of the county is occupied by the lias, except a little of the new red sandstone in the north-west corner.

Hydrographic System.—The Trent, for about 16 miles, separates the counties of Lincoln and Nottingham; from below Gainsborough to its junction with the Yorkshire Ouse, its course of 19 miles is almost entirely within the borders of Lincolnshire. This river is navigable throughout that part which belongs to this county. The Idle, the Bykerdike, and the Torne flow into the Trent. The Ancholme rises near Spirdlington, and flows past Bishop Briggs to the Humber near Barton; there is a straight artificial cut of 20 miles to aid the navigation. The Tetney is formed by two streams which rise near Market Rasen, and flows into the German Ocean between Grimsby and Saltfleet. The Ludd rises near the south-west escarpment of the chalk range; it is formed by the junction of two or three brooks which unite above Louth and flow north-east into the German Ocean by several arms. The Louth navigation consists partly of this river and partly of an artificial cut. The Withern flows into the German Ocean at Saltfleet, and the Steeping at Spilsby.

South of Wainfleet the fen district commences: and from the extensive system of draining that has been carried on, the hydrography of the county becomes very complicated. The rivers have in several places been diverted from their natural beds, and now flow in artificial channels in direct lines, or are connected with artificial cuts, forming a very complete scheme of intercommunication.

The Witham, the most important river in the county, rises near the village of Thistleton, just within the border of Rutlandshire, and flows past Grantham, Lincoln, and Tattershall to Boston, below which town it flows into the Wash. The length of the Witham is about 80 miles, during the course of which it receives the waters of the Brant, Langworth, South Beck, Bain, Sleaford River, and the Waring, Scrivelsby, and Enderby Becks. Many of these minor streams are united by artificial cuts. The Welland rises in Northamptonshire, and flows past Stamford, Deeping, Crowland, whence there are two branches, the Old and New Welland, to the Wash. The Glen rises near Grantham, and flows into the Wash near the mouth of the Welland.

A general account of the great fen district of England, and of the changes which it has undergone, is given elsewhere. [BEDFORD LEVEL.] The northern fens are described in AXHOLME. The artificial cuts or drains are very numerous; they are called by the several names of 'cuts,' 'drains,' 'leams,' 'doves,' 'becks,' 'eans,' and 'dykes.' The chief among them, in this county, are the Car Dyke, the South Forty-Foot, the North Forty-Foot, the East Fen Drain, the West Fen Drain, the Old and New Hammond Becks, and the Shire Drain.

Of navigable canals, besides the Ancholme, Louth, Horncastle, Sleaford, Bourn, and other navigations, there are only two. One of them, the Foss Dyke, is probably a Roman work, and appears to have been used for navigation previous to the Conquest. Henry I. had it cleaned out and the navigation improved. It extends from the Trent to the Witham.

The other canal is the Stainforth and Keadby Canal, which connects the Trent with the Don.

Soil and Agriculture.—The soil varies greatly in different districts. In some places it is rich and productive, and in others so poor as to weary the patience and industry of the most persevering. But the grazing land in this county cannot be surpassed in its capabilities for fattening cattle; and some of the drained fens and warp-lands along the rivers possess a high degree of fertility when cultivated. The finest pastures are fed off by horses, which are fatted for the markets; but horses soon deteriorate the grass, while sheep improve it. Very little hay is made in the county: the grass is mostly eaten in a green state.

The lands which have been reclaimed from the sea by banking and draining are mostly laid out in large farms, which require a considerable capital. In other parts of the county there are many small properties, cultivated by the owners, and kept with great neatness. Fish is much used as a manure. Ground bones are used very abundantly on the light sands.

On the richest fen lands the most profitable rotation consists of the following crops:—1, Cole fed off with sheep; 2, oats; 3, beans; 4, wheat; 5, clover; 6, wheat. In some heavy soils the Essex rotation is adopted:—1, fallow; 2, barley; 3, beans; 4, wheat; and this, alternated with the others, answers well on rich land. For the poor sands there is no system so advantageous as that of raising turnips, and feeding sheep with them on the land where they grew.

There is some wood cultivated in the neighbourhood of Boston on rich warp-land; some sainfoin grown on the chalky soils, and lucerne on the richer. Cabbages and carrots are cultivated to a considerable extent; the former on the heavy clays, and the latter on the light and deep sands.

One of the most effectual improvements on land by the side of rivers in which the tide flows rapidly is that of warping; or in other words retaining the water on the land until it deposits a layer of sand and mud. The warping is effected by letting in the water of the rivers, which have a muddy current, by artificial channels and sluices, and retaining it there till low water. The river Humber carries off, in its course over various soils, all the finer particles which are too light to be immediately deposited. These consist of every kind of earth and portions of vegetable and animal matter, and are in such quantity that a layer one-tenth of an inch in thickness is often deposited between one tide and the next. Thus in a very short time a new soil is formed of any depth which may be desired, provided the land lies below the level of the river at high tides. Besides creating a soil, the warping fills up all inequalities, and a perfect level surface is produced. The soil thus produced is of extreme fertility.

In a county which contains such rich pastures it is of great importance that the breed of cattle and sheep be of the most profitable kind; accordingly we find that no county possesses finer breeds of horses, oxen, and sheep. There are not many dairies in Lincolnshire: breeding and fattening are considered more profitable and less troublesome. There is, however, some excellent cheese made of the Stilton kind.

Divisions, Towns, &c.—Lincolnshire has long been divided into three 'parts,' as they are termed, Lindsey, Kesteven, and Holland. Lindsey is by far the largest, and comprehends all that part of the county which lies north-east of a line drawn from Clifton-upon-Trent to Lincoln, thence by the Witham to near Boston, and from just above that town to the sea between Boston and Wainfleet. The name Lindsey, like that of the county, is derived from Lindum, the Roman name of Lincoln. Kesteven comprehends the south-western part of the county, and Holland (or Hollow-land) comprehends the remainder, including the greater part of the fens. Lincolnshire is further divided into wapentakes, hundreds, and soles. It is in the diocese of Lincoln, and in the Midland Circuit, the assizes being held in Lincoln. For parliamentary purposes the county is divided into North Lincolnshire and South Lincolnshire, each of which returns two members to Parliament; besides which, the city of Lincoln, Stamford, Grantham, and Boston return each two members, and Great Grimsby one—total, thirteen. The number of voters on the county register in 1866 was 21,632; 12,372 in the northern division; and 9260 in the southern.

The county is divided into 33 hundreds, and 629 parishes. It is famed for the number and beauty of its ancient parish churches.

The following are the principal towns, with the population of each in 1861:—

Alford ('Old-ford') is 22 miles N. by E. from Boston, and situated near the head of a small stream which flows into the sea. The town consists chiefly of one street. Population of the parish, 2658.

Barton-upon-Humber, a market town on the south side of the Humber, 33 miles N. by E. from Lincoln, is an ancient town, and at the time of the Norman Conquest was one of the principal ports of the Humber. It is now the place where the northern road passes the Humber to Hull; and the improvements which have been made in the ferry have rendered it a considerable thoroughfare. The town contains two large churches, one of which is very ancient. A thriving trade in corn is carried on; and bricks, tiles, ropes, and sackings are extensively manufactured. Population, 3797.

Bolingbroke is a small market town, 8 miles N. from Boston. There are a few remains of an ancient castle which belonged to John of Gaunt, and from which his son Henry IV. took the surname of Bolingbroke. Population of the parish, 1018.

Boston. [BOSTON.]

Bourn is a market town on the road from London to Lincoln, 36 miles S. by E. from Lincoln. It consists chiefly of one long street of modern houses. In the centre of the market-place is an ancient town-hall, said to have been built by the great Lord Burghley, a native of the town. The parish church is large. Wool-stapling and tanning are carried on, and the town has some trade in leather and wool. There is a navigable canal communicating with the river Glen. Population of the parish, 3730.

Crowland, or Croyland, is near the south border of the county, 42 miles S. by E. from Lincoln. Croyland Abbey was a rich monastic establishment. There are some remains of the church. The village is surrounded by fens. The market has been removed to Thorney. Population of the parish, 3148.

Gainsborough, an ancient market town and seaport, is situated on the eastern bank of the Trent, 15 miles N.W. by N. from Lincoln. The town consists chiefly of one street running parallel with the river, which is here crossed by a substantial stone bridge. There is a town-hall, beneath which is the gaol. By means of the Trent, which falls into the Humber about 20 miles below the town, vessels of 200 tons' burthen can come up to the wharfs, and the town has inland communication by canals, and a railway extends from Gainsborough to Great Grimsby. The population of the town is 6320; of the entire parish, 7339. The number of vessels which entered the port in 1864 was 177 (9083 tons), and the clearances 283 (13,045 tons). The customs revenue in 1865 was 90611.

Grantham, a parliamentary and municipal borough, is situated on the west bank of the Witham, 23 miles S. by W. from Lincoln. The church is a beautiful specimen of the Gothic architecture of the thirteenth century, with a spire which is much admired for its elegance and loftiness. There is a guild-hall, a gaol, a house of correction, and a free grammar-school founded in 1528. Grantham is connected with the Trent by means of a canal 30 miles long. The trade is chiefly in corn, malt, and coals. The municipal borough is governed by four aldermen and twelve councillors: population, 4954. The parliamentary borough returns two members: population, 11,121. The number of registered electors in 1866 was 755.

Grimsby. [GRIMSBY.]

Holbeach is a market town, 12 miles S. by E. from Boston. The church is large and handsome. Population of the parish, 4956.

Horncastle is a market town, 17 miles W. from Lincoln. The town has been much improved of late years, and contains many well-built houses. Part of the church is ancient. Corn and wool are the principal articles of commerce, which has been much promoted by opening the Horncastle navigation from this town to the Witham. Population of the parish, 4944.

Lincoln, the capital of Lincolnshire, a city and a county of a city, a municipal and parliamentary borough, is situated on the north bank of the Witham, 134 miles from London by the road. It was a place of considerable importance under the Romans, and also in the time of the Saxons.

The city is built on the southern slope and at the foot of a hill, on whose summit stands the cathedral. It is irregularly laid out; the principal street is along the road from London to Barton-upon-Humber, which traverses the entire city, crossing the Witham by a bridge, and running up the hill crowned by the cathedral. This street also extends a considerable length south of the Witham. The most interesting of the public buildings is the cathedral, which has two transepts, a central tower at the intersection of the larger transept, and two western towers. It has been erected at different periods. The predominant style is the Early English. Fuller remarks that the floor of this church is higher than the tops of most churches. The nave is very fine, and the piers in this part are peculiarly rich. The entire length, in the interior, is 482 feet, the height of the vaulting of the nave is 80 feet. The new bell, which is

larger and heavier than the old bell called Tom of Lincoln, is 6 feet 10½ inches in diameter at the mouth, and weighs 5 tons 8 cwt.—the old one weighed nearly a ton less. There are several parish churches. The remains of the castle stand on the hill, west of the cathedral: they consist chiefly of the outer walls and the gateway tower. The site of the interior of the castle is occupied by the county gaol and court-house, which were rebuilt some years ago by Sir R. Smirke. The guild-hall dates from the reign of Henry VIII. Lincoln abounds in monastic and other remains of ancient architecture. There are several ancient gateways, as Newport Gate, whose arch is Roman, the Chequer or Exchequer Gate in the Cathedral Close, and the Stonebow in the High Street. The remains of John of Gaunt's Palace, and of a building called John of Gaunt's Stables, present some interesting Norman and Early English features.

The chief trade is in flour, and there are some extensive breweries noted for their ale. The county assizes are held here. Its horse, sheep, and cattle fairs are of great importance.

The municipal borough is divided into three wards, and is governed by six aldermen and eighteen councillors. The parliamentary borough returns two members: the number of voters in 1866 being 1713. The population within the municipal and parliamentary limits (which are co-extensive), is 20,999.

Louth, a market town and municipal borough, is situated on the bank of the little river Ludd, 25 miles N.W. by W. from Lincoln. The church is one of the finest in the county; it has a lofty and elegant tower, surmounted by a spire. The Louth navigation extends from the town to the sea at the mouth of the estuary of the Humber. The municipal borough is divided into two wards, and is governed by six aldermen and eighteen councillors. Population of the parish, 10,667.

Sleaford, called *New Sleaford*, to distinguish it from the adjacent village of Old Sleaford, is a market town, situated on the little river Sleas, 16 miles S. by E. from Lincoln. The town has been much improved of late years, and is well paved and drained. The church is large and handsome, with a tower surmounted by a lofty spire. The Sleaford Canal is cut from this town to the river Witham. Population of the parish, 3467.

Spalding, a market town, is situated on the left bank of the river Welland, 15 miles S.W. by S. from Boston, of which port it is a member. The Welland is navigable for vessels of 60 or 70 tons up to the town. This town is in the fen district, but is well drained and clean. There is a town-hall, a gaol, a union workhouse, a small theatre, and a church with a fine tower and spire. Population of the parish, 8723.

Stamford, a municipal and parliamentary borough, stands on the left bank of the river Welland, 40 miles S. from Lincoln. A stone bridge of five arches crosses the river, and connects Stamford with a suburb in the bordering county of Northampton. The town is ancient, and the streets are irregularly laid out, but are paved and lighted with gas, and most of the houses are built of freestone and covered with slate. The Welland is made navigable to the town for boats and small barges. There are six churches in Stam-

ford, and one in the suburb on the right bank of the river. Most of the architecture of these churches is ancient, and some of it very fine. Some interesting monastic remains exist in and near the town. There are a town-hall, gaol, theatre, infirmary, several places of worship for dissenters, and numerous schools. The Great Northern Railway passes through Stamford. The municipal borough is divided into two wards, and is governed by six aldermen and eighteen councillors. The parliamentary borough returns two members, there being 512 electors in 1866. The parliamentary and municipal boundaries are conterminous, the inhabitants numbering 8047.

History and Antiquities.—At the time of the Roman conquest Lincolnshire constituted part of the territory of the Coritani. In the division which the Romans made of Britain it was included in the province of Flavia Cesariensis.

Under the Saxons, Lindsey, a name which perhaps applied to a district equal to the modern county of Lincoln, appears to have been a subordinate state dependent upon the kingdom of Mercia. Under the Danes it suffered greatly. The narrative of their ravages, given in the pages of the apocryphal Ingulfus, is interesting, and if its authenticity could be depended on would throw considerable light upon the historic darkness of the period. The county passed permanently into Danish hands about 877; it constituted part of the territory of the Danish burghs of Lincoln and Stamford, and was included within the boundary of the Danelagh (the Danish jurisdiction), as settled by the treaty between Alfred and Guthrun the Dane. In time, however, the Danish and Anglo-Saxon population became amalgamated, and the whole district passed under the supremacy of the Anglo-Saxon crown.

In the civil war between Stephen and the Empress Maud Lincolnshire was the scene of frequent contests. In the broils in which Henry II. was involved with his children, one of the Mowbrays, who had a castle in the Isle of Axholme, and was an adherent of the insurgent Prince Henry, was compelled to submit to the Lincolnshire men. In the civil war of the barons with John and his son Henry III., Lincoln was signalized by a second battle, which seated Henry III., yet a boy, securely on his throne. In the latter part of his reign, when troubles had again broken out, Axholme became once more the refuge of the disaffected. In the civil war of the Roses Lincolnshire does not appear to have suffered; but in the reign of Edward IV. an insurrection occurred in the county, in which the Lincolnshire men were defeated with great loss. At the time of the Reformation they again broke out into rebellion upon the suppression of the monasteries in 1536; but the insurrection was soon crushed.

In the civil war of Charles I. this county was the scene of several important events; engagements were fought, in 1642–3–4, at or near Grantham, Ancaster, Gainsborough, Horncastle, and Lincoln.

Of the ecclesiastical and baronial edifices which were erected between the Conquest and the Reformation, Lincolnshire contains many admirable specimens, especially churches. The cathedral of Lincoln, and the churches of Louth, Sleaford, and Spalding, are among the principal.

Of monastic edifices there are several remains. Of

Barling's Abbey part of a wall and some fragments of columns are extant. Of Thornton Abbey, the gate-house, which formed the western entrance, is yet tolerably entire; four handsome hexagonal towers form the four angles of this gate-house. A spacious room, probably the refectory, and an adjoining room with recesses in both ends, the abbey church, and a portion of the octagonal chapter-house, are also standing. Of Bardney Abbey, Kirkstead Abbey, Revesby Abbey, Haverholme Priory, Temple Bruer, and Croyland Abbey, some portions remain.

Sir Isaac Newton was born at Woolsthorpe, near Grantham, and John Wesley was a native of Epworth.

LINCOLN'S INN, one of the four English Inns of Court, having the exclusive right of calling persons to the English bar, or rather to the degree of barrister-at-law. It became an Inn of Court in 1310, occupying premises which had belonged to the earl of Lincoln; hence its name. The other Inns of Court are the Inner Temple, the Middle Temple, and Gray's Inn. [INNS OF COURT.]

LINDLEY, JOHN, an eminent English botanist, was born on the 5th February, 1799, at Catton, near Norwich, where his father kept a nursery garden. In early youth he evinced a strong partiality for botanical studies, and published in 1819 a translation of Richard's 'Analyse du Fruit.' Soon afterwards, his botanical papers in the 'Transactions' of the Linnæan Society having attracted favourable attention, he removed to London, and became assistant-secretary to the Horticultural Society. He recommended the classification of plants on the natural system in his great work on the 'Vegetable Kingdom,' published in 1846, which is now recognized as a standard authority. He also devoted himself to the popularization of botany, and in furtherance of this admirable object produced his 'School Botany,' 'Ladies' Botany,' and other lucid and instructive treatises. For many years he was editor of the *Gardener's Chronicle*, which he conducted with great ability. While engaged in these multifarious labours he was diligently employed, as a practical botanist, in describing new species of plants, on which he wrote a large number of papers for various botanical publications. From 1829 to 1860 he was professor of botany at University College, London. He was a Ph.D. of Munich, a member of several foreign scientific bodies, and a Fellow of the Royal Society, whose gold medal he received, in 1858, as a recognition of his services to botanical science. Dr. Lindley died November 1, 1865.

LINDSAY, SIR DAVID, was born about the end of the fifteenth century, at the family seat of 'The Mount,' in Fifeshire, whence he is commonly called Sir David Lindsay of the Mount. In the year 1512 he was appointed servitor, or gentleman usher, to the young prince of Scotland, afterwards James V. His duties seem to have been of the most servile kind—he had not only to attend the person of the infant prince, but practised the craft of nursing.

He is the authority on which his kinsman, Lindsay of Pitscottie, in his 'Chronicles of Scotland,' describes a spectral apparition which, in 1513, appeared to James IV. in the church of Linlithgow, and warned him against that campaign which terminated in the battle of Flodden. Sir David professed to have seen the apparition approach and vanish, and described

him as 'ane man clad in a blue gown, beltit about him with a roll of linen cloth, a pair of bootikins on his feet to the great of his legs, with all other clothes conform thereto.'

The 'Dream,' supposed to be the earliest of his writings, appeared in 1528. His other principal pieces are—'Complaint of the King's Papingo;' 'Complaint of John the Commonweil;' 'History of Squyer Meldrum;' 'The Monarchie;' and 'The Play, or Satire, on the Three Estates.' He particularly excelled in his attacks on the priesthood and the corruptions of the court; and after the Reformation his name was long popular as that of a Protestant champion. 'The Satire on the Three Estates' stands half way between the early 'Mysteries' and the dramas of the latter part of the sixteenth century. It was sometimes acted in the open air. Lindsay held the office of Lord Lyon King at Arms. In 1537 he had the task of preparing some masques or pageants to celebrate the arrival of Mary of Guise, queen of James V. The time of his death is not known, but he is said to have been alive in 1567.

LINE, a term used in military language, to distinguish the ordinary regiments of cavalry and infantry from the Guards, Artillery, and Engineers. They are so called from the fact of their usually constituting the 'line of battle.'

LINE. [SOLID, SURFACE, POINT.]

LINE SYSTEM. [PRINTING.]

LINEN MANUFACTURES. The textile fibres of the flax plant, twisted into threads and woven into an interlaced network so as to produce a compact fabric, have been employed from the most remote periods as a material for clothing. The production of linen occupied an important place among the manufactures of ancient Egypt. The sacred writings abound with allusions to it, and Herodotus and other authorities frequently refer to the skill which the Egyptians had acquired in weaving fabrics of fine linen, and the enormous quantities in which they were prepared both for home use and foreign exportation. In Egypt the priests were obliged to clothe themselves in linen garments; and microscopic examination of the bandages with which they wrapped the bodies of the dead, show that they were composed of the same material. These bandages have been found to consist of linen of every description of quality, from the 'fine linen' resembling the finest lawn of the present day to a coarse fabric like sacking. The weaving processes employed in the manufacture were evidently not so perfect as the spinning. The webs are usually found to consist of scarf-like pieces about six yards long, and the whole length of the web was probably stretched in a frame as at present by the native manufacturers of the East. The finer fabrics had a twilled appearance, owing to the weft rising on the surface from the looms employed not being capable of light weaving. In a fragment of mummy cloth given by Belzoni to Mr. Thompson, of Clitheroe, the warp contained 90 threads to an inch, the weft only 44. Mr. Thompson ascribed this peculiarity to the difficulty of getting in the weft when the shuttle was thrown by hand. In modern cloths the proportions of warp and weft are nearly equal. A specimen of cloth taken from the body of a mummy in the museum of the Natural History Society of Belfast, was lately submitted to

the examination of a flax merchant, who reported that under the 37-inch glass used by linen merchants 'it counted 17⁰⁰ in the warp and 9⁰⁰ in the weft, and was composed of yarn evenly and well twisted. The flax used was fine in quality, and prepared for spinning in the most careful manner. The warp is about No. 50 and the weft about No. 80. The fabric is not one that would be woven at the present day, as for a 17⁰⁰ linen about 90 warp and 110 weft would now be used.' The Egyptians had the art of introducing into the edgings of their fine linen threads of blue and fawn colours, dyed in the yarn, and some of the cloths are found with broad borders dyed blue, such as are worn at the present day in Nubia, and manufactured by the successors of the ancient weavers of Egypt. In the early times of Greece and Rome linen was regarded rather as an article of luxury than for common use, and confined to female dress; but as civilization and refinement advanced, its value as a healthy material for clothing became more generally recognized, and we find that under the emperors, the Romans had become manufacturers, as well as large importers of the more delicate fabrics of the looms of the East.

The spindle and distaff, such as are to be seen represented on the walls of the tombs of ancient Egypt, and to which there are so many references in the Old Testament, were until comparatively modern times the sole instruments employed in preparing the flax fibres for the weaver. The introduction of the common hand-spinning wheel was the first departure from patriarchal methods, and until about the end of the eighteenth century all the flax fibre produced in Europe was spun by its simple machinery. At that period the production of linen in those countries, as in some parts of Europe at the present day, was merely a rural manufacture of a purely domestic character. The farmer not only cultivated the flax crop but steeped and dressed the fibre, the female members of his household plied the wheel, while his sons wove the delicate threads into brown linen. Improvements, however, were going forward in every department of industry, and the ingenious application of automatic machinery by which Hargreaves and Arkwright had revolutionized the process of cotton spinning, was in 1787 brought to bear by two Durham mechanics, Kindrew and Porthouse, in the manufacture of flax. The earliest attempts in England were made at Darlington, and works were subsequently erected at Leeds, which has now, mainly through the persevering exertions of the Messrs. Marshall, become the head-quarters of the flax trade of England.

In Ireland the manufacture of linen claims the most remote antiquity. Even at an early period the linen merchants of Ireland appear to have found a market for their goods, as at present, in the great towns of England. In 1272 we find Irish linen at Winchester, and about the same period the ancient poem on 'The Battle of Down,' describes the followers of O'Neill as wearing 'fine linen shirts.' From the time of Charles I. the importance of the trade attracted the attention of the English government; and in 1639 the earl of Strafford, then chief governor, by introducing flax seed and skilled workmen from the Continent, and by the enactment of severe laws for the regulation of the processes employed, endeavoured to promote improvement in the manu-

facture. Though for political purposes successive governments endeavoured by bounties to stimulate the production of linen in Ireland, while they adopted stringent measures to confine the manufacture of woollens to England, but little real or permanent progress was made until the settlement in the north of Ireland of many Protestant families forced to fly from France by the revocation of the Edict of Nantes. Among the refugees were several linen manufacturers, one of whom, Mr. Lewis Crommelin, settled near Lisburn in the county of Antrim with a colony of his own countrymen, who were liberally encouraged by grants from government to devote themselves to the improvement of the linen trade. By Crommelin's efforts and the introduction of improved machinery and processes, both in spinning and bleaching, this branch of industry was greatly promoted, and the Irish weavers enabled to produce linen of much finer quality than had been previously manufactured by them. The next important event in the history of the Irish linen trade was the appointment, by an act passed in the ninth year of the reign of Queen Anne, of a 'Board of Trustees of the Linen and Hempen Manufactures.' Large sums were placed at the disposal of this board, and for several years 20,000*l.* were annually distributed under its management in the encouragement of flax cultivation, and in bounties on the export of linens; while, at the same time, heavy duties were placed on the import of flax fabrics of foreign manufacture. For some years this system tended to advance the Irish trade, but, like all false measures of the kind, prevented its healthy development. It was abolished in 1828, and the exportation of linen, which, while it existed, did not in any year exceed thirty-five millions of yards, in the course of a few years increased to upwards of seventy millions of yards annually. For a considerable time the attempts which were made to introduce the new spinning machinery into Ireland were not attended with much success; and the English and Scotch spinners who, like the Marshalls of Leeds, and Messrs. Ivory, of Glammis, in 1790, had adopted Kindrew's machines, and also various improvements which added to their efficiency, especially what is termed 'wet spinning,' by which the fibres of the flax plant, by being made to pass through warm water in the spinning process, are softened, so that they can be drawn out and made to yield thread of much superior delicacy than when dry spun, were enabled to purchase up the flax offered in the Irish markets, and to produce linens far below the prices of the Irish manufacturers. In 1828 Belfast, which is now the metropolis of the flax industry of the United Kingdom, did not possess a single flax mill; and the credit of introducing the new machinery into Ireland is due to Messrs. Mulholland, of Belfast, and Murland, of Castlewellsan, who in that year laid the foundation of the prosperity of the linen trade of the north of Ireland. Owing to the circumstance that the raw material was produced in abundance on the spot, while in England and Scotland the culture of flax had been almost abandoned, the new machinery enabled the Irish manufacture rapidly to outstrip that of the sister countries, and also of those continental countries which depended upon the ancient system of hand spinning. Though strenuous efforts

have of late years been made both in France and Germany to regain their former position as linen producers, Ireland, especially in the manufacture of certain qualities of flax fabrics, continues to maintain her superiority. France in 1864 had 563,000 spindles, and has at the present time, probably, at least 680,000 at work; Prussia in 1854 had only 47,000, but her twenty-two mills contained in 1864 133,800 spindles, and 38,200 additional spindles had been ordered. The American war, and the diminution in the supply of cotton, tended to stimulate the progress of the linen trade in every part of Europe, and has exercised the most remarkable influence on the development of this branch of industry in the north of Ireland. The successful application of the power-

loom to weaving flax fabrics has also, within the last six or seven years, contributed to promote the rapid extension of the Irish trade. In 1859 there were only 3124 power-looms employed in Ireland, while at present there are 7929. In 1828, as already stated, Belfast did not possess a single spinning mill. Of the 700,000 spindles, and 35,000 workers employed, in the present year in Ireland, three-fourths are to be found located in the neighbourhood of that town.

Next to cotton, coal, and iron, the linen trade is the most important of the United Kingdom. No record is kept of the very large quantity used at home, but the following tables give the imports and exports for the year 1864:—

IMPORTS.

	Quantity.	Value.	Chiefly from
		£	
Linen yarn, ...	2,040,952 lbs.	142,449	France, Russia, and Holland.
Cambrics and French lawns, ...	46,021 yards.	7,477	France.
Damask and diaper, ...	6,903 "	1,036	Hamburg and France.
Sails and sailcloth, ...	387,404 "	19,375	Russia and France.
Other kinds of linen not separately specified, ...	—	112,948	Russia and Belgium.
Total value, ...	—	283,285	

EXPORTS.

	Quantity.	Value.	Chiefly to
		£	
Linen yarn, ...	40,314,568 lbs.	3,000,969	{ Hamburg, Holland, Spain, Gibraltar, Italy, and the United States.
Linen manufactures:—			
Plain and unmixed, ...	171,371,186 yards.	6,005,275	{ Hamburg, Egypt, Cuba, United States, Australia, and West Indies.
" Mixed, ...	12,829,084 "	422,117	{ Egypt, Cuba, United States.
Cambric and lawns, ...	4,993,875 "	186,892	{ United States.
Damask and diaper, ...	1,459,609 "	93,335	{ United States.
Sailcloth, ...	6,941,249 "	394,284	{ Hamburg, United States, and British North America.
Checked, printed, or dyed, unmixed, ...	10,556,315 "	413,365	{ France, Cuba, and United States.
" Mixed, ...	2,137,351 "	85,990	{ Cuba, Mexico.
Ticking, ...	180,083 "	6,244	{ United States.
Lace of thread, ...	12,534 "	326	{ United States.
Sails, ...	—	12,897	{ British North America.
Tarpaulins, tilts, &c., ...	—	15,041	{ Australia.
Hosiery—Stockings of thread, ...	—	22	{ Australia.
" Other sorts, ...	—	25,786	{ South America and Australia.
Tapes and smallwares, ...	—	19,045	{ United States.
Thread for sewing, ...	3,978,321 lbs.	492,194	{ Hamburg and North America.
All other sorts of linen manufactures, ...	—	24,195	{ United States and Turkey.
Total value, ...	—	11,197,977	

The imports and exports of FLAX and HEMP are given in the articles relating to those subjects.

LINES OF INTRENCHMENT are the parapets executed by an army in the field, for its protection, when it is to remain for a time on the defensive. In many cases the protection of an army consists merely of the natural obstacles of the country, as escarpments, rivers, and marshes; but where these are wanting, and occasionally with them, there is formed a continuous breast-work, consisting of redans, as C C, fig. 1, joined by curtains, as a b. The distances of the redans from centre to centre may be 150 yards; such was the construction recommended by Vauban, but since his time it has been modified, by giving to the curtains the form indicated by the

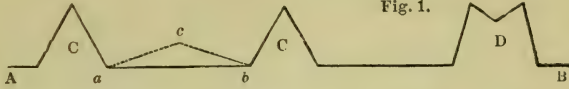
lines a c, b c, in order that the ditch might be more effectually defended from the faces of the redans. These may have the form of equilateral triangles, and the lengths of their sides may be about 50 yards. The entrances are usually in the middle of the curtains.

Instead of simple redans, parts of the line have occasionally been formed of works resembling two united together, as D.

These lines are considered advantageous for the protection of a frontier, to prevent the enemy's marauding parties from making inroads for the purpose of levying contributions or laying waste the country.

When it is intended to defend a bank of a river, or a side of a road, the parapets may consist of a series of branches in the form a b c d, fig. 2. A line

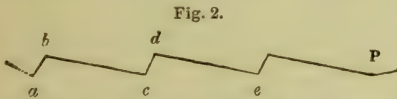
of this kind is said to be à *crémaillères*; and in such situations a succession of fires from the branches, *a b, c d, &c.*, may be directed against the enemy during his advance. The distances between the salient points, *b, d, &c.*, should not exceed 100



enemy being supposed to occupy the ground in front of *a b*, the short branches could be easily raised high enough to defilade those which, as *b c, d e, &c.*, tend towards the foot of the hill.

The most perfect fortification for defending a line of country presenting few natural obstacles to the advance of an enemy, should the importance of the position render it advisable to incur the labour of the construction, would be a series of bastions connected by curtains, either straight or broken. The distance from the centre of one bastion to that of the next may be 180 yards.

Lines of intrenchment composed of works placed at intervals from one another, provided the distances be not so great as to prevent the troops in them from mutually assisting each other, have great advantages over those formed of continuous lines of parapet. In the latter case it is scarcely possible for the army to make a movement for the purpose of attacking the enemy, however favourable the opportunity, since much time would be lost in issuing from the line through the narrow passages. Detached works, on



the other hand, constitute a number of strong points by which the position of the army is secured, while through the spacious intervals an advance or retreat may take place with all necessary facility. It may be added, that detached works are capable of being easily adapted to any kind of ground; for it is merely necessary to place them on the more elevated spots in such situations that the enemy may not be able to penetrate between them without being exposed to their fire. [ENCAMPMENT.]

All the works which have been described consist of parapets formed of earth obtained by cutting a ditch in front.

LINGARD, DR. JOHN, was born at Winchester on the 1st of February, 1771. After receiving the rudiments of education under the parental roof, he was placed, while still very young, in the celebrated Roman Catholic seminary at Douai. Here he displayed great natural acumen, an untiring perseverance, and a passionate love of study; while he necessarily imbibed those religious principles which coloured all his later life, and infused so strong a theological leaven into all his writings. On his return to England he embraced historical pursuits with extraordinary ardour, and, the first among English writers, directed his attention to the stores of information accumulated in the national records and state papers. In 1806 he made his first appearance

yards, and the lengths of the short branches may be about 18 or 20 yards.

It may be added, also, that the line à *crémaillères* (indented line) is convenient when the descent of a hill is in its direction, as from *a* to *e*; for then, the

as an author. He was then in priest's orders at Newcastle-on-Tyne, and he published there his 'Antiquities of the Anglo-Saxon Church,' a work not more replete with erudition than with sophistry and misrepresentation. This was followed by the *magnum opus* which will hand his name down to posterity, 'The History of England from the first Invasion of the Romans to the year 1673.' Though to some extent superseded by the more comprehensive and elaborate research of Froude, Hallam, and Macaulay, it will always enjoy a deserved reputation for its learning, method, and intelligence; for the new paths of historical inquiry which it opened up; and because it provides us with the views of an able Catholic on many controverted points of English history. Where not biased by his religious tenets, his judgments are eminently impartial. His facts are arrayed with care and discrimination, and his style is lucid and dignified. Several editions of the History have been published. Lingard died in 1851.

LINGULA (Lat. *lingua*, 'a tongue'), a genus of bivalvular Mollusca, which abounds in the fossil state.

LINIMENTS (Lat. *linire*, 'to besmear,') are ointments of equal consistency with oil, and therefore rubbed into the skin more readily than ordinary ointments. Chemically, they are of the nature of soap, being a compound of oils and alkalies. Among the most important are, *Liniment of Ammonia*, or harts-horn and oil, being a mixture of solution of ammonia and olive oil, used to relieve neuralgia, rheumatism, and sore throat; *Soap Liniment*, made of soap, camphor, and spirits of rosemary, used for sprains, bruises, rheumatic pains, &c.; *Liniment of Lime*, or Carron Oil, a mixture of equal quantities of olive or linseed oil and lime-water, used for burns and scalds; *Camphor Liniment*, consisting of camphor dissolved in olive oil; and *Simple Liniment*, which is made of four parts of olive oil, and one part of white wax; it is used to soften the skin and to promote the healing of chaps.

LINKOPING. [SWEDEN.]

LINLEY, THOMAS, was born at Wells about the year 1730. He was first the pupil of Chilcot, organist of the abbey, Bath, and finished his studies under Paradies, an eminent Venetian, who had become a resident in this country. Mr. Linley established himself at Bath, where his concerts, supported by the vocal abilities of his two daughters, Eliza and Mary, afterwards Mrs. Sheridan and Mrs. Tickell, were very attractive. He joined with Mr. Stanley, and afterwards with Dr. Arnold, in conducting the London oratorios. In 1775 he set the music to Sheridan's opera 'The Duenna,' which ran seventy-five nights. He next purchased a large share in Drury Lane Theatre in 1775, and in connection with that theatre produced his 'Carnival of Venice;' 'Selima and

Azor,' from the French; 'Love in the East;' and 'The Camp.' He also added those charming accompaniments to the airs in 'The Beggar's Opera,' which are still in use. His Six Elegies, Twelve Ballads, and Madrigal, 'Let me, careless and unthoughtful lying,' were among the most popular of his musical productions. Linley's management of the theatre was generally successful.

Mr. Linley survived his two accomplished daughters and several of his other children. Mr. Linley died in 1795, leaving a widow, a daughter, and two sons, of whom

LINLEY, WILLIAM, born about the year 1771, was the youngest. Having been well educated, and placed in easy circumstances, he devoted most of his attention to the study of music. He produced a considerable number of glees, all of them evincing great originality of thought and refined taste. He composed a set of songs, two sets of canzonets, two comic operas, and many detached pieces; he compiled the 'Dramatic Songs of Shakspeare,' and wrote two novels and several short pieces of poetry. He died in 1835. Thomas Linley, the eldest son, was born at Bath in 1756, and at an early age discovered a remarkable genius for music. In addition to several beautiful pieces contributed to 'The Duenna,' he composed some new music to Shakspeare's 'Tempest,' which show him to have been possessed of a delicate fancy and fertile imagination. He was accidentally drowned in 1778, at the early age of twenty-two.

LINLITHGOWSHIRE, or WEST LOTHIAN, a county of Scotland, is bounded N. by the Frith of Forth, W., S.W., and N.W. by Stirlingshire and Lanarkshire, and S. and S.E. by Edinburghshire, from which it is separated by the rivers Breich and Amond. It lies between 55° 49' and 56° 1' N. lat., and 3° 18' and 3° 51' W. long. Its greatest length is nearly 21 miles, and its greatest breadth somewhat exceeds 10 miles. The area is 81,113 acres, about three-fourths of which are arable. The population in 1861 comprised 19,868 males, and 18,777 females—total, 38,645; being a considerable increase since 1851, when the inhabitants numbered altogether 30,135. At the last census there were 5392 inhabited houses, 166 uninhabited, and 37 building in the county.

The centre of Linlithgowshire consists of a somewhat elevated plateau, surrounded on all sides by hills, of which the highest, in the south-west, attain an elevation of about 1400 feet. Coal is abundant, and several valuable seams are wrought. Limestone and freestone are quarried. The soils are generally strong, well drained, and well manured with lime and farm-yard dung.

The county sends one representative to the House of Commons (the number of registered electors in 1866 being 831), and Linlithgow and Queensferry are each contributory to a parliamentary district.

Bathgate, a market town, is 6 miles S. by W. from Linlithgow. It is a burgh of barony, and governed by a provost, three bailies, and twelve councillors. The town contained in 1861 a population of 4827.

Borrowstownness, commonly written and pronounced Bo'ness, a burgh of barony, is situated on a point of land, or *ness*, which projects into the Frith of Forth, 3 miles N. from Linlithgow. The town is close to the harbour, which is formed by two piers

carried out into the Frith, and is very safe and convenient, with 16 or 17 feet of water at spring tides. The town was very flourishing, and the port had a large commerce till the opening of the Forth and Clyde Canal, and the erection of Grangemouth, in Stirlingshire, into a separate port, since which time it has decreased considerably. The population of the parish in 1861 was 5698, of whom 3814 were in the town. The total number of vessels which entered the port in 1864 was 263 (22,179 tons), and the clearances were 1582 (143,829 tons). The customs revenue in 1865 amounted to only 620*l*.

Linlithgow, the county town, is a royal burgh, and a place of great antiquity. It is 17 miles W. by N. from Edinburgh. The town is situated on the south side of Linlithgow Loch, which is a mile long, and about a quarter of a mile broad in the widest part. The town consists chiefly of one long street, and contains the county buildings and a town-house. It is well supplied with water, and governed by a council of twenty members, including the provost and four bailies. The Edinburgh and Glasgow Railway passes through Linlithgow. It is included in the Falkirk parliamentary district. The population of the burgh in 1861 was 3843; of the entire parish, 5784. The number of parliamentary electors is about 130. The remains of the royal palace of Linlithgow stand on an eminence which projects into the Loch, and divides it into two nearly equal parts. James IV., James V., and James VI. frequently resided in the palace. It was set on fire in 1746, but several of the rooms were preserved from destruction.

Queensferry is a small town and port on the south side of the Frith of Forth, included in the Stirling parliamentary district. The parliamentary burgh consists of part of the parishes of Queensferry and Dalmeny; the royal burgh, of part of Queensferry only. Population in 1861 of parliamentary burgh, 1230; of royal burgh, 760. Parliamentary constituency, 18. It was first chartered in 1636; and is governed by a provost, three bailies, and nine councillors. The harbour is formed by two piers.

LINNÉA, a genus of plants of the order *Caprifoliaceæ*, so called in honour of Linnæus. It is a pretty trailing shrub, and a native of the north of Europe.

LINNÉ, KARL VON, or as his name was Latinized, LINNÆUS, was born at Råshult, in the province of Småland, in Sweden, May 23, 1707. His father was a country clergyman.

In 1727 Linné repaired to the University of Lund in order to study medicine, and was received into the house of Dr. Stobæus, a physician possessing a fine library and a considerable knowledge of natural history. In 1728 he passed the vacation at home, and there formed the resolution of prosecuting his studies at Upsal. To meet the expenses of his academical education, his father was unable to allow him a larger sum than 8*l*. sterling; he consequently suffered much privation, and in vain endeavoured to increase his income by procuring private pupils. His circumstances, however, were somewhat improved by a royal scholarship awarded him on the 16th of December, 1728. He diligently persevered in attendance upon the courses of lectures connected with his future profession—the more diligently perhaps because of his poverty; and by the end of 1729 the clouds of adversity began to disperse. By this time he had

become known to Dr. Olaus Celsius, the professor of divinity at Upsal, who was glad to avail himself of Linné's assistance in the preparation of his 'Hierobotanicon,' a work illustrating the plants mentioned in the Holy Scriptures. His new friend procured him private pupils, and introduced him to the acquaintance of Rudbeck, the professor of botany, then growing old, who appointed him his deputy lecturer, received him into his house as a tutor to his younger children, and gave him free access to a very fine library and collection of drawings.

Here he began to sketch those works which were afterwards published under the titles of 'Bibliotheca Botanica,' 'Classes Plantarum,' 'Critica Botanica,' and 'Genera Plantarum,' and perceived the importance of reducing into brevity and order the unmethodical, barbarous, confused, and prolix writings with which he was surrounded. In the year 1731 Linnæus quitted the house of Rudbeck, and on the 12th of May, 1732, proceeded, under royal authority and at the expense of the University of Upsal, upon a journey into Lapland. The result of this journey was his 'Flora Laponica.' In the beginning of 1735 he set out upon his travels in search of some university where he could obtain the degree of doctor in medicine at the least expense, in order that he might be able to practise physic for a livelihood. He accomplished his purpose at Harderwijk in Holland, June 23, 1735.

In Holland Linné formed a close friendship with Dr. John Burmann, professor of botany at Amsterdam, and it was during his stay with that botanist that he printed his 'Fundamenta Botanica,' a small octavo of thirty-six pages, which is one of the most philosophical of his writings. At this time he was introduced to Mr. Clifffort, a wealthy Dutch banker, who possessed a fine garden and library at a place called Hartecamp. This gentleman engaged the Swede to arrange the objects of natural history contained in his museum, the plants in his garden and herbarium; and assisted him in the publication of a descriptive catalogue, the 'Hortus Clifffortianus.' It was during his engagement at Hartecamp that he visited England, where he seems to have been ill received by Dillenius, at that time professor of botany at Oxford, who was offended at the liberties Linné had taken with some of his genera; but a reconciliation was effected before the Swedish botanist returned to Holland. Towards the end of 1737 he quitted Mr. Clifffort, but did not leave Holland till the following spring.

On his return to Sweden he commenced practice in Stockholm as a physician, and with the aid of a pension of 200 ducats from the government, on condition of lecturing publicly on botany and mineralogy, his prospects for the future became so satisfactory as to enable him to marry at midsummer, 1739. By this time his botanical fame had spread over all Europe, and henceforward his life was one of increasing fame and prosperity. Every branch of natural history he revised or remodelled; books and collections were sent to him from all parts of the world; his pupils, Hasselquist, Osbeck, Sparrman, Thunberg, Kalm, Lofling, and others, communicated to him the result of their travels in Europe, Asia, Africa, and America. He was named professor of medicine at Upsal in 1740, and afterwards of botany; in 1746 he received the rank and title of archiater; in 1757

he was raised to the nobility, and took the title of Von Linné; and by the year 1758 he was able to purchase the estates of Hammarley and Söfja for 80,000 Swedish dollars (above 2330*l.* sterling).

During these eighteen years his life was one of incessant labour; besides his practice as a physician, which was extensive and lucrative, and his duties as professor, he published a most extraordinary number of works on various branches of natural history. In addition to a large number of dissertations bearing the names of his pupils, the 'Flora' and 'Fauna Suecica,' 'Materia Medica,' edition after edition of the 'Systema Naturæ,' and numerous miscellaneous works, some of great importance, he produced his 'Philosophia Botanica,' and 'Species Plantarum.'

Towards the latter part of his life Linné suffered severely in health. He died January 10, 1778, and was buried in the cathedral at Upsal.

After the death of his son, his library and herbarium were purchased for the sum of 1000*l.* by the late Sir James Edward (then Dr.) Smith, and are now in the possession of the Linnæan Society of London.

LINNET, the name of a hard-billed singing bird, which, though well known under one or the other of its various appellations to every English bird-catcher, has, in consequence of the changes of its plumage, and the names applied to it when it appears under those changes, given rise to much confusion in our systems and catalogues, leading both the learned and the unlearned into considerable error.

As synonyms of the Linnet or Common Linnet, we have the Greater Red-headed Linnet, the Greater Redpole, the Rose Linnet, the Gray Linnet, the Brown Linnet; *Fringilla Linota*, Gmel.; *F. Cannabina*, Gmel.; *Linaria rubra major*, Briss.; *Linaria Cannabina*, Swainson, and modern authors. According to Temminck this bird is subject to accidental variation of plumage, from the natural colour even to pure white, or whitish with faint markings; sometimes the plumage is variegated with white, sometimes the general colour is dusky black, the feet being often red. We need not here enter into any long account of the plumage of a bird so well known; yet it may be as well to state that the adult male in spring is thus characterized:—Feathers of the forehead and the breast of a crimson red, terminated by a narrow border of rosy red; throat and front of the neck whitish, with longitudinal brown markings; top of the head, nape and sides of the neck of a pure ash; back, scapulars, and wing-coverts, chestnut brown; under parts whitish; some of the quills blackish, bordered externally with white; tail forked, black. Caged birds do not acquire the roseate tints in spring which adorn the plumage of the free birds. After the breeding season, the roseate tints begin to fade, and gray and brown prevail.

The Linnet is spread over Europe generally, and is abundant in England. It resorts to wild commons, and hedges of furze, building its nest in a low bush; the eggs are bluish white, dotted with purplish red. In winter linnets assemble in flocks, visiting the sea-coasts till spring calls them to return to the uplands, when they separate and pair. Their food consists of small seeds generally, as of the flax, thistle, dandelion, &c., and particularly of those of the cruciform

plants. The song of the Linnet, though short, possesses much sweetness, and hence this bird is very commonly kept in cages.

Besides the Common Linnet, the genus *Linaria* contains two other British species, viz., the Mountain Linnet or Twite (*L. montana*), and the Redpole or Lesser Redpole Linnet (*L. minor*). [FRINGILLIDÆ; GREENFINCH.]

LINSEED, the seed of *Linum usitatissimum*, or Flax plant, contains a mealy albumen of so oleaginous a nature that it yields by pressure in great abundance the oil of linseed. The seed of the flax plant is harvested, not merely with a view to the reproduction of the plant, but also because of the oil which it yields by compression. For both these purposes of sowing and crushing, linseed is largely imported into the United Kingdom. Linseed is also much used as food for small birds. The quantity imported into the United Kingdom in 1865 was 1,350,000 quarters, about two-thirds of which came from Russia, Bombay, and Bengal. It was estimated to be worth 3,690,211*l.*, or about 2*l.* 14*s.* per quarter. In the same year 146,798 quarters, value 390,000*l.*, were exported, five-sixths of the entire quantity having been shipped to Holland and France. The residuum of linseed from which the oil has been expressed is used, under the name of oil-cake, for fattening cattle.

LINSEED OIL may be procured by cold expression of the seeds, a process which makes the oil clearer; or the bruised seeds are roasted in the oil mills, in which case it is brownish yellow, and easily becomes rancid, probably from attracting oxygen. Linseed oil is pellucid, with a faint but peculiar odour and taste. Specific gravity, 0.93. By long boiling it becomes dark brown, tenacious, and thickened, but dries more easily, and in this state is used for printer's ink; by still longer boiling it becomes black, almost solid, and elastically tenacious, like caoutchouc, and in this state it serves for bird-lime.

Linseed oil is used to form liniments, of which the most common is that mixed with lime-water, as an application to burns. But it is much more extensively used in the arts, particularly for painting. The quantity of linseed oil imported into the United Kingdom in 1865 was about 8000 tons, value 340,000*l.*, or about 42*l.* per ton. In the same year about 10,000,000 gallons of British manufacture were exported. The bulk of the former came from Hamburg, Prussia, Holland, and France, and the latter was sent to almost every country in the world.

LIN-TSEH-SU, Chinese Imperial Commissioner, was born at Hing-hwa, in 1785. His father was an artificial flower maker, at which trade the son worked for some years, till a wealthy friend sent him to Peking. He acquired high educational honours, and at the age of thirty was employed by the emperor as censor. He was afterwards appointed to superintend the repairing of the banks of the Yellow River, then to the post of financial commissioner for Kiangnan, and eventually viceroy of the two provinces of Shen-se and Kan-su. On his return, he unwisely urged his sovereign to adopt stringent measures towards the importers, dealers, and consumers of opium, and in dealing with this evil, he excited a war with Great Britain, and brought down upon himself the vengeance of his enraged sovereign. He

was banished, but afterwards recalled, and appointed to a military command. He died January, 1850, while on his way to attack the Taepings.

LINUM, a genus of plants which gives its name to the small family of *Linacæ*. The species are chiefly found in Europe and the north of Africa, but a few likewise in other parts of the world. Few, however, are of any importance, except that which has been an object of culture from the earliest times of which we have any record, that is, *Linum usitatissimum*, or the flax-plant, which is valuable as well for its seed as for the ligneous fibre of its cortical layer, which forms the tow spun into yarn and woven into linen cloth.

The seeds of *Linum usitatissimum* yield several articles useful in medicine and surgery. The testa, or husk of the seeds, is very mucilaginous, the kernel contains much oil, and the farina or meal procured by grinding or bruising the seeds, after the oil has been expressed, furnishes an excellent material for poultices.

LINZ, the capital of Upper Austria, is situated in 48° 19' N. lat., and 14° 17' E. long., on the right bank of the Danube, over which there is a wooden bridge 864 feet long, leading to the suburb Urfahr. The old town consists of one long street, and is of much less extent than the suburbs. There are four gates and three squares. Linz is, on the whole, a well-built city. There are many churches, the largest of which is the cathedral. Other remarkable buildings are—the government house; the hall in which the provincial parliament meets; the town-hall, built in 1414; the city brewery, the custom-house, the gymnasium, the theatre, and the great imperial manufactory of woollen cloths and carpets. Linz gives title to a bishop, and has a lyceum, with a library of 25,000 volumes, several public schools, a deaf and dumb asylum, and many charitable institutions. There are considerable manufactures of cotton and silk goods, leather, gold lace, cards, tobacco, &c. The population of the town at the last census was 27,628. It is a place of considerable trade, with a station on the railway, 100 miles west from Vienna. It is a great railway centre, and its transit trade by the Danube is very considerable. Some Roman antiquities have been discovered here, and it is probably the *Lentium* of the Romans. The fortifications of Linz, constructed on a new plan by Prince Maximilian d'Este, consist of a series of thirty-two detached forts, twenty-three on the right bank and nine on the left bank of the Danube, each at a distance of from one mile to three miles from the town, round which they form a circuit of nine miles, being joined to each other by a covered way. The town and neighbourhood of Linz are celebrated for attractive beauty of scenery. Steamers ply regularly to Vienna, and in summer up the river to Passau and Ratisbon.

LION, *λεων* and *λεαινα*, 'Lion' and 'Lioness' of the Greeks; *Leo*, *Lea*, and *Leena* of the Romans; *Leone* and *Leonessa* of the Italians; *Lion* and *Lionne* of the French; *Löwe* and *Löwin* of the Germans.

The Lion is the largest and most formidable of the existing species of the Cat-tribe [FELIDÆ]. The neck and shoulders of the male are, as a general rule, ornamented with a shaggy mane, and the tail

is tufted at the end. The female has no mane. The colour of the Lion is uniformly tawny, varying in intensity almost to brown; but the young are obscurely striped or brindled. The lion, divided into several varieties, is at the present day confined to Africa, Arabia, India, Persia, and the borders of the Euphrates. Formerly this ferocious animal was common in Egypt and Syria; and not only so, but also in several portions of eastern Europe.

Of the African Lions the following varieties are recorded by Lesson:—

1. *The Lion of Barbary*.—This lion has a deep yellowish brown fur, and the mane of the male is very much developed.



African Lion (Barbary).

2. *The Lion of Senegal*, characterized by fur of a more yellow tint; the mane in the male being less thick, and nearly wanting upon the breast and insides of the legs.

3. *The Cape Lion*, of which there are two races, one yellowish and the other brown; the latter is regarded as the most formidable. The Dutch colonists speak of the *blue* and *black* kinds, and it seems indeed that there is a black-maned lion, one of which, accompanied by his lioness, Mr. Burchell encountered in his travels in Africa.

The lion is not 'king of the forest,' but of wide plains and karroos, interspersed with tracts of brushwood, as well as the borders of rivers. During the day he usually slumbers in his retreat, rousing up from his lair as night sets in, and prowling during the hours of darkness in quest of food. The larger herbivorous animals fall before him, and the horse and the ox of the settler too often become his prey; nor is man always safe from his attack, although experience has taught this fierce brute the deadly nature of fire-arms. Many astonishing details proving the enormous strength of the lion, many thrilling accounts of hair-breadth escapes, and of exciting yet fearful lion-hunts, are on record; but we have not space for such narratives, and therefore refer to the works of various travellers in Africa, as Le Vaillant, Sparrman, Burchell, Steedman, Messrs. Schoon, Gordon Cumming, Livingstone, Baldwin, Andersson, and others.

Of the Asiatic Lions, three varieties appear to be well ascertained:—

1. *The Bengal Lion*.—Mr. Bennett points out the characteristics by which the Asiatic race is distinguished from that of Southern Africa, as consisting principally in the larger size, the more regular and graceful form, the generally darker colour, and the less extensive mane of the African.

2. *The Persian or Arabian Lion*.—This is stated to be distinguishable by the pale Isabella colour of the fur; and those which have been exhibited in England as Persian lions certainly bear out this remark.

3 *The Maneless Lion of Guzerat*.—The ancients (Pliny, viii. 16) evidently were acquainted with a maneless variety of lion in Arabia and Persia, and Olivier enters into details relative to a maneless lion of Arabia and the country around Bagdad. Still nothing very definite was known respecting this variety. In December, 1833, Captain Walter Smee exhibited to a meeting of the Zoological Society of London the skins of a lion and lioness killed by him in Guzerat, and selected from eleven obtained there by him, eight of which he had brought to this country. This lion, he stated, is distinguished from those previously known by the comparative absence of a mane from the sides of the neck and shoulders, the middle line of the back of the neck being alone furnished with longer hairs, which are erect, like those in the same situation in the *Cheetah* (*Felis jubata*). The under surface of the neck has long, loose, silky hairs, and there is a tuft at the angle of the anterior legs. Besides the absence of the extensive mane, the tail is shorter than that of ordinary lions, and is furnished at its tip with a much larger tuft or brush. In this tuft there existed, in the oldest of Captain Smee's lions, subsequently to the arrival of the skins in England, a short horny nail or claw. The ancients believed that the lion lashed himself into fury with his tail, this claw acting as an additional stimulus—an opinion destitute of solid foundation.

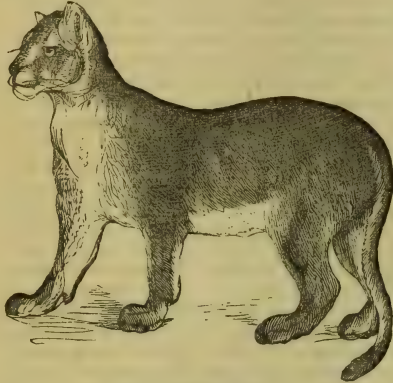
The habits of the Asiatic lions do not differ much from those of Africa, excepting that the former, from the state of the country, frequent the jungles. In India the elephant is generally employed in the chase; and in the accounts of most modern sportsmen in Asia, the great courage of the lion is particularly noticed. One of them states that the lions in India, instead of running away when pursued through a jungle, seldom take to cover as a refuge at all, but boldly face their foes, and have been known to bring elephant and rider to the ground. The tiger shrinks from exposing himself.

Reproduction and Length of Life.—The lioness is said to go with young five months, and generally produces two or three at a litter, which are born blind. The age to which the lion naturally lives is doubtful; it is generally supposed to be twenty or twenty-two years. If, however, the assertion is to be relied on, Pompey, the great lion which died in the Tower in 1760, was above seventy years of age, and another from the Gambia is stated to have attained the age of sixty-three. Hybrids have been produced in confinement between the lion and tigress.

There is in America a large feline animal called the *Puma* or *American Lion* (*Felis concolor*). The uniformity of colour in this great cat, combined with its ferocity, were probably the reasons which induced

the early travellers in America, to whom accounts of its destructiveness were detailed, and who perhaps caught hasty glimpses of it, not unaccompanied with terror, to state that there were lions in America, but this was a mistake.

This animal is called, in various languages of America, *Puma*, *Cuguacuara*, *Cuguacurana*, &c.; hence the French *Couguar*. The Anglo-Americans term it *Panther*.



Puma (*Felis concolor*).

Description.—*Adult Male*. No mane. Silvery fawn above, sometimes reddish, the tawny hairs of the upper parts whitish at the tips; nearly white beneath, and on the inside of the limbs; whitish on the throat, chin, and upper lip. Head black and gray irregularly mixed; ears on the outside, and particularly at their base, sides of the muzzle whence the whiskers spring, and end of the tail (which has no tuft), black. Length from nose to tail about four feet; tail rather more than two.

Female coloured like the male. Head small when compared with his.

Young.—Back marked with three chains of spots, which are generally of a blackish brown; dispersed spots or markings on the neck, shoulders, and sides. As the animal advances in age, these markings become more and more obscure, till they are at last lost in the uniform colour.

Geographical Distribution.—North and South America. There is reason to think that it was formerly to be found from Canada to Patagonia, with an extensive range to the east and west, but its geographical area has been very much diminished, and is daily becoming more and more contracted before that civilization which is in our own time obliterating more species than one. Mr Washington Irving ('Astoria') mentions it as being found about the mouth of the Columbia river.

The *Puma* is insidious and ferocious, and when wounded becomes very dangerous to the hunter. It is said to commit wholesale havoc; for when it meets with a herd of animals it will slay in all directions, sucking only a small portion of blood from each victim. To sheep, fifty of which it is said to have been known to kill in one night, it is most destructive, and the squatter well knows the ravages that it will make among his hogs. Though an expert

climber, it is said to haunt in South America the marshy meadow lands bordering on the rivers rather than the forest. In the Pampas it must affect the comparatively open country; for there it is commonly taken by the lasso. In the northern districts the swamps and prairies are its principal haunts; and its prey, where flocks and herds are not, deer principally, upon which it is said to drop in the manner described by Charlevoix with regard to the elk.

The reader must bear in mind that there is another cat of a uniform colour, *Felis unicolor*, Traill, which is said to inhabit the forests of Demerara, and is one half less than the *Puma*. The *Black Cougar*, *Felis discolor*, is allowed by some zoologists, and rejected by others.

LION D'ANGERS. [MAINE-ET-LOIRE.]

LIPARI ISLANDS, the ancient *Æolia*, or *Vulcaniæ Insulæ*, are situated between Calabria and the northern coast of Sicily, and between 38° 20' and 38° 50' N. lat., and 14° 10' and 15° 13' E. long. They are mentioned by the ancient geographers as seven in number. *Stróngyle* (now *Stromboli*); *Lipara*, now *Lipari*; *Hiera*, or *Vulcania*, now *Vulcano*; *Dídyme*, now *Saline*; *Phœnicódes*, now *Felicudi*; *Ericódes*, now *Alicudi*; and lastly *Eúónymos*, supposed to be either *Liscabianca* or *Panaria*. There are several other smaller islands, or rather rocks, such as *Liscanera*, *Basiluzza*, &c., which belong to the same group, but are uninhabited and barren. *Stromboli* consists of a volcanic conical mountain nearly 2500 feet high. It rises abruptly from the sea, except on the N.E., where it has a cultivated space between it and the sea, which produces cotton and some wine, and is inhabited by about 1200 people. The island is about 12 miles in circuit. The flames of the crater are a constant light to the sailors in that sea; but no eruption has taken place for fully 2000 years. It is called by sailors the 'Lighthouse of the Mediterranean.' *Panaria* is an extinct volcano, whose crater slopes on one side to the sea-shore; the bottom or funnel of it is cultivated by a few individuals, who are also fishermen. Population, 200. *Lipari*, the largest and most important island in the group, is a bishop's see, and the residence of a military governor; it is about 18 miles in circumference, and contains about 20,000 inhabitants. It has several mountains with volcanic craters now extinct: it also contains a hot spring, and is wholly composed of volcanic products. The land, which is very fertile, produces cotton, olives, grapes, and the 'Malvasia di Lipari' wine. The town of Lipari with its harbour is on the eastern coast of the island; it contains a castle, several churches, and some remains of antiquity; population (1861), 19,133. Lipari belonged successively to the Greeks, the Carthaginians, and the Romans. *Vulcano* is a barren deserted island, consisting entirely of mountains, the chief of which, Mount *Aria*, contains two craters. *Salina*, 16 miles in circumference, with several villages, and about 4000 inhabitants, consists of two mountains separated by a deep and very fertile valley. *Felicudi*, about 10 miles in circumference, produces corn, fruits, and wine; population, 800. *Alicudi*, the most western of the Lipari group, is hilly and not very productive, has some pastures, and about 1000 inhabitants. The islands belong to Sicily.

LIP'ARIS (Gr. *λαπαρίς*, 'shining'), the Sea-snail,

a genus of fishes of the family *Discobuli*. They resemble the gobies in form, and are generally found under stones at low-water mark.

LIPPE, River. [RHINE.]

LIPPE, a German principality which takes its name from the river Lippe, a feeder of the Rhine, is now divided into *Lippe-Detmold* and *Schaumburg-Lippe*, from the names of the two branches into which the ancient house of Lippe is divided.

Lippe-Detmold forms a compact territory, bounded E. by Hanover, N.E. by Hesse-Cassel, and on the other points by Prussia. The small bailiwick of Lipperode, with the town of Lipstadt, lies detached, being entirely surrounded by Westphalia. The area of the principality is 432 square miles, and the population in 1861 was 108,513. The country is mountainous, but well-wooded. The Weser, the only navigable river, just touches the northern frontier of the principality for a short distance, and receives the Emmer, the Exter, the Werre, the Bega, and some other small streams. The Ems rises in a branch of the Osning or Teutoburgerwald mountains, which run through the territory from S.E. to N.W., and soon enters the province of Westphalia. The Lippe merely touches the bailiwick of Lipperode and the town of Lipstadt. Vast forests of oak, beech, and other timber clothe the higher parts of the mountains, while on the slopes there is the finest arable land. The climate is temperate, but the air is frequently loaded with fogs. The winter is cold and wet; the summer very hot. The chief crops are corn, flax, hemp, potatoes, rape seed, garden vegetables, and timber. The mineral products are plaster of Paris, lime, iron, clay, marble, and freestone; and there is a salt spring from which nearly 40,000 bushels of salt are annually obtained. The breed of horned cattle is good; that of sheep has been much improved of late years. Swine and goats are numerous. The horses are good. The only manufactures of any importance are linen and linen yarn. The present constitution of the state dates from the 15th March, 1853, and nearly all power is in the hands of the prince. The annual expenditure and revenue are about 30,000*l*. The chief towns are Detmold, Lemgo, and Horn.

Detmold, the capital of the principality, situated on the Werra, 47 miles south-west of Hanover, has among its chief buildings a palace, Lutheran and Calvinist churches, and a gymnasium. The inhabitants (with the military) numbered, in 1861, 5598, many of whom are engaged in manufactures of linens and leather, and in several breweries. There are also in the town a normal school, school of arts and sciences, library, Bible society, &c. In the vicinity is the battlefield where the army of Varus was destroyed by the Germans under Hermann (Arminius) A.D. 9. *Lemgo* on the Bega, a walled town with seven gates, has 4000 inhabitants, who manufacture woollen cloth, linen, leather, and tobacco-pipes.

Schaumburg-Lippe, or *Schaunburg-Lippe*, is a principality surrounded by Hanover, the Hessian part of Schaumburg, Lippe-Detmold, and Westphalia. It is 445 square miles in extent, and had a population of 30,774 in 1861. The country is mountainous; its products are similar to those of Lippe-Detmold; but, in addition, it has coal. The chief town and residence of the prince is *Bückeburg*, on

the Aue, which has a population of 4219. Representative institutions of a very limited character were given to Schaumburg-Lippe in 1816. To the prince belongs the whole legislative and executive authority. He acts through a minister, called the President of the Government. The budget, as far as it is known through statements laid at intervals before the Diet, comprises an annual revenue of 34,050*l*., and an expenditure of the like amount. There exists a comparatively large public debt, particulars of which, however, are not published.

The reigning house of Lippe is descended from a count of the same name, who lived in the sixteenth century, acquiring some small territorial possessions in Westphalia. It was only in 1807 that the two counts of Schaumburg-Lippe and Lippe-Detmold were elevated to the rank of princes, and became independent rulers of their estates, by espousing the cause of Napoleon, as members of the Rheinbund. They would have been struck from the list of sovereigns by the Congress of Vienna, but for the protection of Prince Metternich, who preferred having two crowned heads more in Europe to giving their territories to Prussia.

LIPPI, FRA FILIPPO, was born at Florence in 1412. When he was eight years old, he was received into the Carmelite convent Del Carmine. Filippo himself gave early evidence of his extraordinary ability in art by a fresco of the papal confirmation of the rules of the order of the Carmelites; he executed also several other works in various parts of the convent and its church, each work superior to his preceding effort, and so like those of Masaccio that his spirit was said to have passed into Filippo. All these works, however, or at least what remained of them, were destroyed in the conflagration of the church in 1771.

In 1430, or when only seventeen years of age, Filippo repaired by sea to Ancona, was captured by a pirate, carried in chains to Africa, and sold as a slave. Eighteen months after, he amused himself one day with drawing from memory his master's portrait in chalk upon a white wall. The performance so pleased his owner, that he immediately released Filippo, and after he had employed him to execute various pictures, sent him back to Italy. Filippo was landed in Naples, where he remained only a few months, and then returned to Florence. One of the first works which he executed at this time was a small picture of the Adoration of the Madonna, for the wife of Cosmo de' Medici, which is now in the Imperial Gallery at Florence.

Filippo executed many excellent works at Florence, Fiesole, Arezzo, and at Prato. The Death of San Bernardo, painted for the cathedral of Prato, is one of his finest; it is still in the cathedral. Vasari terms the Martyrdom of St. Stephen, in the same church, his master-piece.

Filippo is supposed to have died at Spoleto in 1469, aged 57. He is said to have been poisoned by the relations of Lucrezia Buti, a young Florentine novice who had eloped with him, and by whom he had a son, Filippino Lippi, who was also a celebrated painter. The tale, however, seems without any good foundation.

LIPSIUS, JUSTUS, was born at a village between Brussels and Louvain, the 18th of October,

1547. He was educated at Brussels, Cologne, and Louvain, and at the age of nineteen published 'Varie Lectiones' of some of the principal Roman authors. This work was so highly esteemed that its author was received with distinguished honour at Rome by Cardinal Granvelle and Pope Pius V. After remaining there two years, he was appointed professor of history at Jena, where he resided till 1574. In 1579 he was appointed professor of history at Leyden, and during his residence there professed the Reformed religion; but on quitting Leyden in 1591, returned to the Roman Catholic Church, in which he had been brought up. He was afterwards professor of history at Louvain, where he remained till his death, March 24, 1606. The works of Lipsius, which are very numerous, were collected and published at Antwerp in 1637; and also at Wesel in 1675.

LIQUEUR, the name applied to any alcoholic preparation which is flavoured or perfumed, and sweetened to be more agreeable to the taste. Among the numerous varieties of liqueurs, we may mention the following:—*Aniseed Cordial*, made by flavouring weak spirit with aniseed, coriander, and fennel seed, and sweetening with syrup of refined sugar. *Ab-sinthe* is flavoured with the young tops of certain species of artemisia, and *Clove Cordial*, with bruised cloves, and coloured with burnt sugar. *Curacao* is made from small oranges which have fallen from the tree long before maturity, or from orange-peel, by digesting in sweetened spirits, along with a little cinnamon, and often a little mace or cloves. It is coloured with powdered Brazil wood and burnt sugar. *Maraschino* is distilled from bruised cherries. *Noyau* is a cordial flavoured with bitter almonds, and sometimes with peach or apricot kernels. *Peppermint* is sweetened gin, flavoured with oil of peppermint, which is previously mixed with refined sugar. The imports of liqueurs in 1864 were 170,230 gallons, of which 13,528 gallons were entered for home use.

LIQUIDAMBAR, a genus of plants of the natural order *Altingiaceæ*. The species are only three in number, all forming fine trees, and occurring in Java, the Levant, and North America. *Liquidambar styraciflua* is the species found in Mexico and the United States, in the latter of which it is called Sweet Gum, and forms a large and fine tree. The wood is of a hard texture and fine grain, and makes handsome furniture; but the tree is more noted for the fragrant liquid resin which exudes from incisions in the stem, though not very copiously. This is called *Liquidambar*, or Oil of Liquidambar, which has a pleasant balsamic odour and an aromatic bitter taste. This, becoming dry and opaque, forms what is called Soft or White Liquidambar, which resembles very thick turpentine, has a feeble odour than the liquid balsam, and contains less volatile oil. The word is a contraction of *Liquidum ambar*, or liquid amber, and refers, of course, to this balsamic product.

LIQUIDITY is that condition of a material substance in which the particles have a perfect freedom of motion, without any sensible tendency to approach to or recede from one another, except by the action of some external power. [FLUID, FLUIDITY; FLUIDS, ELASTIC.] When the particles of a substance are situated beyond the limits of the attractive forces existing between them, the repulsive power, arising probably from the action of caloric, causes the

particles to recede continually from one another, and induces the state of aeriform fluidity; and when the particles of a substance are, from any cause, brought so near one another that the attraction of affinity is in equilibrio with the repulsive force of the caloric, the particles become freely movable in any direction about one another, whatever be their form; and thus may arise the condition of liquidity.

The particles of a liquid are held together with considerable force, notwithstanding their freedom of motion, since a small quantity of a liquid has a tendency to take a spherical form when at a distance from any substance for which its particles have greater affinity than for one another: this is very evident in mercury, oil, and water, the first of which, on being suffered to fall on a table, immediately divides itself into globules, and the others take a like form when a small quantity of either is suspended from a pointed extremity of any object.

The expansions of any liquid, at different temperatures, for equal increments of caloric, are not equal to one another.

From the experiments of MM. Dulong and Petit, the mean expansion of mercury, in volume, for 1° (Fahr.) between the temperatures of freezing and boiling water, is expressed by '000101; between the freezing-point of water and 392° (Fahr.) by '000102; and between the freezing-point of water and the temperature at which mercury boils, by '000105. The expansion, in volume, of water for 1° (Fahr.) between the temperatures of 34° and 44° is '00002; at 90° it is '0002; and at 212°, '00088. The expansion of spirit of wine, highly rectified, for 1° is, at 0°, '00047, and at 172°, '00083.

LIQUORICE. [GLYCRRHIZA.]

LIRIODENDRON. [TULIP-TREE.]

LIRIS. [CAMPANIA.]

LISBON (Portuguese, *Lisboa*; French, *Lisbonne*; German, *Lissabon*), the capital of the kingdom of Portugal, is situated on the northern bank of the Tagus, about 9 miles above the bar or entrance of the river, in 38° 42' N. lat., and 9° 8' W. long. It rises in the form of an amphitheatre from the bank of the river, being built on a succession of hills, the highest of which are the hill of Buenos Ayres, or Estrella, to the west, and the Castle Hill to the east. Most of the streets are steep, irregular, and tortuous, besides being ill paved and dirty. The new town, built in a valley between the hills, after the earthquake of 1755, contains, however, many fine streets. At the river's edge is a fine square called Praça de Commercio, one side of which is formed by the Tagus, and the other sides by the arsenal, the custom-house, the exchange, royal library, and other public buildings. Other open places are the Praça da Figueira, or market-place, the Praça do Rocio, and the Passeio Publico, or promenade. The oldest part of Lisbon, east of the castle, consists of narrow streets of lofty houses. Westward of the new streets the town ascends a slope, crowned by massive buildings, chiefly convents and churches, which crown the summits of the hills, and tower above all the rest. The extreme limits of Lisbon extend about four miles by one and a half; but many parts of the included area (3000 square acres) are occupied by extensive gardens, plantations, the naked steep

declivities of the hills, and by ruins and waste ground. West of the bridge of Alcantara a line of streets parallel to the Tagus connects Lisbon with the market-town and royal residence of Belem, or Bethlehem.

The Tagus from Belem up to Lisbon is little more than 1 mile in width, but opposite the city it expands to 5 miles, and assumes the noble aspect of a fine estuary. The southern bank is studded with a number of small towns and villages, which supply the capital with provisions. The river affords to Lisbon a most splendid and safe harbour, which might contain all the fleets of Europe. The largest men of war can anchor close to the city. The entrance of the river is defended by two forts with lighthouses adjacent, St. Julian on the north bank, and Bugio on a small island opposite, which is joined to the southern bank at low water.

The most striking and imposing buildings of Lisbon are its vast and massive convents, which crown the hills, and look like palaces and fortresses; the royal palace of Ajuda; the theatre of San Carlos, or opera-house; and the cathedral, and other large churches, especially those of Do Caraço da Jesus, Santa Engracia, and the Martyrs.

The climate of Lisbon is healthy and genial; it is very hot and dry in the summer months, when the heat is often 96° of Fahrenheit, but is relieved by north-west winds: heavy rains fall in November and December; cold clear weather prevails in January, but in February the weather becomes mild again, and the spring begins. Snow is a very rare occurrence.

A fine aqueduct, Os Arcos das Agoas Livres, supplies Lisbon with good water, brought from several springs in the neighbourhood, through tunnels and along viaducts, to a central reservoir, from which the water is distributed to several fountains about the town. The Gallegos, or porters, draw water in small barrels from the fountains, and sell it from house to house, or cry it about the streets. Lisbon is ill provided with conduits or sewers, and all the filth is thrown into the streets, from which it is washed off by the rain into the river.

Olive and orange trees, cypresses and judas trees, and some elms and poplars, grow near the city. Much of the adjacent country is covered with large gardens called 'quintas,' surrounded by high walls, which bound the view on every side. A large house is usually attached to them, in which the families of the owners spend part of the summer.

The population of Lisbon at the last census was 275,000. Its trade, though much diminished since the loss of Brazil, is still considerable. It exports wine, fruits, and oil; and it imports corn, salt fish, salt butter, cheese, timber, iron, lead, tin, copper, coals, tar, and all sorts of foreign manufactures, with which it supplies the whole southern part of the kingdom. Lisbon has some manufactories of silks, paper, soap, and leather; its goldsmiths and jewellers are very expert; and there are also sugar refineries and potteries. Lisbon is 764 miles by the shortest sea-route from Plymouth, steamers making the voyage in about three or four days.

LISBURN. [ANTRIM.]

LISCOW, CHRISTIAN LUDWIG, born at Wittenberg, 1701, ranks high in Germany for his satirical writings. About the year 1739 he was private tutor

at Lübeck. After this he became private secretary to the Geheimrath von Blöme, and subsequently entered the service of Von Heinecker at Dresden. Having offended the English minister at that court, he drew upon himself the resentment of Count Brühl, who caused him to be sent as a state prisoner to Eilenburg, where he died shortly afterwards, October 30, 1760. Some, however, have questioned the truth of his having been in confinement. The first complete edition of Liscow's works was published by Mühler, in 3 vols. 8vo, Berlin, 1806.

LISIEUX. [CALVADOS.]

LISKEARD. [CORNWALL.]

LISLE, or L'ISLE. [VAUCLUSE.]

LISMORE. [WATERFORD.]

LISSA. [POSEN.]

LIST, DR. FREDERIC, an eminent political economist, and member of the Wirtemberg Parliament, was born in 1789. His general opinions were of so bold and liberalizing a tendency, that he was at length expelled the Assembly; but in 1819 he established a journal, and published several spirited works on political economy, in support of his peculiar views and opinions. He at length succeeded in laying the foundation of the celebrated Zollverein (the Customs Union of the German States), which, after encountering various obstacles, was eventually adopted by nearly the whole of Germany; but the doctor, having been long exposed to serious annoyances and disappointments, lost his mental faculties, and in a fit of insanity committed suicide in 1846.

LISTER, THOMAS HENRY, a historian and novelist, was born in 1801, and may be said to have descended from a literary ancestry; for both his father and grandfather, of whom Miss Seward has left some favourable notices, were well known in the republic of letters. Among Lister's lighter productions may be mentioned his 'Granby' and 'Herbert Lacy,' two 'fashionable' novels of considerable merit. But his 'Life and Administration of Lord Clarendon,' and his tragedy of 'Epicharis,' have contributed to establish his reputation as a historian and dramatist. He died in 1842.

LISTON, JOHN, a very clever and popular actor of farce and low comedy, was born in 1776 in the parish of St. Anne's, Soho, and in early life was engaged as a day-school teacher. But directing his attention to the stage, in 1805 he obtained an engagement at the Haymarket Theatre, where his peculiar drolleries and natural humour drew vast crowds of laughter-loving playgoers, and established his fame as a first-rate comedian. His acting, in the very clever comedy of 'Paul Pry,' which was one of his favourite characters, acquired him immense popularity, and has probably never been surpassed. On quitting the Haymarket he made his appearance on the boards of Covent Garden, where he remained, increasing in popularity, till 1823, when he received an engagement at Drury Lane, where he acted for some time. But in 1831 Madame Vestris, the then manager of the Olympic Theatre, offered him the enormous salary of 100*l.* per week, which he was induced to accept, and played on the boards of that theatre for six successive seasons. This may be said to have closed his theatrical life; but he was able to retire with a very comfortable independence. He died in 1846.

LISTOWEL. [KERRY.]

LITANY. A collection of prayers and supplications. The term is derived from the Greek *λειτουργία*, and was adopted by Christian writers at a very early period.

In the Common Prayer Book of 1549 (the first book of King Edward), the Litany was placed between the Communion Office and the Office for Baptism, under the title of 'The Letany and Suffrages;' which book also directed it to be said or sung on Wednesdays and Fridays. In the review of the Common Prayer in 1552, the Litany was placed where it now stands, with the direction that it shall be used on Sundays, Wednesdays, and Fridays, and at other times when it shall be commanded by the ordinary. Till the last review, in 1661, the Litany was used as a distinct service, and followed the morning prayer; it was then directed and has ever since continued to be read as one office with the Morning Prayer, after the third Collect for Grace. In the Roman Catholic Church three litanies are used: 'the Litany of the Saints' (which is the most ancient, and the only one in the public service books of the church), 'the Litany of the Name of Jesus,' and the 'Litany of our Lady of Loretto.' Throughout all the varieties of form which the litanies used publicly in different churches have assumed, one characteristic has always been maintained, viz., that the prayer should alternate between the priest and the people. The former announces the object of each petition, and the latter reply in a common supplicatory form.

LITCHI, or **LEE-CHEE**, the produce of the *Nephelium litchi*, natural order *Lapindaceæ*, a native of China. The fruit is about the size of a small walnut, of a red or green colour, with a thin tough rind, and a colourless pulp, in the centre of which is one dark brown seed. The pulp is rather sweet, and very pleasing to the palate. The Chinese dry the fruit, and much of it has been sent to England during the last few years.

LITHARGE. [LEAD.]

LITHIC ACID. [URIC ACID.]

LITHIUM, a metal, the oxide of which is one of the earths, and is called *lithia*: it occurs in a few minerals, combined with silica. When separated, the metal resembles sodium in whiteness; but it has not been much examined.

Oxygen and *Lithium* combine with great readiness, and are separable with difficulty. The compound is *lithia*, which as a hydrate exhibits a crystalline structure; the oxide is supposed to consist of $L^1 O^1$. *Chlorine* and *Lithium* ($Ch^1 L^1$) form a white semi-transparent substance, very deliquescent, and soluble both in water and in alcohol. By evaporation cubic crystals are obtained. *Sulphur* and *Lithium*, when obtained in combination by decomposing the sulphate of lithia with excess of charcoal, form an extremely pyrophoric substance. *Fluorine* and *Lithium* form a fusible compound, prepared by dissolving lithia in hydrofluoric acid; it is difficultly soluble in water; the solution deposits small opaque crystals.

Nitrate of Lithia ($L^1 Acid^1$) is obtained by adding lithia to the acid. This salt is very deliquescent; when the solution is gently evaporated, crystals are obtained. Its taste is like that of nitre; it is extremely fusible, and becomes by heat as liquid as water. *Carbonate of Lithia* ($L^1 Acid^1$) is very slightly soluble in cold water; it is decomposed by acids with effervescence, and has an alkaline taste.

Sulphate of Lithia ($L^1 Acid^1$) is very soluble in water; it has a saline taste without bitterness, and crystallizes only in irregular masses. *Phosphate of Lithia* is an insoluble compound.

Characters of Lithia and its Salts.—Lithia acts so readily upon platinum, that this property will serve to detect a small quantity in any substance. Lithia is distinguished from soda and potash by its greater saturating power; chloride of lithium is distinguishable from the chlorides of sodium and potassium by its solubility in alcohol, and the solution burns with a red flame. Unlike potash and soda, lithia forms a difficultly soluble carbonate and phosphate.

LITHOGRAPHY, (Gr. *λίθος*, 'a stone,' and *γραφειν*, 'a graving' or 'writing') the art of printing from stone, was invented by Aloys Senefelder, at Munich, about the end of the eighteenth century. It consists in writing or drawing on stone with a pen, brush, graver, crayon, or chalk; or in transferring to the stone an impression printed upon transfer-paper with transfer-ink from an engraved copper or steel plate, or a writing or drawing made with the pen or brush on transfer-paper; and then printing as described below.

The best *lithographic stones* are found at Kelheim and Solenhofen, near Pappenheim, in Bavaria; they have been found also in Silesia, England, Ireland, France, Canada, and the West Indies. These stones are composed of lime, clay, and silicious earth, and are of various hues, from pale yellowish-white to a light buff, reddish, pearl-gray, light-gray, blue, and greenish colour. Those of uniform colour are the best. The yellow-buff ones, being soft, are adapted for lettering and transfer; the pearl-gray ones, being harder, for chalk-drawings and engraving. They are found in beds, commencing with layers of the thickness of paper, till they reach the dimensions of one, and several inches in thickness, when they are easily cut, being yet soft in the quarries, to the sizes required for printing purposes. The stones are ground plane with sand, and when required for the pen, the brush, the graver, or transfer, they are polished with pumice stone. Imports in 1864, 13,000 cwts.

The two chief agents employed in producing designs, writings, &c., on stone, are termed lithographic chalk, and lithographic ink. The lithographic ink is composed of 2 parts of white wax, 2 shell-lac, 1 hard soap, $\frac{1}{2}$ tallow, $\frac{1}{4}$ carbonate of soda, and 1 of powdered lamp, or better, Paris black. The lithographic chalk (crayon) is made of 3 parts of white wax, 2 hard soap, 1 shell-lac, $\frac{1}{2}$ 'drops of' mastic, 1 tallow, $\frac{1}{2}$ old lard, $\frac{1}{2}$ Venetian turpentine, $\frac{1}{4}$ Brunswick black, $\frac{1}{4}$ carbonate of soda, and $1\frac{1}{2}$ of Paris black, properly melted and burned together. The mass is then poured into a mould, from which it takes the form required to fit it for use. The chalk is used dry, as it comes from the mould; but the ink, rendered soluble by the presence of the soap, is dissolved by attrition in water, and used with a pen or a pencil of camel hair.

To render the lithographic process intelligible, let it be supposed that the artist now completes a drawing with the chemical chalk just described, upon a grained stone. If, while in this state, a sponge filled with water were passed over the face of the stone, the

drawing would wash out, the chalk with which it is made being, as we have seen, soluble in water, by reason of the soap which it contains. Before, therefore, it is capable of yielding impressions, a weak solution of nitrous acid is poured over it, which unites with and neutralizes the alkali or soap contained in the chalk, and renders it insoluble in water. After this, the usual course is to float a solution of gum over the whole face of the stone; and when this is removed, if a sponge and water be applied to its surface, as before supposed, the drawing is found to be no longer removable, because the chalk with which it is executed is now no longer soluble in water. In this state the work is ready for the printer, who obtains impressions by the following process.

Having thrown a few drops of water on the stone, and spread them with a sponge, so as to wet, or rather damp, the whole surface equally, the printer finds that the water has been imbibed by the stone only on those parts not occupied by the drawing, which, being greasy, repels the water and remains dry. A roller properly covered with printing-ink is now passed over the whole stone, which will not even be soiled where it is wet, from the antipathy of oil and water. But the parts occupied by the drawing being, as we have seen, dry and greasy, have an affinity for the printing-ink, which therefore passes from the roller, and attaches itself to the drawing. In this state it is said to be charged, or rolled in. Damped paper is then put over it, and the whole being passed through a press, the printing-ink is transferred from the stone to the paper, and this constitutes the impression. By repeating in this manner the operations of damping the stone and rolling in the drawing, from 1000 to 1500 good impressions may be obtained. A steam lithographic press by Huguet of Paris has recently been introduced, by which from 3000 to 4000 impressions have been obtained from one stone. [See Plates PRINTING, 'Lithographic Press.']

The modes of lithography are, as we have said, various, but the illustration just given will explain the principle of them all. It consists in the mutual antipathy of oil and water, and the affinity which the stone has for both, *i.e.*, in its power of imbibing either with equal avidity.

To insure complete success, great nicety is requisite in the preparation of all the agents employed in this art. Those who wish to study or practise the art in its full extent will do well to consult 'A Complete Course of Lithography,' by its discoverer, M. Senefelder, or 'A Manual of Lithography,' by M. Raucourt, both translated into English.

Plates of zinc have, for some descriptions of common work, been much used as substitutes for the German stones; the practice is then called *zincography*, but excepting the difference of the material on which the work is performed, it is precisely the same art as lithography.

LITHOLOGY, in mineralogy, is the name given to the study of the mineral structure and constituents of rocks. By some it is used in a wider sense, and is regarded as including the relations of different rocks to each other. It is, however, better to limit its use to such features of rocks as can only be known by the aid and appliances of inorganic chemistry.

LITHOMARGE, a mineral of a white, gray, or blue colour, occurring in massive or scaly glimmering

particles; the constituents of which are silica, alumina, oxide of iron, chloride of sodium, and water.

LITHONTRIPTICS (λίθος, 'a stone,' and τριβω, 'to rub or bruise'), medicines or other means which are thought to possess the power of dissolving stone or calculus in the urinary organs. With few exceptions, their employment has been nearly empirical; and aggravation of the case has as frequently resulted as benefit from their employment. The researches of recent chemists and pathologists have given something approaching to a scientific explanation of the circumstances under which calculi form, as well as of their varied characters, so that more good may reasonably be expected from the use of lithontriptics than has hitherto been realized. [CALCULUS.]

LITHOPHA'GIDÆ, a name applicable to all marine *Conchifera*, *Mollusca*, *Radiata*, &c., that penetrate stone, masses of madrepore, and other hard corals, forming therein a nidus for themselves; but more particularly applied to the *Conchifera*. The perforation is effected by chemical erosion and mechanical action. The erosion is not confined to the *Conchifera* only; for *Patella* has the power of perforating certain rocks to a limited extent: nor to the *Mollusca* generally; for some of the *Echinidæ* (*Radiata*), for instance, are known to make shallow basin-like lodgments in the rocks whereon they dwell.

LITHOSPERMUM, a genus of plants belonging to the natural order *Boraginæ*. The whole of the species are noted for the stony hardness of their pericarps or nuts.

The nuts of *L. officinale* were formerly esteemed as an infallible lithontriptic. Their virtues in this respect are, however, entirely imaginary. This species is indigenous to Europe, Asia, and North America. It is found in dry and stony places in Great Britain, but sparingly. *L. purpureo-cæruleum* has white, highly polished, and hispid nuts. It is a native of middle and south Europe, of the Caucasus in woody mountain places, and of England and Wales in chalky soil. *L. arvense*, Bastard Alkanet, has white and small flowers, the root of a bright red, communicating its colour to paper. It is a native of Europe, Asia, Africa, and some parts of North America, and is found plentifully in the corn-fields of Great Britain.

LITHOTOMY (from λίθος, 'a stone,' and τέμνω, 'to cut'). Although urinary calculi may be extracted from the kidneys, urethra, or bladder, the term lithotomy is restricted to the operation of cutting into this latter viscus for the purpose of removing one or more stones. Before the operation is performed, it is necessary to determine with certainty the presence of a stone, which is done by *sounding* the patient. This consists in introducing into the bladder, through the urethra, a metallic instrument called a sound, by means of which the stone can be plainly felt, and an audible noise perceived on striking it: till this be rendered evident, no surgeon would be justified in undertaking the operation.

Several modes of performing lithotomy have been in use; but that which is mostly had recourse to at the present day is the *Lateral Operation*—so called from the prostrate gland and neck of the bladder being cut laterally, in order to avoid wounding the rectum. The patient having been put under the influence of chloroform, and then sounded, to ascertain that the stone is actually within the bladder (for instances have

occurred of stone becoming encysted a short period before the operation), he is placed on his back upon a table, with his buttocks projecting rather beyond its edge; he is then made to grasp the outside of each foot with the hand of the same side, and the two pair are firmly bound together. A *staff*, which is an instrument shaped very much like a catheter, or sound, but somewhat longer, and grooved on its convex side, is passed through the urethra into the bladder, where it must be retained firmly by an assistant; its convexity looking towards the perineum, and the groove slightly inclined to the left side of the patient. The operator now commences his incision below the bulb of the urethra, about an inch and a quarter in front of the anus, and continues it obliquely downwards to the left of the raphe of the perineum for three inches, till it reaches midway between the tuberosity of the ischium and the anus: this should cut through the integuments and superficial fascia. The next incision, made in the same direction, divides the transversus perinei muscle, and exposes the membranous portion of the urethra, and the groove in the staff must be felt for with the finger; into this groove, which serves as a director for making the concluding section of the operation, is inserted the point of the knife, which is then pushed along the groove in the staff till it enters the bladder. The surgeon then introduces his left forefinger to ascertain that the wound is sufficiently extensive to permit the extraction of the stone; and if it be not, he either repeats the last incision, or dilates the opening in the bladder with his finger. The staff is now to be withdrawn, and the forceps carefully introduced, and the stone seized and removed.

Dr. A. Buchanan of Glasgow has contrived another form of staff, called the rectangular, which necessitates only *one* incision; the operator at once entering the groove in the staff, and, without removing the knife, pushing it into the bladder by a straight thrust. This operation is very easily performed, and has been attended with very great success. The writer has performed it nineteen times with only *one* fatal result.

LITHOTRITY (from λίθος, 'a stone,' and the root τρι-, 'to pierce'); *Lithotripsy* (from λίθος, and τριβω, 'to break'), the reduction of a calculus in the bladder into small pieces, by means of instruments passed into that organ through the urethra, so that the fragments may be discharged through the latter tube. This operation must be ranked among the most brilliant achievements of modern surgery, as it proposes to substitute a nearly perfectly safe proceeding for the more serious and dangerous operation of lithotomy. It, however, can only be performed with certainty of success in the adult, and on calculi of a comparatively small size. The lithotrite is an instrument consisting of a smooth hollow steel rod 15 inches in length, with its extremity about 1½ inches bent at nearly a right angle. Through this rod glides another, its extremity bent the same as the first, in such a manner that its bent end is received into a groove in the bent end of the first. When shut up, the two rods seem one instrument, but when introduced into the bladder the inner one can be withdrawn so as to leave an interval between the bent ends, into which the stone falls or is caught, and by a rack and pinion the bent ends are driven together,

and the stone crushed to pieces. Great care is necessary in the employment of instruments in such a delicate organ as the bladder.

LITHUANIA, a large tract of country in the north of Europe, which now forms the Russian provinces of VILNA, GRODNO, BIALYSTOCK, MINSK, MOHILEV, and VITEPSK, with the palatinate of Augustov, in the kingdom of Poland.

LITOPA, a genus of pectinibranchiate molluscs, established by M. Rang, and placed by him between *Janthina* and *Phasianella*. M. Bellanger, we believe, was the first to discover the singular fact that this mollusc, which lives upon floating plants in the sea, sometimes quits them, holding itself secure by a thread. Subsequently M. Rang detected some small glairy masses which appeared to be attached to the foot, and which were easily drawn out to a considerable length.

LITMUS, or LACMUS, a fine blue but fugitive colour prepared from the *Leconora tartarea*, a lichen which grows in the Canary and Cape Verde islands. In order to extract the colouring matter, the lichen is cleaned and reduced to powder; this is then mixed with urine and lime, and in a few days the blue colour is developed. The litmus is imported in small cubical cakes of dusky blue colour, which are light and easily reducible to powder.

Litmus is used as a chemical test for detecting the presence of acids, by which it is turned red, and the blue is restored by alkalies, so that when slightly reddened it may also be employed to detect alkalies. It will exhibit the presence of sulphuric acid, even when diluted with 100,000 times its weight of water.

LITTLETON, THOMAS, was the eldest son of Thomas Westcote, of the county of Devon. Educated at one of the universities, he removed to the Inner Temple, where in due time he became one of the readers. On the 26th April, 1466, he was appointed one of the judges of the Court of Common Pleas, and went the Northamptonshire Circuit. He married Joan, widow of Sir Philip Chetwin, of Ingestre, in the county of Stafford, one of the daughters and co-heiresses of William Burly, Esq., of Broomscroft Castle, in the county of Salop, with whom he had large possessions. By her he had three sons and two daughters.

Littleton died at Frankley on the 23rd August, 1481, aged about sixty, and was buried in Worcester Cathedral.

Littleton's work on English Tenures is written in Norman French, divided into three books, and addressed to his son. The style of this treatise is very good. It combines the qualities of clearness, plainness, and brevity, in a degree that is extraordinary for the rude age in which the author wrote.

Littleton very seldom quotes any authority. Owing to the alterations in and additions to the law since Littleton wrote, there is much of Littleton's book that is not now law; but Littleton is still an indispensable manual to the student of jurisprudence. Roger North observes in his 'Life of the Lord-Keeper Guildford,' 'Coke's Comment upon Littleton ought not to be read by students, to whom it is at least unprofitable; for it is but a commonplace (book), and much more obscure than the bare text without it. And, to say truth, that text needs it not; for it is so plain of itself, that a comment, properly so called,

doth but obscure it.' It is much better for the student who wishes to lay well the foundations of his professional knowledge to read Littleton first without the comments of Coke, which he will find useful afterwards, when he wishes to examine any particular point very minutely.

LITRE, the French standard measure of capacity in the metrical system. It is a cubic décimètre, or a cube whose sides are each 3·9371 English inches. It contains a little less than our quart; more precisely, it is 22009637 of a gallon. The litre is subdivided into the decilitre, centilitre, and millilitre, or the tenth, hundredth, and thousandth part of a litre. Ten litres make a decalitre; 100 a hectolitre; 1000 a kilolitre. The hectolitre is equal to 3439009 English quarter, or nearly $2\frac{3}{4}$ bushels, and is the common measure for grain.

LITUITES (Lat. *lituus*, 'a curved trumpet'), a group of fossil Cephalopods, found in the Silurian and other systems. The shell is partly convoluted and partly straight.



Lituites Cornu-arietis.

Mr. Dallas calls these Lituities the representatives of the Nautilus and cuttle-fish, which, though not so plentiful as in former times, are still very common in certain localities.

LITURGY (from the Greek *λειτουργία*, which originally signified at Athens, 'certain public functions or duties to which the citizens were personally liable') is a form of public devotion, and more particularly the Office of Common Prayer used in our own or any other church. In the Greek or Constantinopolitan church three Liturgies are in use: those of Basil, Chrysostom, and the Liturgy of the Præsanctified. In the Romish church the Liturgy is divided into several books or offices, as the breviary, the ceremoniale, or office peculiar to the pope; the missal, or office of the mass; the pontificale, directing the functions of the bishops; and the rituale, or pastorale, for the guidance of the simple priests.

At the Reformation all the Protestant churches on the Continent, without a single exception, introduced liturgies for the decorous celebration of divine service.

Previous to the Reformation of the Church of England the service was performed in Latin, and different liturgies were used in different parts of the kingdom. The cathedrals of York, Lincoln, Hereford, and Bangor, and even Aberdeen in Scotland, had their respective uses; but no cathedral had such a variety of service books for its use as Sarum.

The publication of King Henry VIII.'s 'Primer'

in 1535, in the vernacular tongue, was one of the first steps in the reformation of doctrine and worship in the Church of England. In 1547, 1st Edward VI., Archbishop Cranmer, Bishop Ridley, with eleven other bishops and eminent divines, were commissioned by the king in council to compile a liturgy in the English language, which was confirmed by Parliament in 1548, and published in 1549. It 1551 it was slightly revised and again confirmed by Parliament. Both acts were repealed in the first year of the reign of Queen Mary; but upon the accession of Elizabeth, several learned divines, headed by Archbishop Parker, were appointed to make another review of King Edward's liturgies, when the restoration of the second book of King Edward VI. was determined upon, and finally confirmed by Parliament. The Act received the royal assent April 29, 1559. In the 1st of James I., after the conference at Hampton Court, a few slight alterations were introduced. In this state it continued till the time of Charles II., who, in 1661, issued a commission to empower twelve bishops and as many Presbyterian divines to consider the objections raised against the liturgy, and to make such reasonable and necessary alterations as they should jointly agree upon, nine assistants on each side being added to supply the place of any of the twelve principals who should happen to be absent. The conference broke up without anything being done, except that some particular alterations were proposed by the episcopal divines, which in the May following were considered and agreed to by the whole clergy in convocation. The liturgy was then brought to its present condition, and was unanimously subscribed by both houses of convocation of both provinces on Friday, 20th of December, 1661, and being brought before Parliament the March following, both houses passed an Act for its establishment; and the earl of Clarendon, then lord-chancellor, was ordered to return the thanks of the lords to the bishops and clergy for the great care and industry shown in its revision. Of late years several attempts have been made by Lord Ebury and others to obtain a revision of the liturgy, the objections being that it is too long, and contains too many repetitions for one service, and that particular parts require modification or alteration. Hitherto the heads of the church generally have objected to any change, and the attempts at alteration have therefore been unsuccessful.

LIUTPRANDUS, or LUITPRANDUS, was a deacon at Pavia in the year 946, when Berengarius, marquis of Ivrea and regent of the kingdom of Italy, sent him as his ambassador to Constantinople, where he learnt the Greek language. After his return he was made bishop of Cremona, where he died. He was a man of considerable learning for his age, and his works are valuable for the historical information which they contain.

LIVER. The liver is the secreting organ or gland by which the bile is formed. Its existence has been traced very low in the scale of animals; and parts supposed to have an analogous function have been found in insects, but their nature is at present a disputed question. The differences in regard to size, form, and colour, which the liver presents in the higher animals (mammalia, birds, reptiles, amphibia, and fishes), are of no great importance.

In man the liver is a large solid viscus, of a reddish

brown, or mottled red and yellow, colour, situated immediately beneath the diaphragm, in the right hypochondriac, and partly in the epigastric region of the abdomen. [ABDOMEN.] When enlarged, it can be felt by the hand applied below the ribs on the right side. It is flattened in the vertical direction, is thinner at its anterior than at its posterior border; and its outline, when viewed from above, is irregularly ovoid. The upper surface, which is convex, is applied to the diaphragm; the lower, which is irregularly concave, lies above, and in contact with the stomach, large intestine, and right kidney, has attached to it the gall-bladder, and presents two deep furrows, which divide it into several compartments, termed by anatomists lobes. Of the furrows, one running from before backwards (the longitudinal fissure), transmitted, during uterine life, the vessel which conveyed the blood from the placenta to the heart of the fetus; it afterwards contains merely the cord-like remains of that vessel, now impervious in the greater part of its extent. The second furrow, in the under surface of the liver, is called the transverse fissure, since it crosses the former at right angles, lying, however, chiefly to its right side; it serves to allow the entrance of bloodvessels and nerves to the liver, and the exit of the bile-ducts. Like other viscera of the abdomen, the liver receives an investment from the lining membrane of that cavity, the peritoneum, which, being reflected from it at different points, forms broad bands connecting the liver with surrounding parts.

The intimate structure of the liver consists of ramifications of the hepatic artery and vein, the portal vein, and the hepatic ducts. The ultimate arrangement of these different bloodvessels in the liver is very peculiar. When the substance of the liver is torn, it is seen to be composed of innumerable granules of about the size of a pin's head; each of these contains the elements of a liver. They are connected most intimately with the branches of the hepatic vein, a small twig of which is contained in the interior of each, while on their exterior surface and in their interstices run branches of the portal vein, hepatic artery, and bile-duct. The mass of each granule or lobule is constituted in great part of a close network of capillary bloodvessels, which communicate on the exterior with the small branches of the portal, and on the interior with the twig of the hepatic vein. The blood brought by the portal vein, therefore, is poured into the capillary net-work of each granule or lobule of the liver, and, after yielding in it the constituents of the bile, is received into the branches of the hepatic vein, whence it is transmitted to the general vascular system. The branches of the hepatic artery soon become very minute on the exterior of the lobules, and few can be traced into their interior; it is probable that, after having nourished the coats of the vessels and ducts, and other tissues of the liver, the blood of the hepatic artery is poured into the minute net-work formed by the ultimate division of the portal vein, and contributes, with the blood of that vein, to yield the constituents of the bile.

The biliary canals, reduced in number by successive reunion to two tubes, one from the right, the other from the left lobe of the liver, issue at the transverse fissure of its under surface, there soon unite, and

form one main trunk, the hepatic duct. After running a short distance together with the portal vein, hepatic artery, and nerves, in a quantity of dense cellular tissue inclosed within the fold of the peritoneum, the hepatic duct meets and unites with the duct of the gall-bladder, or cystic duct. The tube resulting from the junction of the hepatic with the cystic duct is called the *ductus communis chole-dochus*: it is about three and a half inches in length, and terminates by opening, together with the duct of the pancreas, into the portion of the intestine named duodenum, at the distance of a few inches from the stomach.

The gall-bladder is a pyriform membranous sac, lodged in a shallow depression at the inferior surface of the liver, which communicates, as we have stated, with the excretory duct of the liver, by means of a tube called the cystic duct. [BILE.]

Diseases of the liver.—The liver is subject to all those general morbid changes which, depending on disordered actions of the bloodvessels, modification of the nutritive process, or alterations in the blood itself, may affect most organized parts of the body: such are inflammation (hepatitis), acute and chronic; hypertrophy and atrophy; induration and softening; and the different kinds of tumours or transformations of tissue, carcinoma, or cancer, medullary sarcoma, fungus hæmatodes, melanosis, and scrofulous tubercle. It is occasionally infested by parasitic animals (hydatids), which may likewise affect other parts of the body.

But the liver is also liable to other diseases which appertain to it specially, and are connected with its function—secretion. The chemical changes which give rise to the formation of bile in the liver may be so deranged, that one or all of the ingredients of that fluid are increased or diminished in quantity, or vitiated in quality, and such disorder of the secreting process may manifest itself in several ways: the imperfectly formed fluid passing into the intestines may cause irritation there, and consequently diarrhœa; or, being absorbed into the blood, may produce jaundice and its concomitant symptoms; or some of the ingredients of the bile may congregate into solid masses in the ducts of the liver or the gall-bladder, forming gall-stones. The diseased state of the liver, in which it becomes impregnated with an unnatural quantity of fatty matter, may also be reckoned among the diseases appertaining to the special function of the organ, for the bile naturally contains a large proportion of fatty matter (cholesterine), though the chemical composition of this substance, and that of the oil or fat with which the liver is impregnated in disease, appears to be different.

The treatment of diseases of the liver is regulated by the general principles according to which the cure of diseases in other parts is attempted, and will of course vary with the nature of the particular affection requiring it.

LIVERPOOL, a municipal and parliamentary borough and seaport of Lancashire, stands on the right or E. side of the estuary of the Mersey, in 53° 24' N. lat., and 2° 58' W. long.

Liverpool is first mentioned in a deed of Henry II. about the year 1173, at which time it was a ville and manor, but not a borough. In the year 1207 King John purchased the manor and granted a charter, by which he gave to all persons who

should take burgages or grants of land at Liverpool, on burgage tenure, all the rights enjoyed by the burgesses of any free borough on the sea in any part of England. This was the first charter of Liverpool, and although expressed in a few lines, it included everything that could be granted in the largest and most liberal charter. In the year 1227 Henry III. granted a second charter to Liverpool, confirming in detail to the burgesses all the local rights that were usually granted in those times to seaports and municipal towns. These charters were afterwards confirmed by Edward III. (1333), Richard II., Philip and Mary (1556), and Charles I. (1625). In the reigns of Edward III. and Richard II. the burgesses were authorized to raise rates to pave the town; and in the reign of Henry VIII. (1561), an improved harbour was constructed in the pool or arm of the sea which at that time ran along the S. and E. sides of the town, and with the river on the W. made it almost an island. The castle of Liverpool, probably built by King John, for there is no earlier mention of it in any deed of authority, stood in the middle of the town, at the point where St. George's Church now stands, and the streets sloped down from it towards the river and the pool.

Until the time of the colonization of the North American continent and the West India islands by England, the trade of Liverpool only extended to the W. coast of Scotland, to Wales, to the E. and S. coast of Ireland, and occasionally to France, Spain, and Portugal. The imports consisted of wool and linen yarn, which were in great demand even in those early times by the manufacturers of Manchester, and of wine and dried fruit from France and Spain. The exports consisted chiefly of Manchester goods, Sheffield cutlery, coals, and occasionally grain. During all this period Liverpool was a small place with only from 1000 to 1500 inhabitants; but there were then no great towns in the N. of England, and Liverpool was as large as any of the neighbouring towns except Chester, which was then much the richest place in the north-western division of England.

But when new colonies were established in Virginia, New England, Barbadoes, and numerous other points on the mainland or on the islands of America, the trade of Liverpool began to expand, and at the close of the civil war, in 1649, Liverpool had a considerable trade with America and the West Indies, as well as with other parts of the British Islands and the continent of Europe. The town suffered greatly in the civil war, having been twice besieged; once by Prince Rupert, who carried it by storm, and a second time by Sir John Meldrum, one of the commanders of the parliamentary army, who compelled the king's general, Sir Robert Byron, to surrender it to the Parliament. From the time of the Restoration to the Revolution of 1688, the commerce of Liverpool increased rapidly, and at the beginning of the eighteenth century nearly the whole of the Virginian tobacco trade, then the principal staple of America, was concentrated there.

In the reign of Queen Anne the corporation of Liverpool obtained power to form a wet dock and a dock for the building and repairing of ships at the entrance of the pool. A second dock of larger size was formed in the reign of George II. A third and still larger dock was constructed immediately after

the accession of George III. Two other large docks were constructed during the peace between the first American war and the French Revolution, and before the close of the century the Liverpool docks, either formed or authorized to be formed, extended nearly two miles in length from N. to S. During the present century they have been still more rapidly enlarged, so that they are now between five and six miles in length, independent of the immense docks which have been constructed at Birkenhead on the opposite side of the river Mersey. These docks, taken as a whole, now form the finest artificial harbour in the world, and accommodate the greatest trade.

The most important public buildings in Liverpool are the Town Hall; the Exchange Buildings, entirely rebuilt and greatly beautified and enlarged during the last three years; St. George's Hall, one of the most beautiful Grecian structures of modern times; the banks, and the large masses of offices built on a uniform plan, some of them in the very best style of architecture. In the Town Hall the ground floor contains the council room, several committee rooms, the mayor's, town clerk's, treasurer's, and town surveyor's offices; but some of these are about to be removed to the new public buildings which the corporation are erecting in Dale Street. The principal story of the Town Hall contains a very fine suite of rooms magnificently furnished, and approached by a noble staircase lighted from the dome. The saloon, two drawing-rooms, two ball-rooms, and the banquet-room, all communicating with each other, are noble apartments. The Exchange Buildings form, with the Town Hall, three sides of a quadrangular area which is used by the merchants of Liverpool as an Exchange. The news room, which is just finished, is one of the largest rooms ever erected for commercial purposes, being built to accommodate from 3000 to 4000 subscribers. The other buildings, designed for the underwriters of the port, with the cotton saleroom and other establishments, are also on a large scale. The Custom House, in which are also contained the dock offices, the excise office, the post office, the stamp office, and other public offices, is situate on the site of the old dock; the extreme length, measuring from E. to W., is 466 feet. St. George's Hall is a most elegant building. The eastern façade is 400 feet long, and has a colonnade, projecting centre, with depressed wings. Within the central projection is an ambulatory 26 feet wide: behind this is St. George's Hall, a noble vestibule or hall bounded on the N. and S. by the assize courts, to which it affords approaches.

Liverpool contains upwards of forty churches belonging to the Establishment; these, with the various episcopal and dissenting chapels, give a total of more than a hundred places of worship.

Numerous buildings devoted to charitable purposes have been erected in various parts of the town. The infirmary, the workhouse, the fever hospital, the lunatic asylum, with the numerous smaller hospitals and the dispensaries, are all most valuable and efficient establishments. There is also the Sailors' Home, of which the first stone was laid by Prince Albert in 1846. The Bluecoat School, established by Bryan Blundell in 1709, has accommodation for 250 boys and 100 girls, who are educated,

boarded, and clothed free of charge. There are also charitable schools for the blind, for the deaf and dumb, for male and female orphans, with corporation free schools, and others supported by different denominations of Christians. The Collegiate Institution, opened in 1845, is a fine Elizabethan structure, and is appropriated as a school for the higher branches of education. The Queen's College, formerly the Mechanics' Institute, is applied to equally valuable purposes. Amongst the other educational and literary establishments of Liverpool are the Brown's Institute, the Royal Institution, the Literary and Scientific Institution, and the extensive libraries of the Lyceum and the Athenæum. The borough jail is a large and well-managed prison. The county house of correction at Kirkdale stands within the limits of the borough.

The markets in Liverpool are on a very extensive scale. St. John's, which covers several acres, is open daily for the sale of meat, poultry, fruit, and garden vegetables. The fish market, on the opposite side of the street, is always liberally supplied.

Many of the modern commercial buildings are architectural ornaments to the town. Amongst them may be named—the Royal Bank, in the Italian style; the Royal Insurance Office, in florid Italian; the Union Bank, Grecian; Brunswick Buildings, on the model of the Farnese Palace; the Branch Bank of England, and the Commercial Bank Buildings. Many of the new ranges of offices exhibit a noble design and great richness of decoration, as Brown's Buildings near the Exchange, Tower Buildings, and several others.

The principal places of public amusement are St. George's Hall, where musical performances are given almost weekly, the Theatre, the Royal Amphitheatre, the Prince of Wales' Theatre, the Philharmonic Hall, one of the noblest music rooms in England, and the Wellington Assembly Rooms. Most of the public balls are given either at the Town Hall or at St. George's. Two or three small public gardens have already been opened, and the corporation has decided to form a new and splendid park in the Parliament Fields at a cost of 250,000*l*. Numerous public baths, formed at the expense of the corporation, are much resorted to.

The municipal borough of Liverpool is divided into sixteen wards, and is governed by sixteen aldermen and forty-eight councillors. The parliamentary borough returns two members to the House of Commons. Electors in 1866, 20,618.

No other town in Great Britain presents such a surprising increase in commercial prosperity as Liverpool. This is in a great measure owing to the impetus given to the cotton trade, and the perfection of communication wrought by the 'iron road,' which made Liverpool the depot of all species of merchandise and manufactures intended for exportation to the United States. Nor must the enterprise of its inhabitants be forgotten, which still operates to increase the prosperity and maintain the commercial influence of the second city in the United Kingdom. At the beginning of the last century its population consisted of only 5000 persons, and its shipping of about 80 vessels. In 1760 its population had increased to 25,780, and its vessels to 1245. The increase was still more rapid during the next forty years, for in 1800 it had 78,000 inhabitants, and about 5000 vessels entered and cleared annually. The great increase of the cotton trade was the cause of this wonderful improvement. In 1781 only 5,000,000 lbs. of raw cotton were imported; in 1791, 31,000,000 lbs.; and in 1800, 43,000,000 lbs. The value of the exports of cotton manufactures during the same period had increased from 355,000*l*. to 6,040,000*l*. But rapid as was this progress, it has been very much exceeded since, until at last Liverpool has become the most important commercial port in the world. The following figures will give the best idea of its progress from 1801 to 1861:—

Year.	Pop.	Vessels.	Tonnage.	Dock Dues.
1801	77,708	5,060	459,719	£28,365
1831	205,572	12,537	1,592,436	183,455
1861	443,938	21,095	4,977,272	444,417

The population is now (Sept., 1866) estimated at very nearly half a million, and the actual state of its trade will be seen from the annexed table:—

	Sailing.		Steam.		Total.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
Number of vessels registered, 1865,	2721	1,409,772	340	144,713	3061	1,554,485
Entries, coastwise, 1864,	4602	402,324	3426	1,069,417	8028	1,471,741
Clearances, ditto, “	4895	351,563	3349	1,009,834	8244	1,361,397
Entries from the colonies, “	1233	855,422	62	68,530	1295	923,952
Clearances to ditto, “	1260	841,503	87	92,137	1347	933,640
Entries from foreign countries, “	2812	1,015,073	860	759,497	3672	1,774,570
Clearances to ditto, “	2590	1,032,609	736	686,685	3326	1,719,294

The total number of entries of all kinds in 1865 was 12,607 (4,224,447 tons), and the clearances, 12,285 (4,010,705 tons); or together, 24,892 vessels, and 8,235,152 tons.

But perhaps the most striking idea of the vast commerce of Liverpool is furnished by the following figures, which give the value of British produce

exported from the twelve principal ports of the United Kingdom in the years 1863 and 1864. It will be seen that not only does it head the list, but that it actually exports more than all the others combined; and if every other port in the kingdom is added, it will still be found that Liverpool sends out, within a fraction, as much as all the rest:—

Ports.	Exports.	
	1863.	1864.
Liverpool, ...	£65,154,232	£72,748,031
London, ...	36,211,510	36,554,913
Hull, ...	13,556,254	16,052,398
Glasgow, ...	6,770,368	7,604,426
Southampton, . . .	4,071,991	4,726,513
Newcastle, ...	1,894,281	1,879,041
Leith, ...	1,552,899	1,765,441
Greenock, ...	455,021	502,873
Bristol, ...	341,674	290,113
Cork, ...	108,102	137,435
Dublin, ...	38,196	34,540
Belfast, ...	12,041	21,660
Total, ...	130,166,569	142,317,384

Cotton goods, of course, form by far the largest items in producing the above vast amount, but there are also some very large exportations of other articles. We annex all above 1,000,000*l.* in value which were shipped in 1864, and insert the quantities wherever possible:—

	Quantities.	Value.
Cotton yarn, ...	27,412,775 lbs.	£3,246,448
Cotton manufactures, piece goods, ...	1,266,044,528 yds.	30,932,572
Hosiery & small wares, Haberdashery and millinery, ...	—	1,155,174
Hardware & cutlery, .	—	1,942,700
Linen yarn, ...	—	1,976,632
Linen manufactures, piece goods, ...	14,951,908 lbs.	1,098,676
Machinery of all kinds, Iron of all kinds, . .	144,746,220 yds.	5,219,696
Copper, ...	737,836 cwt.	1,783,349
Woollen manufactures, Worsteds & mixed stuffs, Flannels and carpets, .	1,502,964 tons.	4,867,451
	737,836 cwt.	1,525,668
	22,289,950 yds.	3,090,153
	85,910,597 yds.	3,980,349
	13,211,070 yds.	1,301,616

The import trade of Liverpool is also exceedingly large, and in some articles far surpasses that of London. The official returns do not give the value of the different articles imported at each port, but the quantities of some of the most prominent items landed in 1864 will be found below:—

Cocoa, ...	2,591,720 lbs.
Coffee, ...	6,914,002 "
Wheat, ...	6,347,560 cwt.
Indian corn or maize, .	1,610,497 "
Flour, ...	1,939,683 "
Cotton (raw), ...	7,086,657 "
Madder, ...	216,807 "
Currants, ...	248,618 "
Hemp, ...	328,062 "
Jute, ...	623,820 "
Hides (wet), ...	251,808 "
Hides (tanned), . . .	1,717,179 lbs.
Palm Oil, ...	440,429 cwt.
Bacon and hams, . . .	776,867 "
Cheese, ...	349,954 "
Lard, ...	155,326 "
Rice, ...	1,670,386 "
Saltpetre, ...	453,843 "

Silk (raw), ...	298,922 lbs.
Pepper, ...	2,864,930 "
Rum, ...	1,191,899 galls.
Brandy, ...	766,618 "
Sugar (unrefined), . .	2,248,786 cwt.
Tobacco (all kinds), .	31,484,972 lbs.
Wine, ...	1,385,496 galls.
Wool, ...	53,035,883 lbs.

The customs' revenue collected at Liverpool in the year ended 31st March, 1866, amounted to 2,771,712*l.* In 1821 the total was 1,488,072*l.*; in 1831 it was 3,562,114*l.*; in 1841 it was 4,607,326*l.*; in 1851 it was 3,366,284*l.*; in 1861 it was 3,343,518*l.* The diminution in the receipts since 1841 is due entirely to the abolition of duties on many hundred articles of importation, and to the great reduction of rates on sugar, tea, spirits, and wine, the results of Mr. Gladstone's liberal financial policy.

LIVERPOOL, ROBERT BANKS JENKINSON, EARL OF, a distinguished statesman, and Premier of England, was born in 1770. He was educated at the Charterhouse; from which he proceeded to University College, Oxford. Under the ægis of his father, Charles Jenkinson, first earl of Liverpool, he entered with every advantage on the political arena of his country at a most critical period of its history. In 1790 he was returned as member for Rye, and in 1796, having received the title of Lord Hawkesworth, on the elevation of his father to the earldom, he was appointed a commissioner of affairs for India. In 1801 he became secretary of state for foreign affairs; and four years afterwards was appointed head of the home department. In 1812 he was appointed prime minister. On the dissolution of the Addington administration, he resigned his position; but in 1817 he was re-appointed to the same office. On the death of his father, in 1818, he succeeded to the earldom. He died in 1828.

LIVERWORTS, or LICHENS, a family of plants belonging to the class *Cryptogamia*, of which a definition is given under LICHENS. The order consists of between fifty and sixty genera, which are divided by Fries into four sub-orders:—*Hymenothalami*, *Gasterothalami*, *Idiothalami*, and *Coniothalami*: to these some systematists add *Byssaceæ*. These are again subdivided into several tribes, each tribe comprising several genera. The species of the genus *Usnea* are amongst the most common of the Lichens which cover the trunks of aged trees. The species of the genus *Everina* are common in Great Britain. One of them, *E. prunastri*, has a peculiar power of imbibing and retaining odours, and on this account is in much request as an ingredient in perfumed cushions and sweet pots. It has been recommended as a remedy in pulmonary affections. It is frequently found on the oak and other trees. The species of *Parmelia* are exceedingly numerous. One of the most common throughout Europe is the *P. parietina*, Yellow Moss. It has a very bitter taste, which has caused it to be used as a tonic in medicine, and it has been recommended as a remedy in intermittent fever. *P. tartarea* yields the dye known by the name of Cudbear. *P. parella* affords the substance known as Litmus, or Lacmus. One of the species of the genus *Sticta*, *S. pulmonacea*, has been used as a substitute for the Iceland Moss. It is used in Siberia for giving a bitter flavour to beer. It is a

native of Great Britain, and is found on the trunks of trees in mountainous districts, almost entirely covering them with its large shaggy fronds. The tribe *Lecidinæ* embraces the important genus *Cladonia*, and also *Cenomyce* and *Scyphophorus*, which are often only regarded as subgenera of *Cladonia*. They have both been used in medicine as astringent and febrifuge. (See Plates 1, 2, 'Lichens.')

LIVERY. During the earlier period of English history, when the feudal system had permeated all ranks of society, the wearing of livery was not confined to domestic servants as it is now. Each class wore the livery of their superiors: the armed retainers wore that of the noblemen whom they served; the son of a gentleman wore that of a knight; and the knight that of the duke; and even the duke's son, as page to the prince, wore the prince's livery. The colours of the livery were then, and are usually now, borrowed from the armorial bearings of the family whose livery is worn; being generally the tincture of the field and that of the principal charge, or the two tinctures of the field, where it has two. The royal family of England have at times adopted other colours than those found in their arms. The Plantagenets had scarlet and white; the Tudors, white and green; the Stuarts, yellow and red; and the House of Brunswick, scarlet and blue. In London, the freemen of the trade-guilds or companies, are called liverymen; and it was anciently the custom to allow each of them twenty shillings a year, towards the purchase of a suit of the livery of their respective companies, that they might make a splendid appearance in civic pageantry. The liverymen elect the common council-men, sheriffs, and aldermen of the city; and before the Reform Bill of 1832 they were the exclusive constituency of the city of London.

LIVIVS, with his full name, **LU'CIUS LIVIVS ANDRONICUS**, was the first person who introduced a regular drama upon the Roman stage. (Liv., vii. 2.) The time and place of his birth are uncertain; but his first play was probably exhibited 240 B.C., in the year before Ennius was born. The fragments of his works which have come down to us are too few to enable us to form any opinion respecting them: Cicero says that they were not worth being read a second time.

LIVIVS, TITUS, the Roman historian, was born at Patavium (Padua), B.C. 59. We possess very few particulars respecting his life. He appears to have lived at Rome, and to have been on intimate terms with Augustus, who used, according to Tacitus ('Ann.' iv. 34), to call him a Pompeian, on account of the praises which he bestowed upon Pompey and his followers. He also encouraged the historical studies of Claudius, afterwards emperor. He died A.D. 17, in his seventy-sixth year.

Livy's great work, which was originally published in 142 books, gave an account of the history of Rome, from the earliest period to the death of Drusus, B.C. 9. Of these books only 35 are now extant, namely, the first ten, which contain the history of the city to B.C. 293; and from the twenty-first to the forty-fifth inclusive, which commence with the Second Punic War, B.C. 218, and continue the history to the conquest of Macedon, B.C. 167. There also exist brief epitomes of the lost books, as well as

of those which have come down to us, though these have been frequently supposed, but without sufficient reason, to have been compiled by Florus. We have, however, only epitomes of 140 books; but it has been satisfactorily shown by Sigonius and Drakenborch on Livy, 'Ep.' 136, that the epitomes of the 136th and 137th books have been lost, and that the epitome of the 136th book, as it is called, is in reality the epitome of the 138th. The fragments of the lost books, which have been preserved by grammarians and other writers, are given in Drakenborch's edition. That portion of Roman history which was contained in the lost books has been written in Latin by Freinshemius.

We have no means for ascertaining when the whole of the history was completed, though there are indications of the time at which some particular portions were written. Thus in i. 19, he mentions the first shutting of the temple of Janus by Augustus after the battle of Actium, B.C. 29; whence we may conclude that the first book was written between this year and B.C. 25, when it was closed a second time. He must also have been engaged on the 59th after B.C. 18, since the law of Augustus, 'De maritandis ordinibus,' passed in that year, is referred to in its epitome.

Tacitus and Seneca, among the later Roman writers, speak in the highest terms of the beauty of Livy's style and the fidelity of his history—praises which have been constantly repeated by modern writers. But while most will be ready to admit that his language is eloquent, his narrative clear, and his powers of description great and striking, it can scarcely be denied that he is deficient in the first and most important requisites of a faithful historian—a love of truth, diligence and care in consulting authorities, and a patient and painstaking examination of conflicting testimonies.

The best editions of Livy are those by Crevier, 1735–40; Drakenborch, 1738–46; Ernesti, 1804; Ruperti, 1817; Döring, 1816–24; and Kreyssig, 1823–27. His Roman History has been translated into most European languages; the most esteemed are the translations in German by Wagner (1776–82) and Cilano (1777–79); in Italian, by Nardi (1755); in English, by Philemon Holland (1600, 1659), by Baker (1797); and in French, by Dureau de la Malle and Noel (1810–12; and 1824).

LIVONIA, one of the Baltic provinces of Russia, situated between 56° 34' and 59° 3' N. lat., 28° 20' and 27° 38' E. long., is bounded N. by Esthonia, E. by Lake Peipus and Pskow, S. by Vitepsk and Courland, and W. by the Gulf of Livonia or Bay of Riga. The area is 18,773 square miles; the population at the last census was 883,681, very mixed, and mostly Lutherans. The surface is generally level, with here and there some hills, which rarely exceed 100 feet in height. Livonia is covered with vast forests, lakes, rivers, marshes, and heaths. The soil on the sea-coast, which is bounded by high cliffs, is very sandy: in the interior, sand, clay, loam, and moorland alternate, but there are also many very fertile tracts. In the south, especially on the banks of the Duna, there is some very picturesque scenery. Most of the forests and marshes are in the west. Of the lakes, 1120 in number, the most considerable are—the great Lake of Peipus, crisscrossed by a narrow channel with that of

Pskow on the north-east; and the Lake Wirzjærw, 80 square miles in extent, in the centre of the province, which is connected by the Great Embach river with Lake Peipus. The principal river is the Düna, which is the boundary between Livonia and Courland till it reaches Kirchholne, whence it runs north-west into the Bay of Riga at Dünamunde. The smaller rivers and streams are very numerous.

The climate is cold and raw from October till the end of May; very hot in the three summer months. September has some fine days, but the nights are often frosty.

The chief occupations of the inhabitants are agriculture and the distillation of spirits. The country produces rye and barley, flax, hops, hemp, and linseed. The fruit, such as apples, plums, and cherries, is very indifferent. There are some good horses on the estates of the nobles, but those of the peasantry are small and of little value. The horned cattle are small; sheep of the German breed are kept by the nobles; the peasants have an inferior breed, the coarse black wool of which is manufactured into cloth. Goats, swine, and domestic poultry are kept. There is abundance of game, white and gray hares; the other wild animals are bears, wolves, lynxes, foxes, beavers, otters, martins, badgers, and squirrels. The Lake Peipus abounds in fish. There are no minerals of importance nor manufactures, except in Riga. The exports are corn, hemp, flax, and linseed; the imports are salt, iron, lead, colonial produce, wine, manufactured goods, and articles of luxury.

The chief towns in the province of Livonia are, RIGA; ARENSBERG, or ARENSBURG; DORPAT; Pernau, a well-built fortified town and port, with 6850 inhabitants, at the mouth of the Pernau, which flows from the Wirzjærw Lake, and falls into the north-eastern part of the Gulf of Livonia. Only vessels of 6 feet draught can come up to the town; those of larger size anchor in the roads about a mile from the harbour, where they are unloaded by small craft. The exports are chiefly corn, flax, and hemp; the imports consist of wine, brandy, salt, drugs, and various kinds of manufactured goods. The total value of the exports in 1842 was 103,015*l.* 16*s.* 2*d.*, which represents the freight of 75 ships of 4451 tons' burthen. Wenden, north-east of Riga, situate on the Aa, which drains the centre of the province, has a population of 2500. The fortress of Dünamunde, built on an island, in the estuary formed by the embouchures of the Düna and the Aa, deserves mention for its light-house, and as defending the entrance to the harbour of Riga.

LIVORNO. [LEGHORN.]

LIVRE, an ancient French coin. The word is derived from the Roman *libra*, or pound. The livre was of two kinds—Tournois and Parisis, the latter being equal to $\frac{1}{14}$ th of the former. This was on account of the rate of money, which was one-fourth higher at Paris than at Tours. Under the decimal system accounts are now kept in francs of twenty sons, of ten decimes each, and each decime is divisible into ten centimes. Eighty francs are worth eighty-one livres Tournois. Livre was also the ancient French unit of weight, and was equal to 17·267 oz. avoirdupois; the kilogramme has taken its place. [GRAMME.]

LIXIVIVM, a term which is synonymous with

ley. It was used by the older chemists to signify a solution of an alkali in water.

LIZARD. [LACERTIADÆ.]

LIZIER, ST. [ARIÈGE.]

LLAMA (genus *Auchenia*), a genus of Ruminants of the family *Camelide*, and representing in the mountains of Peru and Chili the camels (*Camelus*) of the deserts of Arabia or Bactria. In dentition, at least very nearly; in outward form, excepting that there is no hump on the back; in the general structure and cellular apparatus of the stomach, with the concomitant power of abstaining for a long time from water; in the expression of the large, full, overhung eye; in the mobility and division of the upper lip; in the fissured nostrils; in the slenderness of the neck; and in the long woolly character of the clothing—the Llama and the camel exhibit striking points of agreement. In the feet, however, the difference is very considerable. The feet of the camel are broad and extensively cushioned below, being in fact precisely adapted to the sands of its congenial desert; whereas the slender, elastic, claw-tipped foot of the Llama is destined for the crags of the Cordilleras.

The foot of the Lama consists of two springy toes completely divided, each having a rough pad beneath, and at the tip a strong hoof; these hoofs are pointed at the extremity, and hooked down somewhat like a claw; they are compressed laterally, and the upper surface presents an acute ridge, while the under surface is linearly concave, a form well fitted for security on the mountain range.

The Spaniards, when they conquered Peru and Chili, found the Llama, which seems to have been the only beast of burden possessed by the natives as a domestic animal: it was not merely a beast of burden—its flesh was eaten, and its wool was woven into cloth. It was at once pack-ox and sheep, and was described by the early Spanish writers as a sort of sheep. Its skin was also prepared as leather.

One of the labours to which the Llama was subjected was that of bringing down ore from the mines among the mountains. Its ordinary load was 80 or 100 pounds, and its average rate of travelling with this burden was from 12 to 15 miles a day, over rugged paths and through mountain passes; but, like the camel, if too heavily laden, it would lie down, and obstinately refuse to proceed; nor would it bear to be urged beyond its accustomed pace. Gregory de Bolivar estimated that in his day 300,000 were employed in bearing the produce of the mines of Potosi alone, and 4,000,000 annually killed for food.

Augustin de Zarate, treasurer-general in Peru in 1544, in his account of the conquest, speaks of the Llama, as it was observed in the mountains of Chili, as a sheep of burden. He says that, in situations where there is no snow, the natives, to supply the want of water, fill the skins of sheep with that fluid, and make other living sheep carry the skins; for he remarks that these Peruvian sheep are large enough to serve as beasts of burden. De Zarate evidently had the eye of a zoologist, for he says that these sheep resemble the camel in shape, though they have no hump. He states that they can carry about 100 pounds or more, that the Spaniards used to ride them, and that their rate of travelling was 4 or 5 leagues a day. His description appears to be that

of an eye-witness, and bears upon it the impress of truth. When they are tired, says De Zarate, they lie down, and the load must be taken off, for neither beating nor help will make them get up. Their weariness is manifested in a very disagreeable way when a man is on one of them; for our author says that, if the beast is pressed on under such circumstances, it turns its head and discharges its saliva, which has a bad odour, into its rider's face. He speaks of them as of great utility and profit to their masters, praises their good and fine wool, particularly that of the species named *Pacas*, which have very long fleeces, and shows that their keep costs little or nothing, either in money or trouble; for they are satisfied with a handful of maize, and are able to go four or five days without water. He declares that their flesh is as well flavoured as that of a fat Castilian sheep, and notices the public shambles for the sale of it in all parts of Peru then frequented by these animals. But he remarks, this was not the case on the first arrival of the Spaniards; for when an Indian killed a sheep at that time, his neighbours came for what they wanted, and then another Indian would kill a sheep in his turn.

Similar information is given us by the old writers, as John De Laet (folio, Leyden, 1633), D'Acosta, Hernandez, Captain G. Shelvocke (1719-22), Molina, and many others.

As a beast of burden in its native mountains, whether of Peru or Chili, the Llama has yielded to the mule. But it is still most important on account of one of its qualities which attracted the attention of the ancient Peruvians; it is a woolbearer, and that of no ordinary kind, the wool approximating in its character to silk. Large quantities of this material are imported into Europe for the manufacture of shawls and other delicate fabrics, and the improvement of this material has been made a subject of earnest consideration and trial. The older writers leave us in considerable doubt as to the number of species belonging to the genus *Auchenia*. It would appear, however, that the domestic Llama, a stout strong animal, variable as to colouring, but mostly white, is the descendant of a wild species termed the Guanaco, and that the Vicuña, and the Paca or Paco, are still further distinct.

The following species of the Llama are now generally recognized:—

1. *Tame and Wild*.—The Guanaco, Guancu, Huanco (*Auchenia llama*).
2. *Tame and Wild*.—The Paco, Paca, or Alpaca (*Auchenia alpaca*, Desm.)
3. *Wild*.—The Vicuña, Vicugna, Vigognia, &c. (*Auchenia vicuña*).
4. *Wild*.—The Taruga, or Taruca (*Auchenia taruca*), a doubtful species, described by De Laet as a solitary animal of a dark burnt brown colour, with pendulous ears, larger than the Vicuña, but distinct from the wild Guanaco.

Some zoologists consider that there are only two truly distinct species, the Guanaco and the Vicuña; if so, the varieties must be very marked. In the tame Guanaco (or Llama) the wool is long and coarse; in the wild Guanaco it is much finer and softer, and of a cinnamon brown. In the Vicuña, a small species inhabiting the mountain ranges on the verge of perpetual snow, the wool is exquisitely fine, but short,

and of a pale yellow brown. Thousands are annually killed in Peru for this material alone.

In the Paca, or Alpaca, the domestic breed of which is often of an intense lustrous jet black, the wool falls in long flakes, glossy and silken, reaching down to



Llama (*Auchenia llama*).

the knees. This is the Paco-llama of De Laet. With respect to the Taruga of De Laet, nothing is known. Of Alpaca silk-wool vast importations are yearly made into this country; it is worked up into exquisite textures, chiefly at Paisley, Glasgow, &c.,



Vicuña (*Auchenia vicuña*).

and great quantities of yarn, varying from 6s. to 12s. 6d. per pound, are sent to France.

The habits of the Guanaco, or Wild llama, are much better known than those of any other species, and have been described at length by Mr. Darwin in the 'Voyage of the Beagle.' This species lives in the highlands of Patagonia, Chili, and Peru, descending into the valleys on the approach of winter. It is gregarious, wild, fleet, active and inquisitive, and, takes readily to the water. General colour, rich rufous brown; head and part of the neck gray; tail a little raised up and curled down; neck long; height at the top of the shoulders, 3½ feet. (See Bennett, Darwin, and others.)

Attempts to naturalize the Llama, Alpaca, and Vicuña in Europe have been made with spirit and judgment, but hitherto without decided success. In Australia, through the exertions of Mr. Ledger, it has been successfully introduced, and its wool is becoming one of the staple exports of the British colonies in that vast island.

No fossil species of Auchenia has yet been discovered; but Mr. Darwin brought home from South America the remains of a most interesting animal nearly allied to the Llamas, which Professor Owen has characterized under the name of *Macrauchenia*. The cervical vertebrae in this form present the same character in the absence of the holes for the vertebral arteries in the transverse processes as in the Llamas and Camels.

LLANDAFF. [GLAMORGANSHIRE.]

LLANDILO-FAWR. [CAERMARTHENSHIRE.]

LLANDOVERY. [CAERMARTHENSHIRE.]

LLANELLY. [CAERMARTHENSHIRE.]

LLANGOLLEN. [DENBIGHSHIRE.]

LLANRYST. [DENBIGHSHIRE.]

LLANTRISAINT. [GLAMORGANSHIRE.]

LOYD'S, a name given to a set of offices on the first floor of the Royal Exchange, London, which is the great centre for all relating to shipping and marine insurance. The name arose from the fact that the first voluntary association of underwriters was at Lloyd's private coffee house. It has now grown into a vast organization, transacting an insurance business to the amount of forty millions annually. The offices of Lloyd's are very magnificent; the subscribers' room for the business of underwriting is 100 feet long by 48 feet wide, and communicates with a large library and reading-room. These contain a valuable collection of maps and charts, and instruments of navigation. There is also a captains' room, where ships are sold, and captains and owners meet for business; a commercial club-room, board-room, and clerks' offices.

The society of Lloyd's is managed by a committee selected from the members, and the expenses are defrayed by fees and annual subscriptions. None but those who have paid the fees are allowed to transact business there as insurance brokers or underwriters. Every day is registered a list of all vessels arrived or departed, all casualties at sea, and shipping intelligence from every part of the world, which is distributed over the country every evening by the publication of *Lloyd's List*. There is scarcely a port in the world without an agent of Lloyd's, who gives the earliest possible information of all shipping movements. *Lloyd's Register of British and Foreign Shipping* is published annually, and contains an accurate classification of the mercantile marine of the kingdom, and of the foreign vessels trading thereto. This information is supplied by paid surveyors at each of the ports of the United Kingdom. The committee of Lloyd's also give rewards to those captains and others who render services to ships in distress, and exercise a general supervision over the maritime interests of the country.

LO, ST., the capital of the French department of Manche, is situated in $49^{\circ} 6' 59''$ N. lat., $1^{\circ} 5' 55''$ W. long., at a distance of 157 miles W. from Paris, and has a civil tribunal and of commerce, a college, and 9810 inhabitants. The central part of the town

stands on a rocky eminence above the Vire, from which the other streets, all irregularly and badly built, extend down the slopes in all directions. The square called Champ-de-Mars is prettily laid out with avenues of trees. The most remarkable structures are the church of Notre-Dame, in which are fine painted windows, the gift of Louis XI.; the church of Sainte-Croix, the best preserved edifice in the oldest Norman style in France; the church of St.-Thomas, which is now a corn market; and the tower in the garden of the prefecture, which is all that remains of the former defences of the town. The chief manufactures of St.-Lô are drugget, woollen yarn, tape, lace, linen, and leather. There is a considerable trade in horses for the French cavalry, in cattle, corn, small wares, cloth, &c. The town has a museum, dye-houses, and bleaching establishments.

LOACH. [COBITTS.]

LOADSTONE OR LODESTONE, the natural magnet, or magnetic iron ore ($\text{Fe O} + \text{Fe}_2 \text{O}_3$), has been long known for its power of attracting small pieces of iron, and making them adhere to its surface. Loadstone is one of the most valuable of the iron ores. It is sometimes found in nature beautifully crystallized in regular octahedral crystals. For the most part it is of a dark gray colour with a metallic lustre. A careful examination of this substance shows that its attractive force for particles of iron is greatest at certain points, while elsewhere it is weak or even absent. These points are named its poles, and the loadstone is on this account said to be endued with magnetic polarity. 'If one of the poles of a natural loadstone be rubbed in a particular manner over a bar of steel, its characteristic properties will be communicated to the bar, which will then be found to attract iron-flings like the loadstone itself. Farther, the attractive force will appear to be greatest at two points situated very near the extremities of the bar, and least of all towards the middle. The bar of steel so treated is said to be magnetized, or to constitute an artificial magnet.'

LOAM, a soil compounded of various earths, of which the chief are silicious sand, clay, and carbonate of lime, or chalk. The other substances which are occasionally found in loams, such as iron, magnesia, and various salts, are seldom in such proportions as materially to alter their nature. Decayed vegetable and animal matter, in the form of humus, is often found in loams in considerable quantities, and the soil is fertile in proportion. [SOIL.]

LOANGO, on the west coast of Africa, extends from Cape Lopez Gonsalvo in $0^{\circ} 44'$ S. lat., to the river Congo or Zaire, which separates it from Congo in about 6° S. lat. *Loango*, the capital town, stands in a large plain, at the distance of 3 miles from the sea, in $4^{\circ} 40'$ S. lat., 12° E. long. The town is said to be 10 miles in circumference, and the population, including the suburbs, about 20,000. It is the place of residence of the king, whose government, like that generally prevalent among the barbarous tribes of this part of Africa, is the most absolute species of despotism.

A great part of the country is covered with thick woods, which abound in game, and it is only mountainous in the interior towards the south. In the north it possesses some lakes of considerable extent, from which, and from the mountains, many rivers

descend to the sea. The climate is excellent, the soil is rich, and produces potatoes, gum, enormous sugar-canes, palms, manioc, maize, and a pulse called *msangen*. The wild animals are tiger-cats, ounces, and hyenas.

LOANO. [ALBENGA.]

LOASA'CEE, a small natural order of polypetalous Exogens, consists of herbaceous and frequently annual plants, covered with stinging hairs, which cause considerable pain by the wounds they inflict.

LOBEL, or L'OBEL, MATTHEW, one of the founders of the science of systematic botany, was born in Flanders, in the year 1558, travelled in various parts of the middle and south of Europe, and finally settled in England, where he became physician to James I. He is chiefly known now as the author of botanical works illustrated by great numbers of figures, of which there are above 2000 in his '*Plantarum Historia*,' a folio work published at Antwerp in 1576, and still referred to by critical writers on systematic botany. But his name deserves mention more particularly as that of the first naturalist who devised the present method of arranging plants in their natural orders, rudely indeed, but with sufficient distinctness. Lobel died at Highgate, near London, in 1616. The genus *Lobelia* was dedicated to him by Linnæus.

LOBELIA'CEÆ, an important natural order of monopetalous Exogens. The species principally inhabit the warmer parts of the world. They abound in a milky juice, which in all is acrid, and in some so intensely so as to produce dangerous or even fatal consequences when applied to the surface of the body or taken internally. Among the most virulent is the *Hippobroma longiflorum*, a West Indian species, and the *Lobelia tupa*, a Chilian plant now common in gardens. Certain species, however, have proved, in skilful hands, valuable curative agents, especially the *Lobelia inflata*, or Indian tobacco, which is an annual plant, growing in most districts of North America, of which the oval obtuse leaves are used in medicine. The action on the human system is nearly the same as that of tobacco when chewed, producing a copious flow of saliva, and if swallowed in a considerable dose, causing great relaxation of all muscular structures, including the heart and arteries, accompanied with debility and cold perspirations, and also paleness of the surface. In large doses it proves decidedly poisonous. It frequently acts as an emetic and expectorant when given in small and regulated doses.

LOBO, JEROME, a native of Lisbon, entered the order of the Jesuits, and was ordered to the missions in India. He arrived at Goa in 1622, and volunteered for the mission to Abyssinia. He remained at Fremona for several years as superintendent of the missions in that kingdom, but was compelled to fly with the rest of the Portuguese in 1634, on account of the persecutions which they experienced from the native government and the Abyssinian priests. He exerted himself with the utmost vigour and perseverance to re-establish the influence of the Roman Catholics in Abyssinia, but meeting with neither assistance nor encouragement from either the court of Spain or the pope, he was obliged to relinquish the attempt.

In 1640 he returned to India, and became rector

and afterwards provincial of the Jesuits at Goa. In 1656 he returned to Lisbon, and in 1659 he published the narrative of his Journey to Abyssinia, under the title of '*History of Ethiopia*.' The whole was translated into English, from the French of the Abbé le Grand, by Dr. Johnson in 1735. Lobo died at Lisbon in 1678.

LOBO'TES (Gr. λοβός, 'a lobe'), a genus of fishes, of the family *Chaetodonidæ*, in which the body is thick, broad, and ovate, and the pectoral and caudal fins rounded.

LOBSTER. [ASTACUS.]

LOCAL ANÆSTHESIA IN SURGERY. The parts operated upon are rendered insensible to pain by the spray of rectified sulphuric ether: the ether employed for the purpose is called 'Anæsthetic Ether; it has a specific gravity of 0.720 (60° Fahr.) The ethereal spray is developed by a hand bellows, and is projected upon the skin through a fine jet. The parts subjected to the influence of the spray become, in less than a minute, perfectly blanched and deprived of sensation through the refrigerating effects of the ether. It is well known that chloroform renders the whole system insensible to pain, the patient being quite unconscious. By local anæsthesia, on the other hand, the sensibility of a part can be temporarily destroyed without sacrificing the consciousness of the individual. Moreover, one great objection to the employment of chloroform is the great risk attendant on its administration; in certain organic diseases it cannot be used with safety, and may indeed be contra-indicated altogether. In several instances chloroform has caused death. 'Chloroform takes away pain, but it may also take away life.' From local anæsthesia no fatal effects or bad consequences can possibly follow; and there is every probability that, although it will never supersede chloroform altogether, it will do so to a large extent in the minor operations of surgery. Many operations have already been performed under the influence of local anæsthesia with the most satisfactory and gratifying results. The local anæsthetic process not only annuls the pain of the surgeon's knife, but also in a great measure prevents the attendant hæmorrhage. Experience has shown that it does not impair the vitality of the tissues, or interfere with any process of repair which may subsequently be set up. Some incredulity at first prevailed in regard to the advantages of local anæsthesia, but recent experience has dispelled every doubt. The honour of this invaluable discovery is due to Dr. Richardson of London; and the great rapidity with which this method of inducing local anæsthesia has been adopted by the profession affords sufficient evidence of its efficiency and practical utility. The principle may not be altogether novel, but Dr. Richardson may justly claim priority for originating a practice which cannot fail to prove an inestimable boon. It may here be stated, that some years ago it was proposed to induce local anæsthesia by means of ice, but this was found a very tedious and uncertain process. The sulphuret of carbon has been very recently proposed for this purpose by Professor Delcominette, of Nancy. Various painless operations have been performed under the local influence of this agent. One great drawback, however, to the use of the sulphuret of carbon is its extremely disagreeable odour.

LOCARNO. [TICINO.]

LOCHABER. [INVERNESS-SHIRE.]

LOCHMABEN. [DUMFRIES-SHIRE.]

LOCK, a fastening by means of a movable bolt, which bolt is projected by the action of a key, and cannot be withdrawn except by the application of a similar key.

Locks possessing considerable merit are of very great antiquity. The most ancient is an ingenious contrivance described by Mr. Bonomi in his 'Nineveh and its Palaces.' It consists of an arrangement of loose pins so adjusted as to drop into corresponding holes in the upper side of the bolt whenever the bolt is thrown. The bolt can then only be withdrawn by first lifting the pins out of the bolt, which is effected by means of a very simple lifting key.

Practically all locks that are actuated by keys now in use may be ranged under one of three classes: the ward lock, the slide lock, and the lever lock. The ward lock is of almost unknown antiquity, keys on this principle having been found in the ruins of Pompeii and Herculaneum. The drawings in the Plate, marked fig. 1, are copies of keys found at these places, the keys themselves have been deposited in the British Museum; many allusions apparently to a lock of this kind are found in the oldest writings extant. It consists of an arrangement of obstacles called 'wards' for preventing any but the proper key being turned in the lock for the purpose of throwing the bolt. These locks are still in very general use, and perhaps afford a nominal security sufficient for ordinary purposes, although against picking and other methods of skilled burglary their security is very small indeed.

In 1784 and 1817 Joseph Bramah, the celebrated engineer, patented a most ingenious invention, which has become well known as the 'Bramah lock.' This invention, in its present complete form, consists in the introduction of a series of slides radiating around the key-pin, which slides may be regarded as a continuation or multiplication of the cleft portion of the ordinary key; only in this case such cleft portions, instead of being, as they might be, arranged around the key, are retained in the lock itself, and made to take their correct position with reference to the wards by the insertion of the key: the wards in this lock consisting simply of a series of studs or plates around the circumference of the slides. Thus the 'barrel' of the lock, namely, that portion which holds the slides, becomes, in fact, in its movement a portion of the key, and acts as one with it in throwing the bolt. Fig. 2 shows a section of a complete Bramah or Slide lock, together with the key, in the shaft of which the cuts may be seen, to receive the slides of the lock. Several important improvements have been added to this ingenious lock, especially by Larkin, Cotterill, and Mappin. Its great merit is the neatness of its form and the smallness of the key required.

Lever locks differ from all variations of the Ward lock in the fact that instead of offering obstructions to the turning of a wrong key in the lock, they depend for their security on obstructing the passage of the bolt itself, unless the rightful key be used in the attempt to throw it. This object is attained by arranging a number of levers close to and parallel with the bolt. They consist generally of a series of

plates with an up and down motion, working on and held together by a common pin. In each of these plates a passage or gating is cut, so as to allow a stump, or projection from the bolt, to pass through the gating only when the plates are raised to a certain given height. By varying the altitude of the passage or gating in each lever, and forming lifting steps in the key to correspond, a new and important principle of security is obtained. Fig. 3 shows a mortise lock for a room door, and has been selected for illustration as being one of the most complete of its kind. B is the bolt; T shows a series of levers with the open spaces, and passages called "gatings" through which the stump passes. This stump may be seen in the open space to the left, retaining the bolt in the position of being locked; when the bolt is withdrawn, or in other words, the lock unlocked, this stump will be in the inner gating. L shows the position of the latching bolt; s the bolt spring, and F the follower (Hobbs & Co.'s patent) which actuates the bolt.

The first introducer of the lever principle was Robert Barron, who in 1778 patented the application of movable levers for arresting the return of the bolt until they were raised to the required height. These levers he used in combination with ordinary wards. In 1790 Moses Bird patented a series of locks constructed on the true lever principle, and may be regarded as the originator of the present lever lock. In his specification he shows a key formed for lifting twelve levers. The modifications of this principle which have since been devised by many different inventors are too numerous to allow of special mention. We must, therefore, confine ourselves to the more important and substantial improvements.

The first of these is the 'detector lock,' invented by Jeremiah Chubb, and patented by him in 1818. Its object was, in addition to preventing the bolt from being withdrawn by any but the proper key, to give notice to the owner of any attempt being made with a wrong or false key; hence the use of the word 'detector.' If the reader imagine a scale beam to be placed over the levers (shown at T, fig. 3) with clutch ends, to retain the levers should they be raised too high by a false key, an idea of this 'detector' may be obtained. The 'Chubb lock' of the present day contains the same detective movement, with many additional contrivances to give increased security. The principal of these are, first, serrated or notched gatings to the levers, similar to a plan described in Bramah's patent for 1817 as applied to his slides, and again in Strutt's patent of 1819 as applied to his 'new-shaped tumbler or lever lock;' and secondly, the covering curtain of the keyhole invented by De la Fons, and patented by him in 1846. Great credit is due to the eminent firm of Chubb and Son, who have done so much to introduce this lever lock to the public, and to bring it into more general use.

The next important step in the development of the lever lock was made by A. C. Hobbs, who in 1852 patented his celebrated 'protector lock.' This invention consists of an ingenious contrivance, by which it is made impossible for any one to put a pressure upon the levers, and so feel their way to the several gatings through which the bolt stump passes

when the bolt is thrown; and is now universally admitted to be an effectual security against picking. The form of the 'protector' very much resembles a steelyard; it is placed at the back of the bolt, & the slightest pressure against the stump working between the gatings is taken by the long arm of the protector, and thus frees the levers from the only means by which the locks can be picked. This principle marks a new era in the history of locks, and has formed the foundation of many subsequent inventions for the purpose of rendering locks unpickable. Among such inventors may be mentioned Dennison, Tucker, G. Price, and O'Connell. A still further advance has since been made by J. M. Hart, who in his patent of 1861 describes a method of protecting the lock against any fraudulent attempts to cut away that portion of the bolt by which it is thrown, and thus delude the owner into fancying that he had secured his lock, when actually he had only turned the key round in the lock and lifted the levers without carrying the bolt to its destination. These two principles of protection against picking and against fraud are now combined in the 'patent protector locks,' manufactured by Hobbs, Hart, and Co. An important development of Hobbs' 'movable-stump' principle above referred to, is also the invention of J. M. Hart, and patented by him in 1865. Its main feature consists in the multiplication and combination of movable and fixed stumps to such a number that the whole length of a door secured by it would require to be broken away before the lock could be effectually violated.

A valuable and ingenious lock, containing still further principles of security was patented in 1851 by Robert Newall, of New York. It is popularly known as 'Hobbs' changeable lock,' having been introduced by him into this country. The principle on which it is constructed is that, by an admirable mechanical contrivance, the levers adjust themselves in the act of locking to any arrangement of the key-steps by which it is locked; and however the relative positions of the steps of the key may be changed, the levers take accurately a corresponding arrangement. By this means any person holding the key may vary it at pleasure, and thus virtually obtain a new lock as often as he pleases. This lock has since been considerably improved in the details of its construction, and, as now made, constitutes the highest attainment of mechanical art that has ever been reached in this department of industry and skill. Fig. 4 shows a complete lock of this description, with its key and movable bits.

Locks that are actuated without keys are known as puzzle or letter locks; they differ from any of the above, and afford certain advantages peculiar to this class of locks. They are made on the permutation principle, of which the simplest application is the padlock. These locks are regarded rather as an ingenious toy than as an available substitute of the more usually constructed locks. Fig. 5 represents this particular lock.

Some locks have been made in which the action depends on the key being a powerful magnet. In others the difficulty of opening is increased by requiring a peculiar method of applying the key; but in addition to the circumstance that the secret must be known to several persons, these advantages have

the disadvantage of being very inconvenient in use. Many contrivances have been effected for attaching an alarm to locks, by which the introduction of a false key should ring a bell or fire a pistol; but all such contrivances are curiosities rather than conveniences.

LOCK-JAW. [TETANUS.]

LOCK OF A CANAL. [CANAL.]

LOCKE, JOHN, was born at Wrington, near Bristol, on the 29th August, 1632. Locke was placed at Westminster School, from which he was elected in 1651 to Christ Church, Oxford. He applied himself at that university with great diligence to the study of classical literature, and by the private reading of the works of Bacon and Descartes sought to acquire that alimnet for his philosophical spirit which the Aristotelian scholastic philosophy, as taught in the schools of Oxford, did not afford. He adopted the profession of medicine, which, however, the weakness of his constitution prevented him from practising.

In 1664 Locke visited Berlin as secretary to Sir W. Swan, envoy to the elector of Brandenburg; but after a year he returned to Oxford, where he accidentally formed the acquaintance of Lord Ashley, afterwards earl of Shaftesbury, and accepted his invitation to reside in his house. Here he became acquainted with some of the most eminent men of the day, and was introduced to the earl of Northumberland, whom, in 1668, he accompanied on a tour into France. Upon the death of the earl, he returned to England, where he again found a home in the house of Lord Ashley, who was then chancellor of the exchequer, and Locke was employed to draw up a constitution for the government of Carolina, which province had been granted by Charles II. to Lord Ashley with seven others.

In 1672, when Ashley was created Earl of Shaftesbury and made lord chancellor, Locke was appointed secretary of presentations. This situation he held until Shaftesbury resigned the great seal, when he exchanged it for that of secretary to the Board of Trade, of which the earl was still president.

In 1674 Locke visited France, and resided at Montpelier. In 1679 he was recalled to England by the earl of Shaftesbury, who had been restored to favour and appointed president of the council. Six months afterwards, however, when the earl was again disgraced, and was ultimately compelled to leave England (1682) to avoid a prosecution for high treason, Locke followed him to Holland, where, even after his patron's death, he continued to reside; for the hostility of the court had been transferred to Locke, and his name was erased, by royal mandate of the 16th of November, 1684, from the number of the students of Christ Church. During his residence in Holland he had commenced his 'Essay concerning Human Understanding' in 1675, which he completed in 1687. On the revolution of 1688, Locke returned to England in the fleet which conveyed the princess of Orange. He now obtained through the interest of Lord Mordaunt, the situation of commissioner of appeals, with a salary of 200*l.* a year. In 1690 his reputation as a philosophical writer was established by the publication of his 'Essay concerning Human Understanding,' which met a warm reception. Numerous editions passed rapidly through the press, and translations were

made of it into Latin and French. In the same year Locke published two treatises on Government. These essays were intended generally to answer the partisans of the exiled king, who called the existing government a usurpation, but particularly to refute the principles advanced in the 'Patriarcha' of Sir Robert Filmer. In the second essay Locke maintains that the legitimacy of a government depends solely and ultimately on the popular sanction, or the consent of men making use of their reason to unite together into a society or societies. The philosophical basis of this treatise formed a model for the 'Contrat Social' of Rousseau, the source of great errors and infinite miseries to mankind.

The air of London disagreeing with Locke, he accepted the offer of apartments in the house of his friend Sir Francis Masham, at Oates in Essex. In this retirement he wrote a third letter on Toleration, which called forth a reply from a former antagonist of Locke on the subject; in answer to whom a fourth letter, in an unfinished state, was published after its author's death. In 1693 he first gave to the world his 'Thoughts upon Education,' to which Rousseau has been largely indebted for his 'Emile.' Though appointed one of the commissioners of trade and plantations in 1695, he still found leisure for composition; and he was principally engaged in writing on Christianity.

His health had now become so impaired that he resigned his office of commissioner of trade and plantations, refusing a pension which was offered him. From the time of his retirement he resided at Oates, and devoted the remainder of his life to the study of the Holy Scriptures. He died on the 28th of October, 1704, in the seventy-third year of his age.

The personal character of Locke was in complete harmony with the opinions which he so zealously and so ably advocated. Truly attached to the cause of liberty, he was also willing to suffer for it. Perfectly disinterested, and without any personal object at stake in the political views which he adopted, he never deviated from moderation; and the sincerity of his own profession rendered him tolerant of what he believed to be the conscientious sentiments of others.

Locke has a happy facility in expressing his meaning with perspicuity in the simplest and most familiar language. Clearness, indeed, is the leading character of his composition, which is a fair specimen of the best prose of the period. His style, however, is rather diffuse than precise, the same thought being presented under a great variety of aspects, while his reasonings are somewhat prolix, and his elucidations of a principle occasionally unnecessarily prolonged. These are faults, however, which, though they may materially detract from the merits of his composition as a model of critical correctness, have nevertheless greatly tended to make his 'Essay concerning Human Understanding' a popular work.

LOCKERBIE. [DUMFRIESSHIRE.]

LOCKFAST PLACES. The opening of lockfast places is, in Scotch law, an aggravation of the crime of THEFT.

LOCKHART, JOHN GIBSON, D.C.L., was born at Cambusnethan, in Lanark, in 1794, and educated at Glasgow. Such was his early progress in scholastic studies, that in 1809, at the early age of fifteen, he received the Snell exhibition to Balliol

College, Oxford. He there graduated as B.C.L. in 1817; and in 1834 had the diploma of D.C.L. conferred upon him. After visiting the Continent he was called to the Scottish bar in 1816, but never distinguished himself in forensic eloquence. In 1818 he became acquainted with Sir Walter Scott, who recommended him to the publishing firm of the Ballantynes, and he was employed to write the historical part of the *Edinburgh Annual Register*. Lockhart now became a most intimate friend of Professor Wilson, and his ablest coadjutor in the conduct of *Blackwood's Magazine*. In 1820 he was married to Sophia, the eldest daughter of Sir Walter Scott, and lived for some time at Chiefswood, a cottage within an easy distance of Abbotsford. In 1821 he published his first novel, entitled 'Valerius, a Roman Story,' which was soon followed by 'Reginald Dalton,' 'Adam Blair,' 'Ancient Spanish Ballads,' and 'History of Matthew Wald.' In 1825 his 'Life of Burns' made its appearance, and he also wrote a 'Life of Napoleon.' In 1826, on the death of Mr. Gifford, Lockhart was appointed editor of the *Quarterly Review*, which he conducted with great learning and ability for a period of twenty-eight years.

On the death of Sir Walter Scott, in 1832, Lockhart was selected as his biographer; and he executed his important trust with equal skill and discretion.

In 1843 Sir Robert Peel appointed him to the office of auditor of the duchy of Cornwall, at a salary of 600*l.* per annum. In 1853 his declining health compelled him to resign the editorship of the *Quarterly Review*; and with broken spirits he visited Rome, but without any benefit to his enfeebled system. On his return to Scotland he was able to rally in some degree; but a violent attack of diarrhoea, acting upon a weakened constitution, speedily terminated his existence in November, 1854.

Some interesting details of his character and genius will be found in Mrs. Gordon's 'Life of Professor Wilson.'

LOCMARIA. [BELLE-ILE-EN-MER.]

LOCOMOTIVE STEAM ENGINE, or LOCOMOTIVE, a machine consisting essentially of a carriage, on which are conveyed a steam boiler and a steam engine; the engine serving to drive one or more of the wheels of the carriage, so as to enable it to move from place to place, and also to propel other carriages, usually by dragging, and sometimes by pushing. The stores of fuel and water may be carried either by the locomotive itself, or by a separate carriage called a *tender*. Locomotives are used chiefly on railways, and occasionally on common roads. The application of the steam engine to locomotion on land was, according to Watt, suggested by Robison in 1759. The first actual locomotive engine appears to have been a steam carriage for use on common roads, invented by Cugnot, a French engineer, about 1763. It was made, and tried upon a short journey, in 1769, and in an improved form in 1770; but was abandoned on the ground of supposed danger. In 1769 and 1784 Watt took patents for the application of his steam engine to locomotion; but those inventions were never carried into effect. In 1784 William Murdoch, assistant to Watt, made a very efficient working model of a locomotive engine. The first practically successful locomotive engine was that of Trevithick and Vivian, patented in 1802, and

set to work in 1804. It travelled at about 5 miles an hour, with a net load of ten tons, on a tramway near Merthyr Tydvil.

After various inventors had long exerted their ingenuity in vain to give the locomotive engine a firm hold of the track by means of roughened wheel-tires, rackwork-rails, and toothed driving wheels, legs and feet, and other contrivances, William Hedley, in 1813, made the important discovery that no such aids are required, the adhesion between smooth wheels and smooth rails being sufficient. To adapt the locomotive engine to the great and widely varied speeds at which it now has to travel, and the varied loads which it now has to draw, two things are essential—that the rate of combustion of the fuel, the original source of the power of the engine, shall adjust itself to the work which the engine has to perform, and shall when required be capable of being increased to many times the rate at which fuel is burned in the furnace of a stationary engine of the same size; and that the surface through which heat is communicated from the burning fuel to the water shall be very large compared with the bulk of the boiler. The first of those objects is attained by the *blast-pipe*, invented and used by George Stephenson in 1814; the second, by the tubular boiler, invented about 1829, simultaneously by Séguin in France and Booth in England, and by the latter suggested to Stephenson, who was the first to combine those inventions, and adapt them to a form of engine and arrangement of mechanism suited to high speeds. On the 6th October, 1829, occurred that famous trial of locomotive engines, when the prize offered by the directors of the Liverpool and Manchester Railway was gained by Stephenson's engine the *Rocket*, the parent of the swift and powerful locomotives of the present day. The *Rocket*, and two of the other engines which competed on that occasion, Hackworth's *Sanspareil*, and Braithwaite and Ericsson's *Novelty*, are preserved in the Patent Office Museum at South Kensington. Since that time the locomotive engine has been varied and improved in various details, and by various engineers. Its weight now ranges from 5 tons to 60 tons; its load from 50 to 500 tons; its speed from 10 miles to 70 miles an hour.

The hauling force of a locomotive engine is in general limited, not by the power which the engine is capable of exerting—for that is almost always more than sufficient to draw any load that it ever has to convey—but by the '*adhesion*,' as it is called, or force which prevents the driving wheels from slipping on the rails.

The adhesion is equal to the weight which rests on the driving wheels, multiplied by a coefficient which depends on the condition of the surface of the rails; being greatest when they are clean and dry, and least when they are wet and greasy, or covered with ice.

On an average, the adhesion of a locomotive engine may be estimated at about one-seventh of the load on the driving wheels; for by sprinkling sand on the rails when they are slimy, or if they are icy, directing jets of steam on them, it may in general be prevented from falling below that amount.

In order that the rails may be able to bear the load on the driving wheels without damage, it is considered advisable that the load on *each wheel* should not in ordinary cases exceed 1 ton for every 15 lbs.

in the weight of a yard of rail; that is to say, for rails of the ordinary weight of 75 lbs. to the yard 5 tons = 11,200 lbs. Nevertheless there are examples of heavy engines in which the load on each driving wheel is 7 tons.

Locomotive engines are seldom made with fewer than six wheels. Those which are intended for the propulsion of comparatively light trains at high speeds have but one pair of driving wheels of from 5 feet 6 inches to 7 feet 6 inches, and sometimes even 8 feet in diameter. The best position for the shaft of that pair of wheels is nearly under the centre of gravity of the engine, in which case, by proper adjustment of the springs, it can be made to bear any proportion of the weight from $\frac{1}{3}$ to $\frac{2}{3}$. Engines for goods trains of moderate weight have also usually six wheels, two pairs of which are driving wheels, of 5 feet diameter, and are coupled together. For heavier goods and mineral trains engines are used having all six wheels coupled, and usually of smaller diameter, such as 4 $\frac{1}{2}$ or 4 feet, and in some cases of engines for ascending steep inclined planes, 3 $\frac{1}{2}$ or 3 feet; and occasionally the wheels of the tender also are driven by steam power.

WEIGHTS OF ENGINES WITH SEPARATE TENDERS.

(The Tender weighs from 10 to 15 tons.)

	Tons.
Narrow gauge passenger locomotives, six-wheeled, with one pair of driving wheels, ...	19 to 23
Do. do. do. unusually heavy, ...	24 to 27
Broad gauge passenger locomotive, eight-wheeled, with one pair of driving wheels	35
8 feet in diameter, ...	
Goods locomotive, from four to six wheels, coupled, ...	27 to 32

WEIGHTS OF TANK ENGINES, CARRYING FUEL AND WATER.

	Tons.
For light traffic on branch lines, ...	12 to 20
For heavy traffic on steep inclined planes, with from 6 to 12 wheels, ...	40 to 60

By an invention of Mr. Ramsbottom, the tender of a locomotive is made to supply itself with water while in motion, through a tubular scoop which dips into a long water-trough lying between the rails. The speed should be at least 22 miles an hour, to enable the apparatus to work. (See Plate 3, fig. 1.)

In comparing the tractive force of a locomotive engine, as limited by adhesion, with the resistance and gravity of the train which it is to draw, it is obvious that the resistance due to friction and concussion of the engine itself is to be left out of account; for that resistance does not constitute a backward pull on the engine, tending to make the driving wheels slip.

It appears, then, that the *available tractive force* of a locomotive engine in ascending a given inclined plane, which must be at least equal to the resistance of the heaviest train that it has to draw, is to be found by subtracting from the adhesion that component of the weight of the engine which acts as a resistance to its ascent; that is to say, the weight of the engine, divided by the number of times that the length of the inclined plane contains the height of the ascent.

The resistance of the load dragged behind the engine, which must not be greater than the adhesion of the engine, is made up of the resistance on a level, and of the resistance due to gravity. The resistance due to gravity is found, as in the case of the engine, by dividing the load by the number of times that the

length of the inclined plane contains the height of ascent. The resistance on a level is made up of three parts, due respectively to friction, to concussion, and to curvature. The resistance due to friction ranges from '0027 to '004 of the load, according to circumstances. The resistance due to concussion at a speed of 12 miles an hour is about one-tenth of the resistance due to friction; and at other speeds it varies as the square of the speed. The resistance due to curvature, on a curve of 1000 feet radius, is about '0033 of the load; and of other radii it varies inversely as the radius.

Besides drawing the train, the locomotive engine has to overcome the resistance of its own wheels and axles, and of its own mechanism. If the mechanical energy thus expended, while the engine travels a given distance, be divided by that distance, there is obtained the additional train-resistance which would be equivalent to the resistance of the engine; and this being added to the resistance of the tender and train, gives the *gross resistance* of the engine, tender, and train.

The resistance of the engine consists of two parts; the first, being the resistance of the engine *as a carriage*, is the same with that of a train of the same weight; the second, being the resistance caused by the strain on the mechanism, bears a certain proportion to the whole resistance of the engine and train, whether arising from friction, concussion, curvature, or gravity; and that proportion appears to be about one-third. Hence, to calculate the *gross effort* of a locomotive engine, take the sum of the resistances due to friction, concussion, curvature, and gravity, for the *gross load* and to that sum add *one-third*.

The *energy exerted by the engine per minute*, in foot-pounds, is the product of the effort or gross resistance in pounds and speed in feet per minute. To find the *mean effective pressure* of steam in the cylinders, divide the energy exerted per minute by the volume swept by the pistons per minute; if that volume is expressed in cubic feet, the quotient will be the required pressure in lbs. on the square foot, which divided by 144 will give lbs. on the square inch. The *indicated horse-power* of the engine is found by dividing the energy exerted in foot-pounds per minute by 33,000.

The following are some examples of the results of such calculations; the line of railway being supposed straight, and the rails and rolling stock in a good condition, so that the resistance due to friction is only '0027 of the load:—

EXAMPLE.	I.	II.	III.
1. Speed in miles an hour, ...	24	18	12
2. Ascending gradient, ...	1 in 133'3	1 in 133'3	1 in 80
3. Weight of engine, ...	20 tons	30 tons	30 tons
4. Weight of tender, ...	10 "	12 "	15 "
5. Weight of train, ...	104 "	245 "	238 "
6. Effort or gross resistance, ...	4502 lbs.	9241 lbs.	13,057 lbs.
7. Circumference of driving wheel, ...	20 feet	15 feet	14 feet
8. Stroke of pistons (2 in number), ...	2 "	2 "	2 ft. 2 in.
9. Area of each piston, ...	200 sq. in.	226 sq. in.	253 sq. in.
10. Mean speed of pistons, feet per minute, ...	422'4	422'4	328'85
11. Volume swept through by pistons in cubic feet per minute, ...	1173'3	1325'9	1155'58
12. Mean effective pressure in lbs. on the square inch, ...	56'3 lbs.	76'7 lbs.	83'4 lbs.
13. Indicated horse-power, ...	228	444	418

The pressure of the steam in the boiler exceeds the mean effective pressure in the cylinder in a proportion depending on the extent to which the steam is worked expansively, and various other circumstances. It usually ranges in practice from 80 lbs. to 140 lbs. per square inch above the atmospheric pressure. In some cases engines have been worked at a pressure of 200 lbs. per square inch. The most common pressures at present are from 100 to 120 lbs.

The speed at which the engine runs when exerting a given effort is regulated by the quantity of steam at the required pressure which the boiler is capable of producing; which quantity depends on the quantity of fuel that can be burned in the furnace in a given time, and the efficiency of that fuel in producing steam.

The consumption of fuel by locomotive engines, per indicated horse-power per hour, may be estimated as ranging from 3 to 5 lbs., and the evaporation from 7 to 9 lbs. per lb. of fuel. The whole area of heating surface in ordinary engines varies from 800 to 2000 square feet; and the area of heating surface for each lb. of fuel burned per hour varies from about half a square foot to 1½ square foot, and is on an average about one square foot.

The action of the blast-pipe gives to the locomotive engine the power of adapting its consumption of fuel to the work which it has to perform, within certain limits. Hence the rapid consumption of fuel by heavy and powerful engines, in ascending steep inclined planes, is to a great extent compensated by the saving which takes place in descending.

The details of the construction of locomotive engines, and of the action of the fuel and steam in them, cannot be comprehended in the present article. For information respecting these matters, see Mr. D. K. Clark's work 'On Railway Machinery,' Mr. Z. Colburn's work 'On Locomotive Engineering,' and that of Professor Rankine on 'The Steam Engine and other Prime Movers.'

Both engines and carriages may be adapted to sharply curved lines of railway by means of the 'bogey,' a truck capable of turning about a pivot into various positions relatively to the carriage or engine which it supports. A locomotive engine has a two-wheeled bogey under the leading end, the after end being supported on one or two pairs of driving wheels, and the pivot about which the bogey turns being midway between the centre of the bogey and the middle point between the axles of the driving wheels. Instead of a bogey and pivot, Mr. W. B. Adams uses a pair of axle-boxes for the leading wheels, sliding in curved guides, whose centre is at the point already described as the proper place for the pivot. By the aid of these contrivances engines and carriages are enabled to pass round curves of radii as small as 3½ chains (231 feet). On British railways curves of sharper radii than 10 chains are of rare occurrence. For the purpose of ascending gradients on which the ordinary adhesion would be insufficient, locomotives have been introduced in which the engine drives a pair of small horizontal wheels, which grip between them a central rail with a force that can be adjusted so as to prevent slipping.

Locomotive engines for common roads fell for many years into disuse; but have been revived in the 'traction engine.' This machine, of which various

forms have been invented, is adapted to drawing long trains of heavily laden vehicles at a low speed, such as four or five miles an hour, and appears to have been quite successful. To insure that the driving wheel shall take a sufficient hold of the road, without injuring its surface, different contrivances are used; for instance, in one form of traction engine the driving wheel successively sets down in front of itself, runs over, and picks up again, a series of flat oblong plates or shoes, which form a sort of endless tramway for the wheel to run upon, and enable it not merely to travel on roads, but on rough and soft ground.

The examples of railway locomotives in the following illustrations are taken mainly from those shown at the London International Exhibition of 1862.

Plate 4 is a longitudinal section, and Plate 5 a transverse section of an engine by John Ramsbottom, Esq., being one out of a great number of similar engines now used on the London and North-Western Railway. The driving wheels are 7 feet 7½ inches in diameter, the wheel base is 15 feet 5 inches; the cylinders are outside, and are 16 inches diameter and 24 inches stroke; the area of the fire grate is 14·95 square feet; of fire-box heating surface 85 square feet; of external tube surface 1013 square feet. The boiler is fed without pumps by two Giffard's injectors, and is fitted with Mr. Ramsbottom's duplex safety valve, in which a pair of valves are pressed down by the two ends of a cross-bar, the middle of which is held down by means of a spring, as shown in the Plate—an arrangement which makes it impossible for the engine-driver to increase the load on the valves. The ordinary working pressure is 120 pounds on the square inch.

Plate 2, fig. 2, represents a sectional elevation of an express engine, made by Messrs. Neilson and Company, of Glasgow, for the Caledonian Railway Company, according to the design of Benjamin Conner, Esq., locomotive superintendent. Its driving wheels are of the great diameter of 8 feet 2 inches; the wheel base is 15 feet 8 inches; the trailing axles have outside journals; the cylinders are outside, and are of 17¼ inches diameter, and 24 inches stroke; the area of fire-box surface is 96 square feet; of external tube surface 1094 square feet. The weight of the engine when in working order is 30 tons 13 cwt., and of this the unusually large proportion of 14 tons 11 cwt. rests on the driving wheels.

Plate 1, fig. 2, represents an express passenger engine, belonging to the Imperial and Royal Austrian State Railway Company, and designed by John Haswell, Esq., the manager of their engineering works. The driving wheels are 6·74 feet in diameter, and are placed to the rear of the other two pairs of wheels; the bearings are outside; the wheel base, for the purpose of passing easily round curves, is short, being about 11 feet; the cylinders are outside, and are four in number, of 11 inches in diameter, and 25 inches stroke; the area of fire-grate is 15 square feet, of fire-box surface 84 square feet, of tube surface 1260 square feet. The engine when in working order weighs 32 tons, of which about 12½ tons rest on the driving wheels. Each end of the axle is driven by a pair of cylinders lying side by side, in which the pistons move in opposite directions, and thus a balance of inertia is effected of a much more perfect kind

than can be obtained by any system of revolving counterpoises. The compound cranks, which are exposed to a somewhat severe and complex strain, are made of Krupp's cast steel. This engine has run at a speed of 14 German miles, or nearly 70 British miles per hour. (For details see 'Mittheilungen über die zur Londoner Ausstellung im Jahre 1862, von der k. k. priv. (Österr. Staats-Eisenbahn-Gesellschaft gesendeten Gegenstände.')

Plate 2, fig. 3, represents a coal-burning heavy goods engine, made for the London, Chatham, and Dover Railway, by Messrs. Sharp, Stewart, and Company. The wheels are 5 feet in diameter; the wheel base 15½ feet; the cylinders are inside, of 17 inches diameter, and 24 inches stroke; the area of fire-grate is unusually large, being 27½ square feet; the fire-box surface is also large, being 120½ square feet; the tube surface is 1063 square feet; the boiler is fed by a pair of Giffard's injectors, without pumps. The weight of the engine is when empty 28 tons 11½ cwt.; when full 32 tons 1 cwt.

The coal-burning arrangement is Mr. Cudworth's. The grate is very long, measuring 7 feet 3¼ inches in length; it slopes downwards from the door towards the front, and is divided longitudinally by a partition or 'mid-feather;' and smoke is prevented by alternate firing, and by letting the gas distil from the coal near the fire doors before pushing the fuel forward.

Plate 2, fig. 1, is an elevation of a ten-wheeled engine belonging to the Imperial and Royal Austrian State Railway Company, at whose works it was made, under the direction of Mr. Haswell. It has a jointed carriage to enable it to pass round curves. The fore-carriage, which supports the mechanism and the front part of the boiler, has six wheels 3 feet 4 inches in diameter, with a wheel base of 7 feet 4 inches. The after-carriage, which supports the coal-box, the tank, and the fire-box end of the boiler, has four wheels, 3 feet 4 inches in diameter, with a wheel base of 7 feet 4 inches; the mean distance from the hind axle of the fore-carriage to the front axle of the after-carriage is 4 feet 9 inches; giving a mean total wheel base of 19 feet 5 inches. The bearings are outside the wheels; the cylinders are outside the bearings, and are of 18½ inches diameter and 25 inches stroke; the slide-valve gear is inside the wheels.

The wheels are cast-iron discs, with cast-steel tires.

The tank, which is in two divisions, one at each side of the fire-box, holds about 5 tons of water; the coal-box about 2 tons of fuel.

The grate measures somewhat more than 15 square feet in area; the fire-box surface is about 80 square feet, the tube surface about 1260 square feet.

The boiler frame rests on the after-carriage by means of slides, which allow of sufficient change of position in going round curves.

The engine weighs when full about 42 tons.

It has been proved by experience to be capable of drawing 200 tons up an ascent of 1 in 40, with curves of 300 feet radius, at an average speed of about 10 miles an hour.

The most remarkable feature of this engine is the mechanism whereby motion is communicated from the wheels of the fore-carriage (which are directly driven by the engine) to those of the after-carriage, notwithstanding the joint between them, and their

relatively oblique position while the engine passes round curves.

In the following description the hind axle of the fore-carriage will be called 'the third axle,' and the fore axle of the after-carriage 'the fourth axle.'

About two feet directly above the fourth axle is an axle which may be called 'the intermediate axle.' It is supported upon the fourth axle by two uprights, whose bearings are ball and socket joints, so that they admit of those axles becoming oblique to each other horizontally.

The intermediate axle is kept exactly parallel to the third axle by means of a pair of sloping rods.

Each of those three axles has a pair of cranks on its ends, at right angles to each other. The cranks of the intermediate axle are connected with those of the third axle, and also with those of the fourth axle, by means of four connecting rods, all of which have ball and socket joints; and thus a uniform rotation is communicated from the wheels of the fore-carriage to those of the hind-carriage in all their relative positions.

Full details of the theory and construction of this coupling are given in the publication formerly referred to, 'Mittheilungen,' &c.

Plate 1, fig. 3, represents a passenger engine, by Messrs. Ernest Gouin and Company, which has two pairs of cylinders, each pair of cylinders driving its own independent pair of wheels; so that the engine is like two ordinary engines fixed together end to end, with a single boiler of great size.

There are four driving wheels, two on each of the endmost axles, of 5 feet 3 inches in diameter; and six small intermediate wheels. The comparatively small size of the driving wheels has been adopted for the sake of lightness and cheapness; it is made compatible with a high speed by giving a sufficiently rapid stroke to the pistons.

In a goods engine of the same class there are twelve wheels, forming two sets of six coupled wheels, $3\frac{1}{2}$ feet in diameter.

The bearings are all inside, the cylinders and mechanism outside. The two slide-valve motions are acted upon by one reversing handle; but there are two independent regulators. The power of going round curves is provided for by giving end-play to the axles.

The following table gives the rest of the principal dimensions:—

	Passenger Engine.	Goods Engine.
Diameter of cylinders,	14·2 inches ...	16·5 inches
Stroke,	13·4 " ...	17·3 "
Area of grate, ...	28 sq. feet ...	36 sq. feet
Fire-box surface, ...	108 " ...	108 "
Tube surface, ...	1557 " ...	2034 "
Surface of steam-drying tubes, ...	129 " ...	154 "
Contents of water-tank, ...	7 tons ...	8 tons
coal-box, ...	2 " ...	2½ "
Weight of engine, empty, ...	35 " ...	41 "
full, ...	47½ " ...	56½ "
Load on driving wheels, ...	21 " ...	56½ "
engine full, ...		
Working pressure about 120 lbs. on the square inch.		

Plate 1, fig. 1, represents a small locomotive for the use of contractors, &c. Its leading dimensions are as follows:—Diameter of wheels, 2 feet 9 inches; cylinders, outside, 9 inches diameter, 14 inches stroke; tank holds 250 gallons; weight of

engine, full, $10\frac{1}{4}$ tons. It can be adapted to any gauge from 3 feet upwards. Working pressure, 120 lbs. on the square inch.

LOCUS was a name employed to designate the country of three distinct Grecian tribes, the Locri Epionemidii, the Locri Opuntii, and the Locri O'zolæ.

The Locri Epionemidii and Locri Opuntii inhabited the eastern coast of Phocis, and were separated from the latter country by a mountain range which stretches from Mount Œta to the borders of Bœotia. The northern part of this range was called Cnemis, whence the Epionemidii Locri derived their name. The Opuntii Locri derived their name from Opus, their chief town on the borders of Bœotia.

The Locri Ozolæ were bounded on the west by Ætolia, on the north by Doris, on the east by Phocis, and on the south by the Corinthian Gulf. The principal towns of western Locris were Amphissa, now Salona, at the head of the Crissæan Gulf, and Naupactus, now Lepanto.

The Locri Epizephyrii, or Western Locri, who inhabited the south-eastern extremity of Italy, were a colony, according to Ephorus, of the Locri Opuntii, but according to Strabo, of the Locri Ozolæ. The Locri Epizephyrii are said to have been the first Greek people who had a written code of laws, which was drawn up by Zaleucus about B.C. 664.

LOCUS. This word, or the Greek τόπος, signifying simply 'place,' was used by the first geometers to denote a line or surface over which a point may travel, so as always to be in a position which satisfies some given condition. Thus, suppose it required to find the position of a point at which a given line subtends a right angle: the answer is, that the number of such points is infinite; for that any point whatsoever upon the surface of a sphere which has the given line for its diameter is such a point as was required to be found. This would be expressed as follows:—The locus of the point at which a given line subtends a right angle is the sphere described on the given line as a diameter. If, however, the point were required to be in a given plane, its locus would no longer be the whole sphere, but only that circle which is the common section of the sphere and the given plane.

LOCUS PŒNITENTIÆ, in Scotch law, is the power of drawing back from a bargain, and is competent to either party so long as the transaction is incomplete in law.

LOCUST (the *Gryllus migratorius* of Linnæus, *Locusta migratoria* of modern entomologists), a well-known insect, belonging to the order *Orthoptera*, section *Saltatoria*, and family *Locustidæ*. Locusts are endowed with great strength for leaping and flying, and being gregarious, are thus able to commit great devastation, for, when a swarm has destroyed the vegetation of one district, they are enabled to take flight to and traverse another, even though at a considerable distance. The migratory locust has occasionally visited England. In Southern Europe, the East, and Northern Africa, this species and its allies are exceedingly destructive, the swarms being so vast as to destroy all vegetation, whilst the putrefying carcasses of their dead infect the air. The Arabs and people of Nigritia use these insects as food.

Besides the genus *Locusta*, the following are contained in the family *Locustidæ*, viz.: *Gomphocerus*, *Acrydium*, *Pneumora*, and *Proscopia*.

The other families of the *Saltatoria* are *Achetidae* (examples, the Mole-cricket and the House-cricket) and *Gryllidae* (example, the Great Green Grasshopper, *Acrida viridissima*).

LOCUST TREE is the *Robenia pseudacacia* of botanists, a North American forest tree. The same name has also been given to the *Ceratonia siliqua*, or Carob Tree.

LODDON. [BERKSHIRE.]

LODE, a term used by miners for the *veins* in which minerals occur. They are crevices produced by contraction, or the mechanical disturbance of the rock, and which have subsequently been filled with metallic ores.

LODÈVE. [HÉRAULT.]

LODGE, THOMAS, is supposed to have been born about 1556. He was entered at Trinity College, Oxford, in 1573, took a degree, and then, going to London, became an actor and dramatist. About 1580, in an answer to Gosson's 'School of Abuse,' he wrote a 'Defence of Stage-plays,' which being suppressed by authority only two copies of it exist. His 'Alarum against Usurers' was printed in 1584. In the same year he was a student of Lincoln's Inn. Afterwards, it has been conjectured, he became a soldier. He accompanied the expeditions of Clarke and Cavendish. He is usually identified with a Doctor Lodge who took his degree in medicine at Avignon, and printed in 1603 'A Treatise on the Plague,' and in 1614 a translation of the 'Works of Lucius Annæus Seneca.' He is believed to have died of the plague in 1625.

He was a voluminous and versatile writer of novels, volumes of verses, and miscellaneous pamphlets; and a distinguished contributor to the drama in the years immediately preceding the appearance of Shakspeare. One of his novels is entitled 'Rosalynde, Euphues' Golden Legacie; found after his death in his cell at Silixedra,' 1590, 4to; reprinted in Mr. Collier's 'Shakspeare's Library,' 1840. From this novel Shakspeare borrowed the grouping of the characters, and many of the strokes of portraiture, for his 'As You Like It.'

LODGING-MONEY, in the British army, is an allowance in lieu of quarters, granted to officers, non-commissioned officers, and privates, when suitable rooms cannot be spared in the barracks. Married sergeants and privates receive eight shillings a week for lodging-money when on duty and not provided for in barracks. The charge for lodging-money in the army estimates for 1865-66 is 87,000*l*.

LODGINGS, THE LAW OF, differs according to the custom which regulates each particular case from the general rules of law between landlord and tenant.

As the length of the term for which lodgings are let seldom exceeds or even extends to a year, it is rarely the case that a six months' notice to quit is necessary. This can only happen when the tenancy is from year to year. But if the taking be for less than a year, as for a quarter, a month, or a week, which may be presumed from the rent being paid at the lapse of those terms, or other circumstances, the length of notice will be regulated accordingly, as a month for a month, and a week for a week, the expiration of the notice being that of the term. Unless the lodger gives up possession and pays the rent for

a whole term in advance, notice must always be given, and he will not be released from such a necessity merely from an apprehension, however just, of his goods being distrained for his landlord's rent.

The 24 and 25 Vict. c. 96, provides that if any tenant or lodger steal any fixture or chattel let to him, he shall upon being convicted be liable to be imprisoned for two years, with or without hard labour; and if the value of the article stolen exceed 5*l*., to be kept in penal servitude for not less than three or more than seven years.

LODI-E-CREMA, a province of Italy, is bounded N. by the Milanese and Bergamo, W. by Pavia, S. by the Po, which divides it from Parma and Piacenza, and E. by Cremona and Brescia. The province is part of the great plain of the Po, and is watered by the Adda, Serio, Lambro, and other affluents of that river. Until the end of the last century this province was divided into two small ones, which were separated by the Adda, namely, Crema to the east of that river, which then belonged to the republic of Venice, and Lodi, west of the Adda, which was part of the ancient duchy of Milan.

The length of the province is 30 miles from E. to W., and above 27 miles from N. to S. The area is 247 geographical square miles, and the population 240,000. The soil is partly sown with corn, flax, and pulse, and partly planted with the vine and mulberry trees; but the best part consists of artificial meadows, rendered productive by irrigation. On these are fed a great number of cows, from whose milk the rich cheese is made known in Lombardy by the name of Lodigiano, but called, by an odd misnomer, in the rest of Europe Parmesan. Great attention is paid to the rearing of silkworms, and a good deal of coarse raw silk is brought to market. Linen and cordage are also manufactured. A considerable number of horses and pigs are bred.

Lodi, the capital of the province, is a well-built episcopal town, on the right bank of the Adda, with in 1861 19,562 inhabitants. Lodi has a royal lyceum and a gymnasium, a theological seminary, an orphan asylum, two hospitals, the Barni and Martini palaces, a savings' bank, a public library of 15,000 volumes, and a Monte-di-Pietà. The most interesting structures in Lodi are the church of L'Incoronata, and the stone bridge over the Adda, famous for the defeat of the Austrians by Bonaparte on the 10th of May, 1796.

Crema, an episcopal town on the right bank of the Serio, is a well built place, with a gymnasium and 8000 inhabitants, who manufacture linen and linen thread. Codogno, S.E. of Lodi, is a flourishing town with 10,000 inhabitants, a theatre, and a considerable trade in cheese, silk, &c. San-Colombano, at the foot of a hill near the right bank of the Lambro, has a population of 6844.

LOFODEN ISLANDS. [TRONDHIEM.]

LOG and LOG'LINE, the apparatus by which the velocity of a ship's motion through the water is measured. The log is a flat piece of wood, loaded with lead at one of its edges to make it float upright; and to this is attached a line about 150 fathoms long, divided into equal lengths by little pieces of knotted twine rove into it. These divisions begin about twenty or thirty yards from the log, where a piece of red rag is usually fastened, in order to show

the place readily. From the lee quarter of the vessel the log is thrown into the sea, where it is supposed to remain stationary during the operation, and the line is veered out at least as fast as the ship sails. As soon as the red rag leaves the reel a half-minute glass is turned, and when the sand is all run down the reel is stopped. Then by measuring the quantity of line run out, the distance sailed by the vessel in half a minute is known, and by calculation its rate of going per hour. The usual way of dividing the line is to place the knots at distances of fifty feet from each other. Now, as 120 times half a minute make an hour, and 120 times fifty feet make almost a geographical mile, so many knots will run from the reel in one experiment as the vessel sails miles in the hour; from this comes the expression of a vessel's sailing so many knots an hour, meaning miles.

Of late years Massey's patent log has been much used, with great benefit to navigation. It may be allowed to tow astern for hours, and the speed of the ship during the interval is accurately noted on a self-registering dial.

LOG-BOARD and LOG-BOOK. The former is either a large piece of plank, blackened, ruled, and prepared for writing on with chalk, or else a slate with divisions scratched upon its surface; and the latter is the blank book, in which are inserted daily the contents of the board: these are, the course of the vessel, the direction of the wind, and the distance run, as given by the log: in the book is also inserted a record of the different events which occur during the voyage.

The place of the ship, thus obtained by the log and compass, is technically termed *Dead Reckoning*; and this is used until an opportunity is afforded of taking observations for latitude and longitude, or until some place whose position is known comes in sight; the true place of the ship is then substituted in the log-book for that obtained by dead reckoning, and from that place subsequent reckonings are made until another observation is obtained.

By the 17 & 18 Vict. c. 104, the Board of Trade sanctions certain forms of log-books (called *official logs*), as adapted to particular voyages, and it is rendered imperative on every commander to see that all the entries be made as soon as possible after the occurrences happen which are obliged to be noted. It is also compulsory upon every master of a vessel to produce the log-book for the inspection of any ship of war of his own nation whose captain may require its production.

LOGAN, JOHN, born at Fala, in the county of Edinburgh, in 1748, was the son of a small farmer. Being destined to the clerical profession, he was educated in the University of Edinburgh, and became one of the ministers of Leith. In 1770 he had edited the posthumous poems of his friend Michael Bruce, incorporating with them some pieces which he claimed (and probably justly) as his own, and among which was the well-known 'Ode to the Cuckoo.' In 1779 he delivered in Edinburgh a course of lectures on the 'Philosophy of History.' In 1783 he printed, and caused to be acted in Edinburgh, a tragedy called 'Runnimede,' which had been rehearsed at Covent Garden, but was refused a license by the lord chamberlain. This publication brought on him the anger of the Presbyterians; and these

and other annoyances induced him in 1785 to quit his parochial charge and repair to London. There he eked out his livelihood by literary labour, and died December 28, 1788.

LOGANIA/CEE (from *Logania*, one of the genera, so called in honour of James Logan), in Botany, an order of Dichlamydeous exogens, consisting of herbs, shrubs, and trees, with opposite leaves entire, and generally stipulate. The order consists of 22 genera, and about 160 species.

LOGARITHMS. The etymology of this word is *λογῶν ἀριθμός*, 'the number of the ratios.'

The early history of logarithms will be found at length in the preface to Dr. Hutton's Tables; in the 'History of Logarithms' contained in the first volume of Dr. Hutton's 'Tracts'; in Delambre's 'Histoire de l'Astronomie Moderne,' vol. i. pp. 491-568.

The idea of logarithms originally arose (in the mind of John Napier, of Merchistoun, in Scotland) from the desire to make addition and subtraction supply the place of multiplication and division. A table, in which are registered 1, a , a^2 , a^3 , &c., supplies this desideratum to a certain extent; for, since a^x multiplied by a^y gives a^{x+y} , we find the product of the first two by adding their exponents, and looking in the table for the $(x+y)$ th power. Thus, for the set, 1, 2, 4, 8, 16, &c., a table of logarithms is easily constructed, a specimen of which is as follows:—

Num.	log.	Num.	log.	Num.	log.
1	0	32	5	1024	10
2	1	64	6	2048	11
4	2	128	7	4096	12
8	3	256	8	8192	13
16	4	512	9	16384	14

Thus, to multiply 64 and 128, that is, to find the product of the sixth and seventh powers of 2, we must take the $(6+7)$ th or 13th power, which, from the table, is 8192.

Such a table would be useless for general purposes, since it omits more numbers than it contains. But if we take a very little greater than unity, the powers will increase but slowly, and every whole number within given limits may be made either a power of a , or very near to a power of a . Suppose, for instance, that we wish for a table of logarithms which shall contain among its numbers either every whole number under a million, or a fraction within h of every number under a million. Extract the square root of one million, the square root of that square root, and so on, until the r th root of one million has been extracted, and let this r th root be $1+t$. It is obvious that this extraction may be carried on until t is as small as we please. Consequently $(1+t)^r$ is a million, and every lower power of $1+t$ is less than a million, so that (m standing for a million) no two consecutive powers differ by so much as the difference of m and $m(1+t)$, or by so much as mt . If, then, we proceed with the extraction until mt is less than h , we shall have t of the degree of smallness required: that is, since every whole number less than m lies between two powers of $1+t$, having exponents less than r , *à fortiori* every such whole number must be within h of some power of $1+t$.

This is, in fact, the first view which was taken of the method of constructing tables of logarithms; and

it must be remembered that Napier was not in possession of the modern way of expressing the powers of quantities. On the methods of facilitating such enormous computations, and on the details which still remained for the first calculators after they had applied all the analysis which they had, we have not here to speak; but we shall now show how the table may be formed by mere labour, and how the word logarithm arises.

Let us suppose that our system is to be such that, 0 being the logarithm of 1, a hundred thousand shall be the logarithm of 10. If the hundred thousandth root of 10 be extracted and called $1+t$, it would be found that 2 is very nearly the 30103rd power of $(1+t)$, that 3 is very nearly the 47712th power of $1+t$, and so on. If, then, beginning with 1, we increase it in the ratio of 1 to $1+t$, giving $1+t$; if we increase this in the ratio of 1 to $1+t$, giving $(1+t)^2$, and so on, it appears that we shall reach 2 (or very near to it, one way or other), when 30103 such ratios have been taken; or, if we pass from 1 to 10 by 100,000 steps, increasing each time in the same ratio, we shall come nearest to 2 in 30103 steps, which is therefore the number of times the increase is made in a certain ratio, or the number of the ratios, the *λογισμὸν ἀριθμὸς*, or the logarithm of 2.

In such a table it must of course follow that the logarithm of a product is exactly or very nearly the sum of the logarithms of the factors, since, for instance, 2 being $(1+t)^{30103}$ and 3 being $(1+t)^{47712}$ very nearly, 6 must be very nearly $(1+t)^{77815}$. Nor is this property altered if we divide or multiply all the logarithms by the same number. If, then, we divide every logarithm by 100000, the logarithm of 10 becomes 1, that of 2 becomes .30103, and that of 3 becomes .47712, as in the common tables.

It was evident from the first that the connection between a logarithm and its number must be of the following kind: when the logarithm increases in arithmetical progression, the number must increase in geometrical progression; so that, if a and $a+b$ be the logarithms of A and AB, then $a+2b$, $a+3b$, &c., must be the logarithms of AB^2 , AB^3 , &c. Several mathematicians had formed this conception; but the preliminary difficulty which stopped their progress was their being unable to present the series of natural numbers (or fractions of a high degree of nearness to them), in the shape of a geometrical progression. The great merit of Napier is threefold: first, he distinctly saw that all numbers, within any given limit, may be either terms, or as near as we please to terms, of a geometrical progression; secondly, he had the courage to undertake the enormous labour which was requisite for the purpose; thirdly, he made an anticipation of the differential calculus in developing the primary consequences of the definition.

It must be admitted that Briggs, by his construction of the decimal system, divides with Napier the merit of inventing logarithms, considered as an instrument of calculation. In the Napierian system the table must either be carried to an enormous length, or whole numbers only must have logarithms, and every logarithm of a fraction will require two entries of the table and a subtraction. But in Briggs' system, the logarithm of every decimal fraction can be found by one entry of the table, and one inspection of the fraction.

The peculiarity of this system (the base of which is 10) is as follows:—Every number or fraction is either a power of ten, positive or negative, or lies between two powers of ten. The powers of ten are ranged in the following table:—

10^{-4}	$10^0 = 1$	$10^1 = 10$
10^{-3}		$10^2 = 100$
10^{-2}		$10^3 = 1000$
10^{-1}		$10^4 = 10000$
		

From which the following rules may easily be obtained:—A number which has m figures before the decimal point lies between 10^{m-1} and 10^m , and its logarithm therefore lies between $m-1$ and m , or it is $m-1$ + a fraction less than unity. Also, if a fraction be less than unity, and if its first significant figure lie in the n th decimal place, this fraction lies between 10^{-n} and $10^{-(n-1)}$; so that its logarithm is $-n$ + a fraction less than unity. Now the convenience of Briggs' system lies in this, that the fraction less than unity, which is a part of every logarithm, does not depend on the position of the decimal point, but entirely upon the significant figures: the reason being, that an alteration of the position of the decimal point being a multiplication or division by some whole power of 10, alters the logarithm by the addition or subtraction of a whole number. This question is discussed in every treatise on the mode of using logarithms.

LOGIC. Logic, in the extensive signification of the term, offers Universal Criteria of Truth, the study of which affords a systematic discipline to the higher intellectual faculties. Logic and Mathematics are the two most ancient sciences and instruments of liberal culture. Under the various names, or in the various departments of Dialectic, Analytic, Organical or Instrumental Philosophy, the Method of Science, &c., the intellectual aspiration which produces logic, has, from Plato to Hegel, tended towards a practical SCIENCE OF SCIENCE, i.e., a science which should legislate for all the other sciences, providing reasoned methods of pure thought, and methods of applying thought to real existence. In the Dialectic of Plato we are raised above the details of the subordinate sciences, to the conception of science as an organic whole, and intellectual culture for its own sake. The mutual relations and the methods of the different parts of knowledge, with their respective offices in education, are contemplated; and the comprehensive doctrine thus suggested has, in its fragments, if not in its organic unity, maintained a central place in the liberal education of the world. Logicians, in the more strict conception of logic, are those who analyze science *as reasoned*, for the sake of speculative insight and pleasure, and for the practical direction of human understanding; as distinguished from metaphysicians, who, for similar ends, contemplate science *in its first principles*.

The materials for a Logical System were first reduced to comparative order by Aristotle, in the six treatises since collected under the name of the Organon. But the name logic is of later date than

Aristotle, and there is no definition of the contents of his *Organon* in his extant works. If we draw from the *Organon*, as we now have it, our conception of the nature of logic, we shall include in it a great deal that, according to one school of logicians, is foreign to

LOGIC is conversant about Syllogism, or reasoning expressed unelliptically. Accordingly, the *Organon* explains

1. The parts of a Syllogism.

2. The Syllogism itself.

One part of what is now included in logic, *i.e.*, the doctrine of proposition and syllogism, given in the book of *Enunciations* and in the *Prior Analytics*, has maintained to the present day the form it received from Aristotle. 'That logic' (*i.e.*, formal or syllogistic logic), says Kant, 'has proceeded in a sure course from the earliest times, is manifest from this, that since Aristotle it has not needed to retrace a step, unless in the way of clearing off useless subtleties, or developing with more precision what had been previously suggested—changes which belong rather to the scientific beauty than to the certainty of its doctrine. This much, however, is specially interesting in regard to logic, that since the time of Aristotle it has not been able to take a step in advance, and thus, to appearance, it has attained its perfect development.' Notwithstanding what Kant here says, it cannot be denied that the controversies which have been so frequent in regard to what the province of logic is, are due in a great measure to the example of Aristotle in his organical books. 'The book of *Categories*,' says Sir W. Hamilton, 'as containing an objective classification of real things, is metaphysical, not logical. The two books of *Posterior Analytics*, as solely conversant about demonstrative or necessary matter, transcend the limits of the formal science; and the same is true of the eight books of the *Topics*, as wholly occupied with probable matter, its accidents and applications. Even the two books of the *Prior Analytics*, in which the pure syllogism is considered, are swelled with extra logical discussions. . . . The same is true of the book on *Interpretation*; and matters are even worse with that on *Fallacies* (*Sophistic Elenchi*). If Aristotle, therefore, did more than any other philosopher for the progress of the science, he also did more than any other to overlay it with extraneous lumber, and to impede its development under a precise and elegant form.'

It is to be remembered that both Kant and Hamilton in these passages, mean by 'logic' exclusively what is now called Pure or Formal Logic. But the successive attempts to restrict the science to this narrow province have invariably produced dissatisfaction, and occasioned a reaction. A modified material or physical, as well as a pure or formal logic, is implied in the very conception of a science which has for its aim to provide universal and yet practical criteria of truth. Human science is

the science, while we shall exclude not a little that is essential to it, according to another. The following synopsis of the contents of the *Organon* exhibits its relation to Reasoning or Syllogism, that is, to truth or science regarded as reasoned:—

(a) With reference to Primary Notions, in the book of the *Categories*.

(b) With reference to Secondary Notions, in the book of *Enunciation* or Proposition.

(a) Generally, in the *Prior Analytics*.

(b) Specially, { Demonstrative Syllogism, in the *Posterior Analytics*.

{ Dialectical Syllogism, in the *Topics*.

{ Sophistical Syllogism, in the *Sophistic Elenchi*.

reasoned or generalized truth. It is knowledge of the many as one. It is knowledge by means of notions, concepts, or common terms. A science is a system of notions or concepts, in harmony with reality, relating to a special province of truth, and organized by means of reasonings. Now all science may be viewed in two aspects—a formal and a material—as formally true or as really true. The produce of our thoughts may be *formally perfect* without being *actually true*. Clearness, distinctness, precision, conclusiveness, consistency in the use of terms, and method, are some of the characteristics of *formal* truth; harmony between our clear, distinct, precise, conclusive, consistent, and methodical thoughts, and the actual order of external nature—between our concepts and the divine ideas expressed in the phenomena of the universe—constitute *material* truth.

Logicians, in their different schools, have attempted to analyze science, and to test truth in each of these aspects. Some have sought to determine both in one absolute science; others, by abstraction, to deal with the former with or without the latter, or with the latter with or without the former.

Logic, in different hands, has accordingly assumed different types. Two, broadly distinct, are apparent in its history. Of these the one is properly metaphysical or ontological; the other alone is properly logical.

When the two aspects of science—the abstract or formal, and the concrete or material—are merged in one, in obedience to the ontological aspiration after Absolute Science, indifferently called Logic or Metaphysics, we have systems of the first type, in which logic proper is merged in metaphysics or ontology. Of these the dialectic of Plato is one specimen, and the so-called logic of Hegel is another. These we relegate to metaphysics, to be criticized when it endeavours to determine the limits and essential nature of human science.

The 'logic' of Hegel is, in its conception, philosophy proper in its widest range. It is the professed science of that which in one aspect is Thought and in another Existence. Existence as objective, and existence as subjective, are its two momenta; and they are regarded as contained in consciousness in a unity, not abstract but concrete. The Hegelian logic is accordingly divided into the logic of Thought as *existence*, and of Thought as *such*—into objective and subjective logic. In this system the subjective logic,

which treats of Thought in notion, judgment, and reasoning or syllogism, is unfolded in intimate connection with the ontology, metaphysics, and cosmology—in a word, the absolute science—which are comprehended in Hegel's objective logic.

The logic of Hegel, like the dialectic of Plato, being relegated to Metaphysics or Ontology, we turn to those logical systems, less comprehensive in their aims, which seek to unfold and usefully apply the laws of reasoned thought as such; or to describe the conditions and rules to which reasoned thought should conform when it is engaged in the interpretation of nature—in short, the logic which provides for consistency in the use of words, and the logic which exhibits the nature and methods of inductive or experimental proof.

This formal and material logical system commences with Aristotle. It has assumed one or other of two phases, as the *formal* or the *material* truth and perfection of finite science has received the front place in its development. (In the *Organon* of Aristotle science is analyzed both formally and materially—as to its form, chiefly in the treatise on Enunciation and in the *Prior Analytics*; as to its matter, chiefly in the remaining treatises of the *Organon*.)

(I.) Does the logician attempt an analysis of the elements which constitute *formal* truth? In that case a system of Formal Logic is the result; and that system, developed in the Greek Analytic, has descended through the schools of the middle ages into modern philosophy, to be further purified and elaborated by Kant and Hamilton.

(II.) Is the material and especially the *physical* truth of science the ideal of the logician; and its rationale, with the methods of truly interpreting nature, the exclusive or principal object of his investigations? In that case logic becomes the theory and art of scientific induction, and Bacon, Locke, Bentham, Comte, and Mr. Mill appear among its chief names.

A complete system of logic, accordingly, comprehends both these, apparently conflicting, yet really harmonious parts—the formal, and the material or physical. It is the science of the laws of thought as such, and of the application of thought to nature in accordance with the principles of evidence.

Formal logic is a study of Notions, explicated and elaborated in judgments and reasonings; and, whether in the notional form, or as judgments and in reasonings, purified from their connection with things, and regarded exclusively as subject to necessary laws of thought. It is, in short, the science of thought or reasoning *as such*. Material or physical logic is a study of connected phenomena or Things, in the theory of their natural order, as invariably co-existing and successive, with the view to discover methods and rules for bringing our thoughts into harmony with that order. The former is the rationale of the conditions under which we *must* think when we think about anything; the latter consists of the methods, with their rationale, for extracting real or matter-of-fact science from the things about which we think. The logic of the one begins and ends with Necessary Truths; the interval between its primary axioms and its remote doctrinal conclusions being filled by a series of demonstrations conducted by aid of scientific symbols. The logic of the other is a

Code of Physical Discovery, which seeks for rules of observation and experiment that cannot be violated without an implied violation of our faith in the uniformity of nature; it begins and ends with what is contingent, as distinguished from what is formally necessary. The laws of non-contradiction, identity, and excluded middle are the regulating principles of the one; the mental tendency to trust in the constancy of natural order is the regulating principle of the other.

Pure or Formal Logic.—Coleridge speaks of his inability to conceive how any one can, by any spinning, make out more than ten or a dozen pages about syllogistic logic. Nevertheless, an elaborate science, with its axioms and postulates, was constructed by Aristotle, which, since the conception of the science was purified by Kant, has been renovated and extended by Hamilton. It now constitutes a beautifully developed framework, on which judgments and reasonings may be unfolded, and by which the consistency of our thoughts with one another may be tested.

Pure logic and pure geometry are both sciences of Quantity. They are both systems of demonstrations concerning the relation of whole and parts. But the 'wholes' or quantities of pure logic are different from those of pure geometry. Genera and species—in a word, notions or concepts—are the 'whole and parts' of logic; trinal extension constitutes mathematical quantity. All concepts or notions, whatever their special matter may be, are treated by the formal logician as *quantities*, which stand, in any and every science, in fixed quantitative relations to other concepts or notions.

The elementary doctrines of formal logic consist, accordingly, of an exposition of certain quantitative relations of Terms to one another, in Proposition and Syllogism, evolved by means of the axioms of Non-contradiction, Identity, and Excluded Middle, from the very nature of Concepts as such. The framework of this part of logic consists of *forms* for the reception and logical expression of concrete propositions, and *forms* for the reception and logical expression of concrete reasonings. Its problem is to find the various forms, into one or other of which all possible propositions and inferences may be analyzed. The purely scientific pages of a book of pure logic, even on a cursory glance, accordingly resemble the pages of a book in algebra. Symbols and symbolic notation take the place of common words and concrete examples. These symbols and formulas constitute the logical framework for the exposition and exposure of fallacies, and for testing the formal truth of valid reasonings. This, at least, is their practical function, and they imply a system of practical rules. Propositional and syllogistic forms compel us to complete, in the expression of our judgments and reasonings, what ordinary language elides; and in this view syllogism is valuable as an instrument which forces us to recognise fully the logical extent and relations of its dogmatically assumed, but often unproved and even indistinctly conceived premises. Syllogistic forms are practically interesting and available as the scientific apparatus for dragging into light specimens of verbal ambiguity, argumentative irrelevancy, and false assumption. Accordingly, formal logic may be described as a system of rules which afford a universal *formal* criterion of truth.

Recent scientific discussion and progress in this part of logic relates to the possible number and variety of the logical forms of assertion and ratiocination, and to the theory of their construction. Logic long satisfied itself with the four propositional forms signified by the letters A E I O. The various illative relations of these four forms produce the syllogistic forms prepared by the logician for the reception and expression of concrete reasonings, as our criteria for distinguishing valid inferences from invalid ones. Modern logicians have suggested more than one principle, by the application of which these old logical forms are modified and increased in number, thus professedly constituting a more philosophical or a more effective practical mechanism for the full logical exposure of our thoughts.

We may suppose an addition to the number of propositional and syllogistic forms to be made in two ways—by an express logical measurement or quantification of *both* the propositional terms—the 'predicate' as well as the 'subject,' instead of the subject only as in the Aristotelian Analytic; or by a more detailed (*e.g.*, an arithmetical or algebraical) measurement of the quantity of each term than the old logical signs of quantity ('all' and 'some') permit. The former of these two ways—the express and thoroughgoing quantification of the predicate—is the principle applied by Sir W. Hamilton for the expansion and simplification of the forms of logic; the latter is the logical novelty of Mr. De Morgan and other mathematical logicians. To discuss either principle in its theory, to exhibit its consequences in detail, and to announce and classify the formulas of which it is the parent, would be to write a treatise on Formal Logic. It is enough to say, that a re-organization of the whole scheme of logical forms is the necessary consequence of the application of either principle.

Take the former of these two principles—the express and thoroughgoing quantification of the predicate proposed by Sir W. Hamilton. Under this Hamiltonian analytic, as regards Propositions, subject and predicate become convertible; every proposition becomes an equation, and all conversion becomes simple: as regards Syllogisms, so called major and minor terms, major and minor premises, and the three figures are all made convertible into each other; Hypotheticals, alike in conjunctive and disjunctive reasonings, are shown to be merely complex varieties of the immediate inference of restriction or subalternation, and the syllogistic forms are professedly relieved of a load of exceptions, perversions, and rules. The differences of *quantity* and *quality* alone remain, and by these exclusively are terms, propositions, and syllogisms formally distinguished. Quantity and quality combined constitute the only real distinction of syllogistic Mood. Syllogistic figure vanishes, with its perplexing apparatus of special rules, and even the general rules of syllogism are reduced to a single compendious canon.

A classification of the principal varieties of Fallacy, or inconclusive reasoning, which syllogism, under either the old or the Hamiltonian analytic, is the test for detecting, along with an exposition of the nature and causes of Error, is an important part of logic, connecting the formal with the material or physical part of the system. The *scholastic* classification of

fallacies is grounded on Aristotle's *sophistical elenchi*; but the discussion of error and its causes by Bacon, Descartes, Malebranche, and Locke, has resolved this part of logic into an applied psychology of reasoning. The first book of the '*Novum Organum*' is a suggestive text in this transition part of the logical system.

That we think by means of *signs*—arbitrary and natural—is the one great occasion of fallacy and error. A classification of fallacies is a list of the principal species of invalid reasoning thus occasioned. And material logic, as a universal corrective of fallacies, seeks to provide against (1) the ambiguity of words, or artificial signs; and (2) the ambiguity of the phenomena of nature, or natural signs.

Material or Physical Logic.—We find ourselves in a department which touches upon what is more profound, although it is not so susceptible of exact demonstration, when we enter Material Logic—when we analyze Nature in its relations to thought, and with a view to determine the conditions of legitimate inductive generalization. We are contemplating the objective coherence of *natural* order, and the methods for unravelling its intricacies, instead of the subjective coherence of merely *notional* order, and the necessary forms for its consistent unelliptical expression. The *matter* of our reasonings, derived from experience, and not the *forms for their expression*, have here to be investigated. Nature, and our faith in its uniformity—the methods of research in what has been called inductive or imperfect reasoning, analogy, circumstantial evidence—in short, the methods of interpreting Testimony—whether the testimony of nature, or human and historical testimony—are among the problems proposed by modern science to physical logic, when it endeavours to find criteria of the actual truth of our premises concerning Nature or what is presentable in the senses, and not merely to test the conclusiveness or formal truth of the connection between assumed premises and alleged inferences from them.

This second part of logic is ostensibly a criterion of material or physical truth.

It professes to offer tests for distinguishing sufficiently proved inductive generalizations from mere analogies and hypotheses. It suggests criteria for determining the real truth of premises which depend upon observation and experiment. These are not fully *proved* unless ascertained by tests whose fallacy would imply a want of uniformity in the laws of nature. To reject a generalization attested by the criteria of material logic, is virtually to deny the constancy of natural order. The methods of inductive research, with their theory or rationale, constitute the essence of this part of the logical system, of which modern experimental science is the manifold illustration.

It may be added, that while inductive research, so far as it is merely observational and experimental, is not properly ratiocinative, the inferences we draw from our observations and experiments, including the rules or maxims according to which we draw them, may, as *reasonings*, be exhibited in syllogistic forms, and formally tested by syllogistic rules. Some logicians (as Hamilton) distinguish from one another the syllogistic forms of Induction and Deduction—the former being with them expressive of an ascent from particulars to the general, or from the less general to

the more general, of which the inductive conclusion is the *synthesis*; the latter, of a descent from the more general to the less general, or the particular, the deductive reasoning being virtually an *analysis*. But all reasoning implies reference to a reason, which in the case of 'inductive' reasonings—i.e., reasonings from an *imperfect* induction of instances, is the general rule believed to guarantee that the induction of instances, although 'imperfect,' is nevertheless sufficient. How man *becomes* capable of ratiocination, or endowed with the general truths required for eliciting scientific conclusions from the observations in which his experience commences, is the profound problem of the *origin* of knowledge or science, which logic refers to metaphysics. Do phenomena *blindly* generate his primary generalizations, or are these merely *elicited* on occasion of phenomenal signs being presented in sense?

On the whole, logic may be described as a system of *rules* which are a universal *formal* and *material* criterion of truth, and which are contemplated by the logician in their practical relation to the employment of thought, and also in their theoretical principles.

In its material or physical part logic merges in metaphysics; i.e., in the science of Being, or of Consciousness, or Science in its first principles. To metaphysics must be referred all the ultimate questions about the natural or sensible world in which we find ourselves, and to which our physical reasonings relate. This highest science, recognizing the apparent duality of our conscious existence, either tries with the Transcendentalist to resolve it into a unity that is above consciousness; or is content, with the Descendentalist, with a merely phenomenal universe of things, from which independent personality is excluded as an illusion; or occupies an intermediate position with the modest philosopher, who recognizes the finitude of our understanding, and, unable to solve the mystery of the existence revealed in the duality of consciousness, is ready to acknowledge its relativity, and to cultivate the faith in which it receives at least a practical solution.

Logic, formal and inductive, thus terminates face to face with a problem resembling that which engages the Hegelian logician throughout, and which the Hegelian professes to solve, while the metaphysic of faith confesses its ultimate insolubility by understanding. The phenomena and also the practical beliefs of which we are conscious—transient phenomena, and the 'testimonies' of our consciousness—are the watchword of this tentative metaphysics, in which we have the final outgoing of syllogistic and inductive logic. To ascertain by reflection the appearances really given in consciousness, and our genuine or defensible regulative beliefs concerning them, and to distinguish these last from the idols generated in individuals by accidental or unreasoned associations of their ideas, is the task to which it addresses itself, as it tries to recover the actual facts of our conscious life from the grasp of abstractions, to reconcile our conceptions of 'matter' and 'mind' with experience purified by analysis, and in so doing nourishes reverential feeling and religious faith in the contemplation of the ultimately unknowable by which we are encompassed on every side. This sort of study is the only possible 'science of Being,' as metaphysics was anciently defined; and

this metaphysical interpretation of Nature, as distinguished from practical methods of inductive-interpretation, is the exercise in which a logic of the formal and inductive criteria of truth properly culminates.

In the narrow compass of this article only a faint outline of the logical province, with its principal divisions and relations, has been attempted. The large recent development of logic, and the intellectual activity of which this is at once a cause and an effect, make it impossible, in a few sentences, to unfold scientific details, which are the reward only of the long-continued, patient, and systematic study through which this science awakens thought, and thus constitutes an invaluable and indeed indispensable organ in academical education.

LOGIER, JOHN BERNARD, author of the well-known Logierian system of musical instruments, and inventor of the key-bugle, was descended from a musical family, and born at Hesse-Cassel, in 1780. He received, at a very juvenile age, the first lessons on the piano-forte from his father, as well as a few rules on musical composition. His favourite instrument, however, was the flute; and in his tenth year he was able to play a double concerto in public. At the age of sixteen he was engaged as one of the band of the marquis of Abercorn's newly-raised regiment, in the north of Ireland. He now devoted himself to giving lessons in music; and it was about this period that the new system of facilitating the acquirement of musical knowledge presented itself to his mind. He first tried the experiment on his daughter, who laboured under an intractability of hand which appeared to defy all his efforts; and this led him to the invention of the chiroplast. In a few months his daughter was able to perform the duty of organist at Westport Church, in the county of Mayo, and afterwards to play a sonata in public. A patent for the chiroplast was obtained in 1814; and while in Dublin he delivered two courses of lectures on harmony, which excited the attention of the musical world. He then undertook to instruct a few young children, who had never learnt before, and three months afterwards he submitted them to a public examination. The result was, that several of the professors in Dublin immediately adopted Logier's system; and in the following year it found its way into England and Scotland. Professors from various parts came to Dublin to be initiated; and academies were soon established in Glasgow, Manchester, Chester, Preston, and other places. In 1816 Mr. Webbe, of London, paid Logier a visit; and was so satisfied with his system, that he soon introduced it into the metropolis, and his academy was resorted to by the first nobility. In 1821 M. Logier received a proposal from the king of Prussia to instruct twenty professors, through whom the system was to be taught and diffused through the Prussian dominions. He gladly accepted the invitation, and engaged to remain for three years, with a handsome house and academy, and a liberal remuneration.

From the year 1817 to 1827 the Logierian system flourished; and among other adherents was one no less distinguished than Kalkbrenner, who, with Mrs. Webbe, joined the inventor in establishing his London academy. He now enjoyed a long and prosperous career, dying in 1846, in his sixty-seventh year.

LOGOGRAM (Gr. *logos*, 'a word,' *gramma*, 'a letter'), a complicated form of the *anagram*, in which all the words that can possibly be formed out of a long word or sentence are extracted, and then singly changed into their synonyms, finally working the whole up into rhyme. The puzzle is to find out what the words are for which synonyms are used, and from them to ascertain the original word or sentence out of which they have all been extracted.

LOGOS, a Greek term meaning 'a word,' is used solely as a theological expression. It occurs repeatedly in the Chaldee Targums, where it commonly stands in the place of *Jehovah* in the Hebrew original. In the Apocrypha it is used to express the notion of an embodiment of divine wisdom. In the Platonic philosophy *logos* was the common term for 'plan of the cosmos,' or 'divine reason.' Later schools called *logos* a 'Hypostasis of Divinity,' a separate being, which, created out of the Creator, became the 'Son of the Creator.' In the New Testament this word is found only in the writings of John (Gospel, i.; 1st Epistle i. 1; Rev. xix. 13). These passages are generally ascribed to Christ; but the sense in which *logos* is to be taken, and the nature of the connection between this *logos* and the person of Christ are subjects of much dispute. The Trinitarian expositors assert that these passages can mean nothing else than that the *logos* is a distinct personal subsistence, which has existed from all eternity in a union of nature and of essence with God, which created the universe, and which was joined with a human nature to form the person of Christ. The Arian doctrine represents the *logos* as an emanation from the Deity, superior to all other created beings, and which supplied the place of a human soul in the person of Christ. Most Unitarian divines consider it to be used either for God himself, or as an abstract term for the wisdom and intelligence of God, which was fully imparted to Christ to fit him for his mission.

Those who attribute to the *logos* a personal existence give different reasons for the origin of the name. Some explain it to mean the *speaker* or *teacher*, by metonymy, as Christ is called by John the light, the way, the truth, and the life; others interpret it the *promised one*, and others consider that as speech is a *medium* of rational communication, so the name *logos* is given to the *mediator* between God and man, one who speaks to man in the name of God.

LOGRONO. [CASTILLA-LA-VIEJA.]

LOGWOOD, or **CAMPEACHY WOOD**, imported from the West Indies for the purposes of the dyer, is the wood of a low tree called *Hematoxylon Campechianum*. It belongs to the natural order *Leguminosæ*, and to the section *Cassieæ*. The wood is hard enough to take a fine polish, and is very durable. Its colouring matter, which is a blood-red, and becomes almost black after exposure, is dissolved both by water and alcohol, and it is principally derived from the presence of a peculiar body, to which Chevreul, who discovered it, gave the name of *hematin* or *hematoxylane*. Logwood is employed by the calico-printer to give a black or brown colour, the cloth being always first impregnated with alum mordant, and thus black is obtained. Iron mordant and logwood also yield a black, but it is not so good as with the alum mordant. Cloth with the alum mordant, dyed in a mixture of logwood and madder, has a fine

brown colour fixed upon it. Logwood is also used with other substances to produce various tints of violet, red, purple, and lilac. It is one of the ingredients in black ink, and also forms the basis of red ink when Brazil wood is not used. Of logwood the importation is larger than that of any other dye-wood used in Great Britain. The exact quantity received in 1864 was 41,625 tons, valued at 207,243*l*.

LOIR, River. [LOIR-ET-CHER.]

LOIR, NICHOLAS, was born at Paris in 1624. His father was an eminent jeweller, and he placed Nicholas with Sebastien Bourdon, and sent him afterwards, in 1647, to complete his studies in Rome. Here Loir studied chiefly the works of N. Poussin, and so carefully that in some instances it is said to be scarcely possible to distinguish his copies from the originals. He had great facility of execution, and excelled in various styles, as history, landscape, and architecture. In 1663 he was elected a member of the French Academy of Painting. He died at Paris, rector of the Academy, in 1679.

LOIR-ET-CHER, a department in France, formed chiefly out of the old province of Orléanais, is bounded N. by the department of Eure-et-Loir, E. by those of Loiret and Cher, S. by that of Indre, and W. by Indre-et-Loire and Sarthe. It extends from 47° 14' to 48° 7' N. lat., and from 0° 38' to 2° 14' E. long.: its length from N.W. to S.E. is 80 miles, the average width is about 38 miles. The area is 2452 square miles, and the population in 1861 was 269,029.

Surface and Rivers.—The surface presents numerous elevated and extensive plains, unbroken by any considerable hills and sloping gently to the south-west. The department is divided into two pretty equal parts by the Loire, along the banks of which run two chains of low hills, that have their slopes covered with vineyards and orchards. The district north of the Loire is drained by the *Loir*, which, rising in the south-west of Eure-et-Loir, flows south-east as far as Bonneval, and thence nearly south past Châteaudun to Vendôme, in this department. From Vendôme it runs nearly west, crossing the south of the department of Sarthe, and, reaching the boundary below La-Flèche, it enters the department of Maine-et-Loire, taking a south-western direction to its junction with the Sarthe on the left bank, nearly opposite the point where that river is joined by the Mayenne, about 5 miles north of Angers. The principal feeders of the Loir are the Ozane, the Yère, and the Braye on the right bank, and the Conie on the left. The whole length of the river is about 160 miles, 65 of which are navigable. The district south of the Loire is drained by the *CHER*, its feeder the Sauldre, and by the Beuvron and Cosson, which throw their waters into the Loire, near the village of Candé, below Blois. There are numerous ponds along the left bank of the Loire; and the south-east of the department, which is formed out of part of the old district of Sologne, now included in the arrondissement of Romorantin, presents a vast marshy plain. The department is crossed by the Orléans-Tours Railroad, which runs through Blois and along the right bank of the Loire; and by the Orléans-Vierzon line, which has 32 miles of its length in the south-east of this department.

Soil and Products.—The soil in the north-east, which includes a portion of the Beauce district, con-

sists of a dark rich loam ; in the south-east the arable lands are composed of strong clay and sand ; along the Cher the soil is calcareous. Agriculture is in rather a forward state ; large quantities of bread-stuffs are raised, much more than supplies the home consumption. Of wine, the annual produce is about 13,000,000 gallons, a large portion of which is distilled into brandy. The department yields, besides excellent fruits and vegetables, beet-root, hemp, &c. The Sologne sheep are extolled for the fineness of their wool ; but the horses of that district, though hardy, are small and ill-formed. Black cattle are of inferior breed. The arrondissement of Vendôme is famous for its breed of draught horses. The rivers and ponds abound in fish ; the Sologne marshes and ponds supply also a considerable quantity of good leeches. The department contains a good deal of natural and artificial grass-land ; and in the arrondissement of Romorantin there are large pine woods. The climate is in general mild and healthy, except in the marshy district of Sologne.

Iron mines are worked ; alabaster, building stone, and gun-flints are quarried ; marl and potter's clay are found.

The manufactures consist of coarse woollens, blankets, swanskin, cotton cloth, hosiery, leather gloves, beet-root sugar, woollen yarn, leather, glass, and earthenware.

Divisions and Chief Towns.—The area of the department is 1,569,000 acres, and is divided into three arrondissements, which, with their subdivisions and populations, are as follows :—

Arronds.	Cantons.	Communes.	Pop.in1861.
Blois, . . .	10	139	137,699
Romorantin, . .	6	49	51,957
Vendôme, . .	8	110	79,373
Total, . . .	24	298	269,029

Of the arrondissement of Blois, and of the whole department, the capital is BLOIS. *Mer*, N.E. of Blois, on the right bank of the Loire, has 4776 inhabitants, who manufacture leather, and trade in wine, brandy, and vinegar. Close to *Mer* is *Menars*, where there is a very fine château, now belonging to Prince de Chimay, who has established a college in it. *Montrichard*, formerly an important fortress, defended by a strong castle, now in ruins, is situated on a hill on the right bank of the Cher, 18 miles S. from Blois, and has 2807 inhabitants. The ancient walls of the town, which are pierced by four gates and flanked with towers, are still in a good state of preservation. Near *St.-Aignan*, a small town on the left bank of the Cher, with 3600 inhabitants, are the great gun-flint quarries from which the French armies were supplied.

In the arrondissement of Romorantin, the chief town, *Romorantin*, stands at the junction of the Morantin with the Saultre, 24 miles S.E. from Blois, and has tribunals of first instance and of commerce, a college, and 7642 inhabitants. The town, formerly ill built, has been considerably improved of late years, the streets having been widened and laid out more regularly, houses erected in a modern style, and the roadways well paved. It has important manufac-

tures of cloth and woollen stuffs, several spinning factories, tanyards, and parchment mills. *Selles-sur-Cher*, situated in a fertile country, 10 miles S.W. from Romorantin, on the Cher, which is here spanned by a fine bridge, has 4672 inhabitants, who manufacture cloth, and trade in corn, wine, &c. At one end of the town stands a fine château, erected by Philippe de Bethune, the brother of Sully.

In the arrondissement of Vendôme, the chief town, *Vendôme*, prettily situated on the slope of a vine-clad hill, above the Loir, which here divides into two branches, stands 19 miles N.W. from Blois, and has a tribunal of first instance, a college, and 9356 inhabitants, who manufacture woollen stuffs, gloves, cotton yarn, calico, leather, and paper. The town is well built. On the height above it are the ruins of the old castle of the dukes of Vendôme, from which there is a fine view of the scenery of the Loir. Among the more remarkable structures are the church of La-Sainte-Trinité, the Benedictine monastery, now used as a barrack; the desecrated church of St.-Martin, now converted into a corn market; the college buildings, and the theatre. *Mondoubleau*, a small place of 1621 inhabitants, is prettily situated on a hill above the Graisse, a small feeder of the Braye, 15 miles N.W. from Vendôme. A fine old castle, with walls, towers, and ditches still nearly entire, stands above the town, and formed one of the chain of fortresses that defended the frontier of the old province of Maine. *Montoir*, a pretty town on the right bank of the Loir, and at the foot of a hill crowned by the château of St. Outille, has 3099 inhabitants, who manufacture linen, woollen hosiery, and leather. The church of St.-Gilles, the interior of which is richly ornamented with frescoes, and the handsome square in the centre of the town, are the most remarkable objects. *Savigny*, near the left bank of the Braye, in the north-west of the department, has a population of 2966.

The department forms the see of the bishop of Blois, is included in the jurisdiction of the Cour Impériale of Orleans, and University Academy of Paris, and belongs to the eighteenth Military Division, of which Tours is head-quarters. It has two representatives in the Chamber of Deputies. (*Dictionnaire de la France; Annuaire pour l'An 1866.*)

LOIRE (the *Liger* or *Ligeris* of the Romans), a river in France, the basin of which is bounded E. by the Cévennes ; N. by the mountains of Morvan, the heights of Beauce, and the Menez mountains ; and S. and S.W. by the Margeride mountains, and the volcanic group of Auvergne, with its ramifications westwards to the Atlantic. The limits thus described include a fourth part of France. The greatest length of the basin from N.W. to S.E. is 370 miles ; its greatest breadth, 224 miles. Its area is estimated at 50,783 square miles.

The Loire rises in Mont Gerbier-des-Jones, one of the Cévennes, in the neighbourhood of Mont Mézin, in the department of Ardèche. The general direction of its course is at first north, then north-west to Orléans, where it turns westward, and continues in this direction to its entrance into the Atlantic, 36 miles below Nantes. The number of streams received by the Loire is very great ; its navigable feeders from the right bank are the Arroux, the Maine (formed by the junction of the Mayenne and the Sarthe ; from

the left—the Allier, the Loiret, the Cher, the Indre, the Vienne, the Thouët, the Sèvre Nantaise, and the Achenau, all of which, with their feeders, give a total amount of internal navigation of about 1300 miles. In the upper part of its course, above the junction of the Allier, the valley of the Loire is narrow. At its source the Loire is about 4600 feet above the sea-level; below Nevers, at its junction with the Allier, 550 feet; at Orléans, 294 feet; a little below Tours, 160 feet; at the junction of the Mayenne, 115 feet; and at Nantes, 83 feet above the sea-level.

The whole course of the Loire is about 600 miles, of which 505 are navigable; but of these, 44 miles, from La-Noirie to Roanne, are navigable down the stream only. For two-thirds of the distance above Roanne, the Loire is available for floating timber.

This river, with its larger affluents, constitutes the great outlet for the produce of central and western France. The banks are celebrated for their beauty, particularly in the neighbourhood of Tours. From the melting of the snows in the Cévennes, in which it has its source, the Loire is subject to great inundations, to prevent which it has been embanked in the level tracts below Orléans. [INDRE-ET-LOIRE.] The sand and soil which its waters bring down form islands or shifting banks in its course, which materially impede the navigation, especially above Orléans: to avoid this inconvenience, a canal has been formed along the left bank of the river, from the Canal du Centre, at the junction of the Arroux, to the Canal de Briare, at Briare near Gien. The tide flows about 40 miles up the river, to a short distance above Nantes. [LOIRE INFÉRIEURE; NANTES.] The Loire is connected with the Saône by the Canal du Centre, with the Seine by the Canals de Briare, d'Orléans, and du Loing, and with Brest harbour by the canal from Nantes to Brest.

LOIRE, a department in France, comprising the greater part of the district of Forez, is bounded N. by the department of Saône-et-Loire, E. by those of Rhone and Isère, S. by those of Ardèche and Haute Loire, and W. by those of Puy-de-Dôme and Allier. It extends from 45° 13' to 46° 17' N. lat., and from 3° 41' to 4° 45' E. long.; its greatest length is 77 miles, its average width is about 29 miles. The area is 1838 square miles, and the population in 1861 was 517,603.

Surface.—The department belongs almost entirely to the basin of the Loire, which is separated from that of the Rhône by the Cévennes mountains on the east, and from that of the Allier by a secondary chain of the Cévennes mountains on the west. The interior may be described as two large inclined planes descending from these two mountain ranges, and intersecting in the water-line of the Loire; but as the mountains, in their course northwards, trend off respectively in directions nearly N.N.E. and N.N.W., the northern portion of the department has more the appearance of a single wide plain, which includes part of the former provinces of Beaujolais and Bourbonnais, and is called the plain of Roanne. The rest of the department is called the plain of Forez; and between it and the plain of Roanne the division is marked by a chain of hills running E. and W., and uniting the two mountain ranges before named, except at the point where it is broken through by the Loire. A small portion of the south-east of

the department extends eastwards of the Cévennes into the basin of the Rhône, which river runs along the boundary for about 6 miles. In the western part of the plain of Forez several isolated volcanic swells, consisting of black basalt, lie in a general direction of N. and S., and have their summits crowned with the ruins of ancient castles or monasteries.

Rivers.—The principal rivers are the LOIRE and the RHÔNE, by means of which the various industrial products of the department are conveyed to the Atlantic or to the Mediterranean. The Loire is navigable, in its whole length, in this department to which it gives name; but owing to the rapidity of the current, it is only the down navigation that is available as far as Roanne, where the general navigation of the river commences. Its principal feeders are the Ondène, the Furens, the Coise, the Lignon, and the Sornin. The Gier is the only feeder the Rhône receives in this part of its course. The lateral canal of the Loire from Roanne to Digoin runs through the north of the department; another canal runs from Rivede-Gier to the Rhône. A railroad runs along the right bank of the Loire, from Roanne to St.-Étienne, near which it crosses the Cévennes, and continues up the valley of the Rhône to Lyons; its length is 79 miles.

Products and Manufactures.—The mountains of the Loire abound with excellent pasture and medicinal plants; their lower slopes are cultivated or covered with vineyards and chestnut woods. In the plains the common bread-stuffs are grown, but in quantity insufficient for the consumption; hemp, excellent fruits, oleaginous seeds, and dyestuffs are also raised. About 6,000,000 gallons of good red and white wines are produced annually. Horses and black cattle are small; the sheep are noted for their sweet flesh; poultry and game are abundant. In the valley of the Rhône, mulberry trees are extensively grown for the production of silk. There are also extensive forests of pine, fir, beech, and oak; on Mont Pilat, near St.-Étienne, an immense number of deals are made, saw-mills being established on every available stream of water. But much of the finest pine timber is made into charcoal, in consequence of the great difficulty of transport from the mountain-heights on which it grows; the finest trees vary from 98 to 115 feet in height. Great quantities of chestnuts are grown; these enter largely into the food of the people; the finest are sent to Paris, where they are sold (like those of Ardèche) under the name of *marrons de Lyon*.

The department contains one of the richest coal-beds in France, which besides feeding the numerous factories and furnaces of St.-Étienne, and other places in the department, furnishes large portions for exportation to Lyons and the towns on the Rhône. The quantity of coal annually furnished by the mines of Loire amount to one-third of all the coal raised in France. Lead and iron mines are also worked; building stone, granite, potter's clay, &c., are found; mineral springs are numerous.

The manufactures are of the greatest variety and importance, and give rise to a very extensive commerce. The chief products are fire-arms, iron-mongery, and machinery of all kinds, silks, ribands, crape, velvet, plush, laces, linen, cotton, glass, bricks, steel, iron, scythes, hardware, canvas, mill-castings, files and tools of all descriptions, cotton and linen

yarn, lace, cutlery, earthenware, tiles, lime, &c., &c. Great numbers of coal barges and canal boats are built at Roanne and St.-Rambert. The great centre of manufacturing industry is St.-Étienne.

Divisions, Chief Towns, &c.—The department contains 1,176,000 acres, and is divided into three arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Montbrison,	9	138	132,042
Roanne, . .	10	110	146,495
St.-Étienne,	11	72	239,066
Total, .	30	320	517,603

Of the arrondissement of Montbrison, the chief town, *Montbrison*, stands on the Vizézy, a small feeder of the Loire, in 45° 36' N. lat., 4° 3' 45" E. long., at a distance of 45 miles W. from Lyons, and has 7201 inhabitants. It is built round a basaltic hill (from the summit of which there is a fine view over the plain of Forez), and at the extremity of a branch railroad that joins the St.-Étienne-Roanne line at Montrond. The town, which is ill built, with narrow winding streets and low houses, has a tribunal of first instance, communal and ecclesiastical colleges, a primary normal school, and a public library of 15,000 volumes. The principal building is the cathedral of Notre-Dame. The old ramparts and ditches are now replaced by handsome promenades. Montbrison is the capital of the department of Loire, which distinction it owes solely to its central situation; for with respect to population, or commercial and industrial activity, it is greatly surpassed by St.-Étienne and Roanne. *St.-Bonnet-le-Château*, on a high hill in the south of the department, and on the Roman road made here by Agrippa, has 2230 inhabitants. *Chazelles-sur-Lyon*, a small but well-built walled town east of Montbrison, has a population of 5332. *Feurs*, the ancient *Segusianorum*, and the midway station on the railroad from St.-Étienne to Roanne, from each of which towns it is 25 miles distant, stands in a fertile, well-watered plain near the right bank of the Loire, and has 2823 inhabitants. The Roman antiquities found in the town are numerous; the high stone dykes which confine the Loire in the neighbourhood are said to be of Roman construction. *St.-Galmier*, 12 miles E. of Montbrison, on the St.-Étienne-Roanne Railroad, stands on a high hill near the right bank of the Coise, and has a population of 2954. It is said to occupy the site of the ancient *Aquæ-Segeste*, and is still famous for its cold mineral spring. *St.-Rambert*, 11 miles S.E. from Montbrison, is prettily situated on the left bank of the Loire, and has 2545 inhabitants. The church of St.-Rambert is remarkable for its great antiquity. Nearly 3000 barges are built here annually, and sent down the Loire laden with coal to Roanne. In the neighbourhood are several iron forges and smelting furnaces. *Surv-le-Comtal*, 7 miles S. from St.-Rambert, for a long time the residence of the counts of Forez, whose castle is still in good preservation, has 2770 inhabitants.

In the arrondissement of Roanne, the chief town, *Roanne*, is situated on the left bank of the Loire,

which is here navigable, at a distance of 50 miles by railroad from St.-Étienne, and has a tribunal of first instance, a consultative chamber of manufactures, a college, and 17,398 inhabitants. The town is well built, with straight wide streets, formed by handsome houses; the new bridge over the Loire, the public library, and the college buildings are the most remarkable structures. The manufactures, which are important, consist of muslin, calico, broad-cloth, handkerchiefs, glue, oil, porcelain, linen thread, cotton yarn, and leather; there are several dye-houses, and numerous boat-building yards. By means of the lateral canal of the Loire, which enters that river at Digoin, and by the numerous canals and rivers that join the Loire, Roanne has water communication with all the principal towns in France. The trade in corn, wine, flour, spun cotton, calico, planks, charcoal, the manufactures of Lyons, and of the southern and eastern departments of France, is very considerable. *Belmont*, 3 miles N.E. from Roanne, has 3592 inhabitants. *Charlieu*, 12 miles N. by E. of Roanne, on the Sorin, a feeder of the Loire, is famous for the remains of a Benedictine abbey, and has 3936 inhabitants, who manufacture linen, cotton, silk and cotton yarn, and shoe and glove leather. The hospital of Charlieu, one of the oldest in France, was founded by St. Louis. *Perreux*, on the Rodon, 4 miles from Roanne, has 2552 inhabitants. *St.-Symphorien-de-Lay*, 10 miles S.E. from Roanne, has cotton factories, coal mines, and 4652 inhabitants.

Of the arrondissement of St.-Étienne, the chief town is *St.-Étienne*. [*ÉTIENNE, St.*] *Bourg-Argental*, on the Déôme, in a fertile valley abounding with mulberry plantations, from which silk of the best quality is produced, stands 18 miles S. from St.-Étienne, and has 3535 inhabitants. *Le Chambon*, 3 miles from St.-Étienne, is situated on the Dondaine-Vachery, and has 5514 inhabitants, who manufacture ribands, iron and steel ware, table cutlery, pocket-knives, &c. *St.-Chamond*, beautifully situated at the confluence of the Gier and the Janon, 7½ miles N.E. from St.-Étienne, and near the Lyons-St.-Étienne Railway, is a busy manufacturing town, containing a consultative chamber of manufactures, a conseil des prud'hommes, and 11,626 inhabitants. The town is well built, and presents a great number of elegant houses inclosed in gardens. The church of St.-Chamond, the public baths, and promenades, are among the most remarkable objects. There are extensive coal mines, iron forges, and smelting furnaces in the environs. The town contains a great number of silk mills, and has important manufactures of ribands, stay-laces, nails for the navy, hardware, &c. *St.-Genest-Malifaux*, 9 miles S. from St.-Étienne, near the right bank of the Semène, has a population of 3517. *St.-Héand*, 6 miles N. from St.-Étienne, contains silk mills, and 3612 inhabitants. *Pélussin*, situated at the foot of Mont Pilat, at a short distance from the Rhône, and in a fertile vine district, has 4039 inhabitants. The preparation of raw silk for manufactures, and the working of the porphyry quarries of the neighbourhood, afford employment to a considerable part of the population. *Rive-de-Gier*, 13 miles N.E. from St.-Étienne, on the Lyons-St.-Étienne Railroad, previous to 1815 had under 4000 inhabitants; it now has a population of 14,202. It is built on the Gier, here crossed by

several bridges, and rendered navigable by the Canal-de-Givors, which runs from this town to Givors on the Rhône. The town owes its prosperity to the coal mines, exceeding forty in number, which are worked in the neighbourhood. The basin of the canal is lined with quays, backed by vast coal stores. The reservoir of the Canal-de-Givors, a little S. of the town, is formed by massive mason-work, and is a fine work of its kind. Besides its great trade in coal, with which Lyons and several other places are supplied, Rive-de-Gier has above forty glass works, steam engine factories, iron foundries and forges, steel works, silk mills, riband factories, &c.

The department is in the see of the archbishop of Lyons; it is comprised in the jurisdiction of the Cour Impériale and Academy of Lyons, and is included in the eighth Military Division, of which Lyons is head-quarters. It has four representatives in the Chamber of Deputies.

(*Dictionnaire de la France; Annuaire pour l'An 1866; Statistique de la France.*)

LOIRE, HAUTE, a department in France, comprising the district of Vélay and parts of Gévaudan, Forez, and Auvergne, takes its name from its situation in the upper part of the basin of the Loire, and is bounded N. by the departments of Puy-de-Dôme and Loire, E. by Ardèche, S. by Lozère, and W. by Cantal. Its greatest length from E. to W. is 69 miles, from N. to S. 46 miles; it extends from 44° 44' to 45° 25' N. lat., and from 3° 4' to 4° 26' E. long. The area is 1925 square miles, and the population in 1861 was 305,521.

Surface and Hydrography.—The department is mountainous. The Cantal mountains, and the Margeride chain, which unites them to the Cévennes, cover with their off-shoots so much of the south-west and south of the department as lies on the left bank of the Allier: the south-eastern and eastern districts are occupied with the mass of the Cévennes, from which a secondary chain, running through the interior nearly N. and S., forms the watershed between the Allier and the Loire, and is joined, near Chaise-Dieu, by another range that runs N.W. from Mont Mezenc, the culminating point of the Cévennes [CÉVENNES; ARDÈCHE]. The country, thus surrounded and traversed by mountains, is furrowed by numerous rivers, brooks, and torrents, which flow, with rapid descent, either between steep banks that expose to view the volcanic formation of the rocks, or through picturesque and fertile valleys whereof the soil consists of decomposed lava and other volcanic deposits. On the mountains, which present numerous conical peaks and craters, and have their summits covered with snow during five or six months in the year, there are large forests and extensive pastures, where great numbers of cattle and mules, the chief wealth of the country, are reared. The lower slopes are covered with chestnut woods and vineyards. In the north-west and north-east of the department there are some extensive plains of considerable fertility, all covered with a soil of decomposed volcanic matter.

The principal rivers are the ALLIER, which drains the west of the department; and the LOIRE, which, swelled by the Gazeille, the Lignon, and the Somme, from the right bank, and by the Borne, the Arzon, and the Ancy, from the left, drains the central and eastern districts.

Products and Manufactures.—The agricultural produce of the department suffices the consumption. The usual crops are wheat, rye, barley, oats, meslin, beans, &c.; fruits are abundant. Of wine only 1,264,000 gallons are produced, and this is of inferior quality. Mules are reared and horned cattle and pigs are fatted in great numbers. Among the wild animals are boars, wolves, foxes, wild cats, badgers, &c.

The geological structure and mineral wealth of the department are of great variety, though the latter is not turned to much advantage. The mountain-range which runs north-west from Mont Mezenc consists of trachytic rocks, and is reckoned among the most ancient of the volcanic structures of central France. The district of Vélay, which lies S. and S.W. of this range, and comprises nearly all the south of the department, is occupied with basaltic rocks and lava beds, the great antiquity of which is proved by their being covered with a soil formed by the decomposition of their surface. Along the banks of the rivers in this district the basaltic columns laid bare to view assume a variety of beautiful forms; and the charred fragments of ancient eruptions, which were long subsequently rolled and worn in watercourses that have disappeared for ever, are seen in many places deposited in beds of clay and marl, piled up alternately one upon the other. Among the primitive rocks are found granite, gneiss, quartz, mica schist, &c. Coal, lead, and antimony mines are worked; iron and copper ores are found at various points. Chalcedony, diamond-spar, sapphires, amethysts, tourmalines, &c., are found, and also marble, millstone grit, plaster of Paris, &c., &c. Mineral springs are numerous; they are all saline or acidulous.

The manufactures consist of common articles of necessity and use, and are unimportant, with the exception of silk and thread lace and ribands. The people are in general poor, and many of them emigrate during the winter months as sawyers, hawkers, porters, sweeps, &c.

In a country the highest point of which, Mont Mezenc, is 5820 feet above the sea-level, whilst its lowest point, namely, where the Allier crosses the northern border, is only 1279 feet above the same level, there is room for very great variety of climate and season. Seed-time and harvest differ in different cantons according to the elevation, the maximum variation amounting to as much as two months; and such is the difference of climate, that while in some districts the vine flourishes, in others rye will hardly ripen. The south-west wind blows at times for weeks continually, and with great violence; the west and north-west winds bring rain.

Divisions and Chief Towns.—The department contains 1,232,000 acres, and is divided into three arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Le-Puy, . .	14	114	136,563
Yssengeaux, .	6	40	87,741
Brioude, . .	8	106	81,217
Total, . .	28	260	305,521

In the arrondissement of Le-Puy, the chief town, *Le-Puy*, which is now the capital of the whole department, as it formerly was of the district of Velay, is situated at the foot and around the southern slope of a steep hill, at the junction of three pretty valleys, watered respectively by the Loire, the Borne, and the Dolaison, in $45^{\circ} 2' 46''$ N. lat., and $3^{\circ} 52' 55''$ E. long., 66 miles S.W. from Lyons, and has 17,045 inhabitants. Except the broad street at the foot of the hill, through which the roads from Clermont and Lyons run, the rest of the town is built in the form of an amphitheatre round the steep sides of Mont Anis, which is surmounted by a lofty basaltic rock called Cornielle. From a distance Le-Puy presents a most picturesque appearance; but the interior view disappoints the expectations thus raised. The streets are irregular, narrow, and in the upper part of the town inaccessible to carriages; they are paved with volcanic breccia, which in all weathers is slippery and dangerous to walk upon. The most important structures are—the cathedral, situated in the highest part of the town; the church of St.-Laurent, situated at the foot of the hill, and containing the monument and part of the remains of Du Guesclin; the prefect's residence in the spacious square of Du-Breuil; the college church; the museum, near the cathedral, in which are numerous paintings, Roman antiquities, and one of the best collections of geological and mineralogical specimens in France; the theatre, an ancient structure, supposed to have been a heathen temple; the ecclesiastical college; and the Parnassac gate, a fine specimen of military architecture over one of the promenades of the town. Le-Puy is the seat of a bishop, and contains tribunals of first instance and of commerce, a consultative chamber of manufactures, a college, a public library, and various literary and scientific societies. In the suburb de l'Aiguille is an isolated basaltic rock of pyramidal form, and 285 feet high, which is ascended by a staircase of 218 steps cut in the rock, and is surmounted by the highly-ornamented chapel of St.-Michel, erected in the tenth century. Between this rock and that of Cornielle stands a heptagonal building, said to have been a chapel dedicated to St. Clair, and now used as a corn-store. The chief industrial products of Le-Puy are lace, coarse woollens, vine-skins, nails, and leather; the commerce is in these articles, and in corn, iron, pottery, cattle, &c. *Craponne*, 17 miles N. from Le-Puy, has a population of 2630. *Le-Monastier*, 11 miles S.E. from Le-Puy, has a population of 3589. *St.-Paulien*, built on the ruins of an ancient city, said to be Ruessium or Revesia Vellavorum, has a population of 2932; several Roman coins, vases, monuments with inscriptions, have been found, and are preserved here. *Saugues*, a town of 3839 inhabitants, stands in a rich corn and pasture country, 16 miles W.S.W. from Le-Puy, and has some woollen manufactures. Just outside the walls is a monument of rudely-cut stone without inscription, which is traditionally called the Tomb of the English General.

In the arrondissement of Yssengeaux, the chief town, *Yssengeaux* or *Issengeaux*, an ill-built gloomy place, is situated on a high hill 14 miles N.E. of Le-Puy, and has a tribunal of first instance, a college, and 7971 inhabitants, who manufacture silk, lace, and ribands, and trade in timber, cattle, sheep, &c.

Bas-en-Basset, on the left bank of the Loire, 12 miles from Yssengeaux, has 3189 inhabitants, who manufacture lace and pottery. The town, which is commanded by the old castle of Rochebaron, has a mineral spring. *St.-Didier*, 14 miles N.E. from Yssengeaux, has silk factories and 5220 inhabitants, who manufacture ribands and articles in papier-maché. *Monistrol*, 12 miles N.E. from Yssengeaux, near the right bank of the Loire, is an ugly ill-built town, with an important corn-market, and 4473 inhabitants, who manufacture lace, ribands, hardware, satin, silk handkerchiefs, leather, and papier-maché articles. *Tence*, a manufacturing town of 5537 inhabitants, is prettily situated on the right bank of the Lignon, 9 miles E. by S. from Yssengeaux.

In the arrondissement of Brioude, the chief town, *Brioude*, is situated 29 miles N.W. from Le-Puy, near the left bank of the Allier, and has tribunals of first instance and of commerce, a college, and 4950 inhabitants. It is an ill-built town. The most remarkable structures are the church of St.-Julien and the college buildings. *La-Chaise-Dieu*, 15 miles E. from Brioude, a town of 1722 inhabitants, takes its name from the famous monastery of Chaise-Dieu (Casa Dei), which, with the exception of the church, was destroyed during the revolution of 1793. The abbey church, erected about the middle of the fourteenth century, at the expense of Pope Clement VI., a native of Chaise-Dieu, is considered one of the finest abbey churches remaining in France; it contains tombs of Clement VI. and Gregory XI., some very ancient tapestries, and is greatly admired for the carved woodwork of the 156 stalls in the choir. The walls of the choir are ornamented with ancient paintings in fresco, representing the allegory of the Dance of Death. *Langeac*, built in a pretty situation, on the left bank of the Allier, has 3491 inhabitants. There are coal mines and stone quarries near this town.

The department forms the see of the bishop of Le-Puy, is included in the jurisdiction of the Cour Impériale of Riom, and of the Academy of Clermont, and belongs to the twentieth Military Division, of which Clermont is head-quarters. It has two representatives in the Chamber of Deputies.

(*Dictionnaire de la France*; Malte Brun, *Géographie Universelle*; *Annuaire pour l'An 1866*.)

LOIRE INFÉRIEURE, a department in France formed out of a part of Bretagne, and lying along the lower course and the mouth of the Loire, is bounded N. by the departments of Morbihan and Ile-et-Vilaine, E. by those of Mayenne and Maine-et-Loire, S. by that of Vendée, and W. by the Bay of Biscay. It extends from $46^{\circ} 52'$ to $47^{\circ} 52'$ N. lat., and from $0^{\circ} 55'$ to $2^{\circ} 32'$ W. long.; its greatest length from E. to W. is 74 miles, from N. to S. 69 miles. The area is 2632 square miles, and the population in 1861 was 580,207.

Surface and Hydrography.—The coast line is about 55 miles in length. It presents an irregular outline, broken in the north by the bays of Pennebe and Pembron, which are separated by the promontory of Piriac; in the centre by the embouchure of the Loire, to the north of which are some small islets; and in the south by the large Bay of Bourgneuf. Considerable salt marshes lie along this coast. The surface of the department is level, with the exception of a line of

low hills, which crosses it in the north, forming the watershed between the Loire and the Vilaine. The principal river is the Loire, which enters the department below Ingrande in Maine-et-Loire, and divides it into two unequal parts. It is 5 miles wide at its mouth, and is navigable for large vessels up to Nantes, to a few miles above which the tide ascends. The principal feeders of the Loire in this department are, from the left, the Sèvre-Nantaise and the Achenau, which last is the outlet of the lake of Grand-Lieu; from the right, the Erdre, which enters the Loire at Nantes. The Vilaine touches the department on the north-west, receiving the Don and the Isac. The other most considerable rivers are the Maine and the Moine, feeders of the Sèvre-Nantaise; the Ognon and Boulogne, which flow from Vendée into the Lake of Grand-Lieu; the Brivé, which enters the Loire above St.-Nazaire; and the Tenu, a feeder of the Achenau. The department is crossed by the canal from Nantes to Brest. The climate is healthy, although somewhat damp; the heat in summer is often very great.

Grand-Lieu, the largest lake in France, and the reservoir for the waters of the Boulogne, the Ognon, and some smaller streams, is situated near the left bank of the Loire, with which it has communication by its navigable outlet the Achenau. It has an area of 29 square miles, and abounds in fish; its shores are marshy. North of the Loire there lie many small lakes, and extensive marshes and bogs.

Products.—The quantity of cereal grain produced suffices the consumption. The chief crops of this kind are wheat, rye, buckwheat, and meslin. Barley is grown in small quantity. The meadows and pastures along the Loire, in the islands formed by the deposits of the river, and in the neighbourhood of the marshes, are excellent. Cattle of good breed are very numerous; horses, of which also great numbers are reared, are small. The apple tree is extensively cultivated north of the Loire for making cider; and in the same district there are forests of vast extent. The *Bocage* district, which stretches south-east of the Lac du Grand-Lieu, is well wooded, as the name implies, every field being inclosed with hedgerows and lines of timber trees. The vineyards of the department yield 32,200,000 gallons of wine annually, rather less than a third of which is used for the home consumption; of the surplus, part goes to the supply of Paris, some is distilled into brandy, and the rest is sent to Orléans to be converted into vinegar. The wines are considered of middling quality; the sweet wines are prized for their agreeable flavour, and for their keeping qualities. Fishing affords occupation to a great number of the inhabitants.

Granite, quartz, mica, kaolin, and feldspar are found in the arrondissement of Nantes; in that of Châteaubriant extensive slate quarries are worked, and iron ore is abundant, supplying many forges, blast-furnaces, and foundries. In the arrondissements of Châteaubriant and Ancenis there are important mines of coal of excellent quality; magnetic iron is found in isolated particles on the surface of the ground on the right shore of the embouchure of the Loire. There are mineral springs and sea-bathing establishments at Plaine and Pornic.

Manufactures and Commerce.—The principal

manufactures are linen, calico, printed cotton, serge, and coarse woollen stuffs; shipbuilding is carried on at Nantes, Paimbœuf, and Pellerin; and at Indret, one of the small islands in the Loire, there are establishments for the manufacture of steam-machinery, and also slips for building steam-frigates. Other articles of industrial produce are paper, leather, porcelain, glass, ship cordage, chain cables, cotton yarn, refined sugar, &c. [NANTES.]

The department has an important commerce with foreign countries, coastwise, and with the interior. The principal articles of trade are wine, brandy, fruits, salt (of which a vast quantity is made along the coast), hardware, oil, provisions, soap, wool, and other French and colonial produce. Ships are fitted out for the whale, herring, and cod fisheries; and the mackerel and pilchard fisheries along the coast are actively plied.

Divisions and Chief Towns.—The department contains 1,684,588 acres, and is divided into five arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Nantes, . .	17	67	264,870
Ancenis, . .	5	27	49,835
Châteaubriant,	7	37	75,427
Paimbœuf, .	5	25	47,867
Savenay, . .	11	52	142,208
Total, .	45	208	580,207

In the arrondissement of Nantes the chief town is NANTES, which is also the capital of the whole department. *Chantenai*, situated on a high hill above the right shore of the Loire, has a population of 7252. *Clisson*, beautifully situated on the slopes of two hills at the junction of the Moine and the Sèvre-Nantaise, has a population of 2829, and manufactures of woollen cloth, cotton yarn, leather, and paper. On a rock above the town stand the majestic ruins of the ancient castle of Clisson, which for extent, construction, and beauty of site, has scarcely an equal among the castellated structures of France, while in historical associations it far outstrips them all. Some repairs have been lately made in order to arrest the progress of decay among these magnificent remains. *Chapelle-sur-Erdre*, on the slope of a hill near the left bank of the Erdre, has 2580 inhabitants. *Légé* is situated in the south of the department, near the right bank of the Logne, on a hill which commands a fine view of a rich well-cultivated country. The town, which suffered greatly in the civil war between the Vendéans and the Republicans, has 4488 inhabitants. On the Nantes road, at a short distance from Légé, a monument was erected in 1827 to the Vendean general Charette, which was demolished during the short frenzy of 1830. *Loroux-Bottereau*, a few miles east of Nantes, has 4212 inhabitants; within the town, in a spacious circular place surrounded by trees, a statue of Louis XVI. is erected. *Machecoul*, an ill-built town on the little river Falleron, and formerly the capital of the duchy of Retz, is 20 miles south-west from Nantes, and has 3727 inhabitants. This town was the scene of great cruelties and of some severe actions

during the Vendean war. *St.-Philbert*, 14 miles south-west from Nantes, is situated on the navigable river Boulogne, near its entrance into the Lake of Grand-Lieu, and has 3672 inhabitants. It stands in a fertile wine and corn country, and is a place of some trade in agricultural produce, timber, &c. *Vallet*, 5 miles north of Clisson, is situated on a height among rich vineyards, that yield the best wine of the department, and has 6476 inhabitants. *Vertou*, 5 miles south by east from Nantes, stands near the right bank of the Sèvre-Nantaise; population 6313.

Of the arrondissement of Ancenis, the chief town, *Ancenis*, is prettily situated among vine-clad slopes on the right bank of the Loire, 20 miles north-east from Nantes, and has a tribunal of first instance, a college, and 4628 inhabitants. The old castle of the dukes of Bethune, from the gardens of which there is a splendid view of the valley and islands of the Loire; the Ursuline convent, now a cavalry barrack; and the hospital—are deserving of notice. The steam-boats that navigate the Loire make Ancenis one of their stations. *Varades*, 8 miles east from Ancenis, stands on a high hill near the right bank of the Loire, and has 3368 inhabitants. It was before Varades that the Vendean army, after their defeat at Chollet by the Republicans, crossed the Loire in 1793.

In the arrondissement of Châteaubriant, the chief town, *Châteaubriant*, stands 37 miles north by east from Nantes, and has a tribunal of first instance and 4636 inhabitants, who manufacture common woollen stuffs, cordials, earthenware, tiles, and leather. *Moisdon*, on a hill near the right bank of the Don, has iron mines, iron forges, and 2609 inhabitants. *Nort*, 15 miles north from Nantes, is situated on the right bank of the Erdre, across which a stone bridge of six arches leads to the suburb of St.-Georges. The Erdre here becomes navigable for steamers which ply daily to and from Nantes. *Nort* is a busy town, with a population of 5665, who trade largely in wood, charcoal, and coal for the supply of Nantes, in iron, leather, cattle, &c. *Nozay*, 11 miles north from Nort, on the road from Nantes to Rennes, has 3692 inhabitants. *Rougé*, 5 miles north-west of Châteaubriant, gives name to important iron mines, and has 2705 inhabitants.

The arrondissement of Paimbœuf is named from its chief town, *Paimbœuf*, which stands 24 miles west of Nantes, on the left bank and near the embouchure of the Loire, and has a tribunal of first instance, a naval school, and 3509 inhabitants, who are chiefly engaged in the construction and repairing of ships, in the manufacture of cordage, tiles, and bricks, and in the fisheries and coasting trade. The town consists chiefly of one long street, which is built along the quays which line the river. It has a harbour formed by a well-constructed mole, and capable of admitting the largest ships. Steamers ply several times a day to Nantes. The population of Paimbœuf was nearly 10,000 before the French lost the West Indian Islands. *Bourgneuf-en-Retz*, 15 miles south from Paimbœuf, is situated on the Bay of Bourgneuf, opposite the isle of Noirmoutier, in a low marshy place, and has 2893 inhabitants, who are engaged in the fishery along the coast and in the manufacture of salt. *St.-Père-en-Retz*, 4 miles south from Paimbœuf, has 3086 inhabitants.

The arrondissement of Savenay is named from its chief town, *Savenay*, a small place of 2803 inhabitants, situated 22 miles north-west from Nantes, near the right bank of the Loire. The town, which has a tribunal of first instance, was the scene of a most bloody engagement (November 25, 1793) between the Republican army under Westermann, Kléber, Marceau, and Tilly, and the gallant Vendéans, who were entirely defeated. A monument in honour of the slain has been erected in the cemetery of Savenay. *Batz*, situated among the salt marshes on the sea-shore, where it has a good fishing harbour, is a well-built town with 3003 inhabitants. It has a handsome church with a tower, terminating in an elegant cupola 180 feet high, which serves as a landmark for sailors. *Blain*, near the right bank of the Isac, has 6781 inhabitants. The town was formerly defended by a strong feudal castle, erected by Alan, duke of Bretagne, in 1105. This fortress, which, with the exception of its towers, is still in tolerable preservation, subsequently belonged to the family of Clisson, from whom, by the marriage of Beatrix, daughter of the Constable Olivier de Clisson, it passed to the dukes of Rohan. *Coueron*, prettily situated on the right bank of the Loire, which here forms a commodious harbour for the repairing of vessels, has glass-works and 4709 inhabitants. *Croisic*, situated on the extremity of a small tongue of land that juts out into the Bay of Biscay, is an ill-built place with 2182 inhabitants, who are chiefly engaged in fisheries, the manufacture of salt and soda, and the coasting trade. On a dangerous ledge of rocks called *Le-Four*, off Croisic, a light-house is erected. *St.-Étienne-de-Mont-Luc*, 9 miles south-east from Savenay, has a population of 4783. *Guéméné*, situated on a hill near the right bank of the Don (which here begins to be navigable), at a distance of 22 miles north-north-east from Savenay, and has 4977 inhabitants. *Guérande*, an ancient town, situated about 3 miles from the sea and 25 miles west from Savenay, has an ecclesiastical college, two hospitals, and 8524 inhabitants, who manufacture great quantities of salt, linen, serge, cotton, and woollen yarn, &c. The town, built on the slope of a hill, is commanded by an old castle flanked with towers; it is surrounded by walls built of granite, and pierced by four gates situated at the cardinal points. The ditches which formerly surrounded this ancient fortress are now filled up and converted into shady walks. *Herbignac*, 18 miles north-west from Savenay, has extensive potteries and 3672 inhabitants. *St.-Nazaire*, a town of 10,845 inhabitants, composed chiefly of sailors, pilots, fishermen, and custom-house officers, is situated on the northern shore of the embouchure of the Loire. It has a light-house at the head of the mole which forms the harbour; its chief trade is in fish, corn, and salt. *Pont-Château*, on the left bank of the Brivé, which is navigable by means of the tide from this town to its entrance into the Loire a little above St.-Nazaire, has a corn-market, tan-yards, and 4449 inhabitants.

The department forms the see of the bishop of Nantes, is included in the jurisdiction of the Cour Impériale and Academy of Rennes, and belongs to the fifteenth Military Division, of which Nantes is head-quarters. It returns four members to the Chamber of Deputies.

(*Dictionnaire de la France ; Annuaire pour l'An 1866 ; Statistique de la France.*)

LOIRET, a department of France, formed out of the eastern part of the province of Orléanais, and a small part of Berry, lies between $47^{\circ} 29'$ and $48^{\circ} 20'$ N. lat., $1^{\circ} 32'$ and $3^{\circ} 5'$ E. long., and is bounded north by Seine-et-Oise and Seine-et-Marne, east by the department of Yonne, south by those of Nièvre, Loir-et-Cher, and Cher, and west by Eure-et-Loire. Its greatest length from east to west is 72 miles, and its average breadth from north to south is 42 miles. The area is 2578 square miles, and the population in 1861 was 352,757.

Surface and Hydrography.—The department is divided into two unequal parts by the Loire. The district situated S. of this river is part of the old district of Sologne [CHER], and presents a barren sandy soil, covered with heath, but here and there swelling into hills, which are planted with vines, yielding red and white wines of moderately good quality. The district N. of the Loire is composed of fertile and well-cultivated plains, separated by wooded hills, and diversified by extensive forests, rich meadows, and pasture lands. A chain of hills that forms part of the watershed between the Seine and the Loire traverses the department from S.E. to N.W., at no great distance from the right bank of the LOIRE, which river crosses the department in the same direction as far as Orléans, where it sweeps round to the south-west.

The department takes its name from the *Loiret*, a little river that rises all at once in full flood from a spring in the park of Château-de-la-Source, a few miles S.S.E. from Orléans, and flowing westwards enters the Loire on the left bank after a course of 7 miles. The waters of the Loiret never freeze, owing to the high temperature which they have on issuing from the earth, and to the shortness of their course. The *Duis*, a sluggish muddy stream, is the principal feeder of the Loiret; before its junction with the latter it enters a whirlpool by which part of its waters are generally absorbed, the remainder being conducted to the Loiret by a short canal. But at certain seasons of the year, when the waters of the Loiret are highest, a portion of them ascends the canal and enters with the Duis into the whirlpool, which is said to have an underground communication with the Loire. When the waters of the Loire, however, rise above their usual level, the whirlpool then, instead of absorbing the waters of either river, overflows and adds considerably to their quantity. The Loiret is navigable almost from its source; it drives the machinery of several mills and factories. The *Loing*, which receives the Ouanne and several other feeders, flows N. through this department from that of Yonne in its way to join the Seine. The north-western districts are drained by the Essonne, which flows N. and enters the Seine in the department of Seine-et-Oise. The department possesses great advantages from internal navigation by the Loire, and by the Canal d'Orléans and the Canal de Briare, which unite near Montargis, whence the Canal du Loing runs northward into the department of Seine-et-Marne, and passing Nemours, enters the Seine near Moret. The department is also traversed by the Paris-Orléans, the Orléans-Nantes, and the Orléans-Bourges railways.

Climate, Products, and Resources.—The climate is mild and healthy; the prevailing winds are the west and south-west.

The district north of the Loire is very productive of rye and other breadstuffs; but owing to the infertility of the Sologne district, the produce is little more than enough for the consumption. Yet the department has a most important trade in corn, which, however, is supplied from the great wheat districts of Beauce, Poitou, Anjou, and Lower Auvergne, and finds easy distribution from the great granaries of Orléans, by the means of transit before mentioned, to different parts of France. The quantity of oats grown is enormous, the annual exports amounting to 1,375,000 quarters. Saffron is extensively and profitably cultivated. Asparagus and other pot-herbs are raised in large quantities. About 22,000,000 gallons of wine are made annually, of which about one-fourth goes to the home consumption; most of the remainder is exported under the name of Vins d'Orléans, generally of ordinary quality; some is retained for making vinegar. Apple, pear, and all fruit-trees common to the north and centre of France are successfully cultivated, and a great quantity of preserves are made. The forests contain chiefly oak, beech, birch, elm, and chestnut. Cattle are of good breed, and also sheep, except in the Sologne, where they are small but well-fleeced. Bees are carefully tended; game, poultry, and fish are abundant.

Building and lime stone, marl, and potter's clay are the only minerals found.

The manufactures, except those of Orléans, are unimportant; but the commerce of the department is very extensive. The chief articles of trade are corn, flour, wine, brandy, vinegar, groceries, drugs, fruits and fruit-trees, peas and beans, chestnuts, cider, fish, honey, saffron, salt, wool, firewood, oak-staves, charcoal, cattle, &c.

Divisions and Chief Towns.—The department contains 1,649,933 acres, and is divided into four arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Orléans, . .	14	107	159,821
Pithiviers, .	5	98	61,653
Gien, . . .	5	49	52,465
Montargis, .	7	95	78,818
Total, . .	31	349	352,757

Of the arrondissement of Orléans, and of the whole department, the capital is ORLÉANS. The other towns are—BEAUGENCY: *Châteauneuf-sur-Loire*, which stands on the right bank of the Loire, E. of Orléans, and has woollen cloth and beet-root sugar factories, and 3197 inhabitants: *Cléry*, which is prettily situated near the left bank of the Loire, 9 miles S.W. from Orléans, and has 2765 inhabitants; this town is famous for its beautiful church of Notre-Dame, in the nave of which is a marble monument to Louis XI., who was buried here: *Jargeau*, which is 11 miles E. from Orléans, on the left bank of the Loire, here crossed by a fine bridge, and has a population of 2590. *Meung*, which is a well-built town, situated on the right bank of the Loire, 12 miles

by railroad W. by S. from Orléans, and has 3660 inhabitants, who manufacture leather, room-paper, and felt hats, and trade largely in flour; and *Patay*, a small town of 1208 inhabitants, 15 miles N.W. from Orléans, near which Joan of Arc defeated the English in 1429, and took Talbot prisoner.

The arrondissement of Pithiviers is named from its chief town, *Pithiviers*, which is situated on the slope and at the foot of a hill above the Euf (a feeder of the Seine, which lower down takes the name of Essonne), 25 miles N.E. from Orléans, and has a tribunal of first instance and 4778 inhabitants. The town, which is pretty well built, is famous for its almond-cakes and lark-pies. *Beaune-la-Rolande*, 8 miles S. from Pithiviers, near the Essonne, has a population of 1987.

The arrondissement of Gien takes its name from *Gien*, a well-built town, situated on the right bank of the Loire, which is here crossed by a handsome stone bridge of twelve arches, at a distance of 36 miles E.S.E. from Orléans. From the left bank of the river the view, comprising the bridge and the town, built along the slope of a hill, which is surmounted by the church of St.-Louis and a fine old castle in good preservation, is picturesque. Gien has a tribunal of first instance and 6528 inhabitants, who manufacture porcelain and leather, and trade in salt, corn, wine, saffron, and wool. *Briare*, 6 miles E. by S. from Gien, stands on the right bank of the Loire, at the point where the Briare Canal enters that river. It has a population of 3927, and a good trade in wine, wood, and charcoal. *Châtillon*, further up the Loire and on its left bank, has 3136 inhabitants. *Sully*, 13 miles W. from Gien, on the left bank of the Loire, has a population of 2527, and is remarkable for the castle of the lords of La Tremouille, which was restored by Henry IV.'s minister, Sully, who resided here after the death of his master.

In the arrondissement of Montargis, the chief town, *Montargis*, situated near a forest of the same name, in a plain, 40 miles E. by N. from Orléans, and at the junction of the canals of Briare, Orléans, and the Loing, which complete the navigation between the Loire and the Seine, has a college, tribunals of first instance and of commerce, and 8636 inhabitants. The town, which is pretty well built, has cloth factories, tanyards, paper mills, and a considerable trade in corn, saffron, hides, wool, cattle, &c. The most remarkable objects at Montargis are the church of La Madeleine, the old walls of the town, and the few remains of the extensive castle of Montargis, which was erected by Charles V. on a hill that commands the town. *Château-Renard*, situated 11 miles E. from Montargis, near the right bank of the Ouanne, has 2644 inhabitants. *Châtillon-sur-Loing*, 14 miles S.S.E. from Montargis, on the canal and river Loing, has a population of 2594. *Courtenay*, the cradle of the ancient house of Courtenay, is situated 15 miles E. by N. from Montargis, on the little river Clare, a feeder of the Loing, and has 2871 inhabitants. *Lorris*, formerly a favourite residence of the kings of France, and famous for its ancient charter of privileges, is situated 12 miles S.W. from Montargis, and has a population of 2008.

The department forms the see of the bishop of Orléans, is included in the jurisdiction of the Cour Impériale of Orléans, and Academy of Paris, and

belongs to the first Military Division, of which Paris is head-quarters. It returns three members to the Chamber of Deputies.

(*Dictionnaire de la France; Statistique de la France; Annuaire pour l'An 1866.*)

LOK, or LOKI, in Northern mythology, the name of an evil deity, corresponding to the Ahirman of the Persians, and the supposed source of all the evil with which the world is afflicted. In the great Norse poem of the Edda he is described as a huge serpent, encircling the earth, and as having produced Hela, or Death, the queen of the Infernal Realm.

LOKEREN. [FLANDERS, EAST.]

LOKMAN. There are various traditions about Lokmân, the supposed author of the collection of fables in Arabic, which still exists under his name. It has been conjectured that Lokmân and Æsop were the same individual. This supposition is founded on the close correspondence of the traditional accounts of the person, character, and life of Lokmân with those of Maximus Planides respecting Æsop.

The fables of Æsop have by no means the character of ancient and original Greek compositions. Many of them are strongly marked with an Oriental character. They bear a very striking resemblance to the Indian fables in the 'Panchatantra.' In the fables of Lokmân the same peculiar features frequently occur. Hence we may safely infer that both collections were originally derived from an Indo-Persian source, from whence certainly came the fabulous work attributed to Syntipas, who was no other than the Sindbad of the 'Arabian Nights.'

The fables of Lokmân show evident marks of a later and traditional origin. The moral or application is frequently misunderstood, or at least ill adapted to the apologue; a few ancient expressions had then become obsolete and are interpreted by words of more modern origin; and the language in general exhibits some slight deviations from grammatical accuracy, and approaches nearer to the modern Arabic idiom; as, for instance, in the use of the oblique case instead of the first case. The style is easy and flowing. The fables have often been reprinted for the use of those who are beginning to study the language, after the first edition, with a Latin interpretation by Erpenius, Leyden, 1615: the best and latest editions are by Cousin, Paris, 1818; Freytag, Bonn, 1823; Roediger, Leipzig, 1830; Schier, Dresden, 1831; Rasch, Copenhagen, 1832; and Derenburg, Berlin, 1850.

LOLIGO, the squid, or sea-pen cuttle-fish, very common on the British coasts. [SEPIADÆ.]

LO'LIUM, a genus of Grasses, containing a few species common in many parts of the northern hemisphere. There are two species which require notice. *L. perenne*, the common Ray-grass or Rye-grass of the farmer, one of the most valuable of our pasture grasses. *L. temulentum*, or Darnel, which grows not only in all parts of Europe, but in Japan, New Holland, China, and Monte Video. Darnel is remarkable as being the only well-authenticated instance of a plant belonging to the order of Grasses, in which narcotic or even deleterious properties have been found. The grains are said to produce intoxication in man, beasts, and birds, and to bring on fatal convulsions.

LOLLARDS, a religious sect which arose in Germany at the beginning of the fourteenth century,

and differed in many points of doctrine from the Church of Rome, more especially as regards the mass, extreme unction, and atonement for sin. The name seems derived from the German *lollen*, 'to sing lullingly,' and *hard*, a common affix. Hence, a Lollard was one who sang the praises of God. Lollard subsequently became a term of reproach for all heretics, who were supposed to conceal erroneous doctrines under the appearance of piety; and in England, at the close of the fourteenth century, it was given to the followers of Wycliffe. The term also extended into Scotland, and the Lollards of Kyle, in Ayrshire, excited great attention and were persecuted in the latter part of the fifteenth century.

LOMBARD, an ancient name in England for a banker, was derived from the Lombard merchants, the great usurers of the thirteenth century, who appear to have settled in England before the year 1274, and took up their first residence in a street of the city, still called from them Lombard Street.

LOMBARDIC ARCHITECTURE. This style of architecture may be considered the generic style which prevailed after the extinction of the Roman until the appearance of the Pointed or Gothic. It is the intermediate link between them. Though we are accustomed to regard the Lombardic historically as a distinct style, it was in fact only a further development of the system introduced during the decline of Roman architecture, which applied small orders merely as decoration, and introduced tiers of arches of which the piers form the solid supports of the structure.

Whether forming porticoes and galleries, or applied merely as decoration, these arcades are generally small in proportion to the building itself, and, instead of occupying the entire width of the front, or other elevation, are mostly inserted into distinct compartments of it, and are slightly recessed within the general face of the wall.

Among the other peculiarities of this style, that arising from small open galleries immediately beneath the cornice or roof is too remarkable to be overlooked, especially in gable fronts, where the arches of such galleries follow the slope of the roof itself, the columns being successively elevated one above another on steps (so that the base of those supporting the centre arch are above the lower arches), or else by placing the columns on the same horizontal line, and gradually increasing their height, as in the front of Pisa Cathedral. To this may be added the very prevalent custom of making an upper cornice or border of very small interlacing arches, or rather of mouldings producing that appearance. Pinnacles are of rare occurrence, and when introduced are generally low, and somewhat resemble pedestals. The cathedral of Novara, which belongs to the eleventh century, is one of the finest examples of the Lombardic architecture.

LOMBARDY and LOMBARD CITIES. The name of Lombardy, which is derived from that of the Longobards, its former possessors, has been applied in its widest sense, though with no very definite limitation, to that tract of country which the Romans called by the name of Cisalpine Gaul, and which includes the principal part of the basin of the Po. It consists chiefly of an immense plain, 200 miles long, and from 60 to 70 miles wide, from the Alps to the Apennines. [Po.]

The overthrow of the kingdom of the Longobards [LONGOBARDS] by Charlemagne did not destroy the political existence of that people. They retained their laws and institutions, their property, and their numerous and powerful nobility; they continued a nation and a kingdom, subject, however, to the monarchy of the Franks. Although on the one hand the nobles fostered a feudal spirit, yet on the other the towns began to rebuild their walls, which had been razed by the barbarians. The towns had retained the ancient system of municipalities, and the citizens elected their own magistrates.

After the deposition of Charles the Fat in 888, the crown of Italy was disputed for about seventy years among a succession of pretenders, Italians and Burgundians, until Otho I. of Saxony seized it with a firm hand, and was crowned at Rome by the Pope in 961. Otho and his successors resided chiefly in Germany; and the Lombard nobles and towns, though nominally dependent on the emperors, were in fact nearly independent.

Towards the middle of the eleventh century discord first began to break out in Milan and other cities between the various classes of the population. The lower nobility strove against those of higher rank, and the townsmen lent their aid in such a way as to increase their own municipal influence. On one occasion, in 1041, the plebeians or burghers rose against the whole class of nobles, owing to some insult offered by one of them to a common citizen; and the result was a conflict of three years' duration. In 1059 began the long struggle at Milan and in the rest of Lombardy on account of the married clergy. After a contest of many years, the archbishop of Milan came under the power of the Pope; and the papal discipline was enforced of not admitting any married man to orders.

In the great contest of the investitures, the Lombard cities first aided one side and then the other; and it was during this long struggle that the cities really established their independence, acknowledging no longer the imperial missi, or vicars. The citizens then began to elect a certain number of magistrates, whom they styled consuls, who administered justice and commanded the militia. The rural nobles inscribed themselves among the citizens, and came to reside, at least for part of the year, in the city, in order that they might participate in the political rights. The towns governed themselves in all essential matters, but they owed allegiance to the emperor in certain particulars. No sooner, however, had the towns secured their municipal privileges than they began to fight among themselves; and for a long period Italy was disgraced by brutal contests, in which nearly the whole of the towns were engaged. After a long series of these municipal rivalries and battles, the Emperor Frederick, in 1162, succeeded in quelling a war in which Milan had been especially conspicuous, and in destroying that city. But he so misused his advantage as to raise up a general spirit of resistance against him. In April, 1167, a secret conference was held by deputies of the various cities; and it was resolved to form a league for the common protection, and to assist the Milanese in rebuilding their city. After a severe struggle the towns succeeded against the emperor, and brought about the peace of Constance, in 1183. By this treaty the cities were confirmed in their independent administration;

they had the right of declaring war, of coining money, and other sovereign privileges, but acknowledged a sort of general obedience to the emperor in certain matters. No sooner, however, was this great contest ended than the towns recommenced their struggles with each other, and the contest between parties in each town began again. The annals of Italy for the thirteenth century consist of little else but details of these encounters. It has been said that notwithstanding all these feuds the Italian free cities prospered. The real truth is, that some of them flourished at the expense of the others. It is observed that a number of towns which are mentioned as being of importance in the eleventh century had disappeared in the thirteenth. We read of the glory and wealth of Milan and Florence, but we take no account of the depopulation and calamities of Lodi and of Pisa. Several causes contributed to maintain the wealth of the great Lombard cities during the middle ages—the extraordinary fertility of their territory, their manufactures, in which they were unrivalled in Europe, and the practice of their citizens of lending money at high interest throughout Europe, from whence the name of Lombard became synonymous with that of banker as well as usurer.

In the contests between the popes and Frederic II., in the middle of the thirteenth century, the Lombard cities were divided; and this division increased the anarchy which resulted from mutual jealousy and feuds. In 1260 Martino della Torre was chosen by the towns of Lodi and Novara as their 'signore, or lord. The fashion spread: Cremona chose for its lord the Marquis Pelavicino; Verona chose Martino della Scala; Mantua, the Count San Bonifazio; Ferrara, the Marquis of Este, &c. Martino della Torre having died in 1263, his brother Philip succeeded him as lord of Milan, Lodi, and Novara, to which he added Como, Vercelli, and Bergamo, which towns elected him as their lord. Thus the foundation was laid of that consolidation of Lombardy into one state which in after times was known by the name of the Duchy of Milan. The archbishop of Milan, Otho Visconti, became 'Perpetual Lord of Milan' in 1277; and his descendants, in the fourteenth century, ranked among the most powerful Italian princes. They extended their dominions not only over Lombardy Proper, but south and west of it. Gian Galeazzo Visconti received in 1395, from the Emperor Wenceslas, the title of 'Duke of Milan and Count of Pavia.' The charter of investiture included twenty-six towns and their territories, extending from the hill of Montferrat to the lagoons of Venice. Besides these he obtained also possession, by force or fraud, of Genoa, Lucca, Pisa, Siena, Perugia, Bologna, and other parts of Romagna. In the following century the duchy of Milan became circumscribed within narrower limits. The Venetians took the three provinces of Brescia, Bergamo, and Crema. The Swiss took possession of Bellinzona, and other valleys north of the Lago Maggiore. The duchy of Milan likewise lost its conquests south of the Po. The duchy of Milan, as it came into possession of Charles V., extended about 70 miles north to south from the Alps to the Po, and 60 miles east to west. Its principal cities were Milan, Pavia, and Cremona. Mantua formed a separate duchy until the war of the Spanish succession, when it was taken possession of

by the house of Austria, and annexed to the duchy of Milan. These two duchies constituted Lombardy Proper. The duchy of Milan, during a century and a half that it remained under the Spanish branch of the house of Austria, declined greatly from its former prosperity; but with its transfer to the German branch of that house, Lombardy began to recover its prosperity. By the peace of Campo Formio of 1797, which followed upon Bonaparte's great victories, and by the peace of Luneville, the states of Lombardy were detached from Austria. Milan and Mantua, or Lombardy Proper, were first constituted as a Cisalpine republic; then as an Italian republic, with Bonaparte as president; and were afterwards formed into a kingdom, of which Napoleon made himself king in 1805; and subsequently they were incorporated with Venice, Modena, and other states, into the 'Kingdom of Italy.' In 1814 the Austrian and allied forces occupied the kingdom of Italy, and the Emperor Francis again took possession of his former territories, which were confirmed to him by the congress of Vienna. The districts south of the Po were restored to their former sovereigns; Modena to its duke, and the Legations and Marches to the pope. The Emperor Francis then constituted the territory of Milan, Mantua, and Venice into a kingdom, styled Lombardo-Veneto, under the imperial sway of Austria. But the war of Italian independence in 1859, resulting in the treaty of Villafranca, deprived Austria of her Lombardic provinces, which were then annexed, with the exception of Venetia, to the new kingdom of Italy. The old designation is no longer preserved, but the country has been divided into the provinces of Bergamo, Brescia, Como, Cremona, Milan, Pavia, and Sondrio. Area, 8264 square miles; population, 3,039,055. [ITALY.]

LOMBEZ. [GERS.]

LOMBOK, an island of the Malay Archipelago, lying between 8° and 9° S. lat., and 115° and 116° E. long. It has the island of Bali on the west, and that of Sumbawa on the east. The form of Lombok is nearly square, its mean length and breadth being respectively 53 and 45 miles; area, 1668 geographical square miles, and the population, 250,000, mostly Mohammedans. The surface of the island is mountainous, and one of the loftiest peaks, Goensing Pindjanie, is said to rise to the height of 12,000 feet above the level of the sea. The island is populous and well cultivated. The plains are entirely devoted to rice, the hill sides producing coffee and maize. The chief port is Ampanan, on the western coast. It belongs to the Dutch.

LOMOND, LOCH. [DUMBARTONSHIRE.]

LOMONOSOV, MICHAEL VASILIEVITCH, was born in 1711, near Kholmogor, in the government of Archangel. His father was a serf of the crown, and by occupation a fisherman. The long winters were devoted by Michael to study, and though his stock of books was very small, he made diligent use of them; and being desirous of further instruction, made his way to Moscow, where he distinguished himself so much as to obtain patronage, and to be sent first to the University of Kiev, and afterwards to the Academy of St. Petersburg in 1734, applying himself to mathematics, physics, chemistry, and mineralogy. He was made an associate of the St. Petersburg Academy in 1741; in 1764, professor

of chemistry, and in 1760 rector of the university. He died April 4, 1765.

LONCHOPTERIS, a genus of fossil ferns established by M. Adolphe Brongniart. The species belong principally to the coal formation; but one, *Lonchopteris Mantelli*, is found in the Wealden deposits and in the green-sand.

LONCHURA, a genus of *Fringillidae*, or Finches, of which three species are found in the Deccan, two being restricted to the Ghauts.

LONDON, the capital of the British empire, lies upon both banks of the river Thames and on the hills which inclose the river valley, about 51 miles from its mouth. The centre of the dome of St. Paul's Cathedral, which stands nearly in the centre of what is strictly called the 'City,' is in lat. 51° 30' 47.59" N., and long. 0° 5' 48.2" W. London extends into four counties, Essex and Middlesex on the north, and Kent and Surrey on the south bank of the river.

What little our limited space permits us to say respecting this mighty city, the ancient *Londinium*, is arranged under the following heads:—

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| A. Government; | L. Educational and Literary Resources; |
| B. Divisions; | M. Charitable Institutions; |
| C. Population; | N. Police and Prisons; |
| D. Soil, Temperature, &c.; | O. Public Works and General Statistics; |
| E. Trade and Commerce; | P. Metropolitan Improvements; |
| F. Religion and Education; | Q. General Enumeration of Public Objects; |
| G. Newspaper Press, and Postal facilities; | R. Legal Courts; and |
| H. Objects of Interest; | S. History and Chronology. |
| I. London Worthies; | |
| K. Public Buildings of importance; | |

This classification will, it is hoped, enable the reader to refer more easily to any fact of special interest.

A. *Government*.—That vast congeries of independent districts which we call London is under the control of various administrative bodies—a circumstance which, until the last few years, interfered with every plan of general improvement, and prevented the due execution of many important public works. The City, properly so called, is one of the oldest municipalities in the United Kingdom. It is divided into twenty-six wards, each governed by an alderman, who is elected for life, and, by virtue of his office, is a magistrate. Each ward also sends representatives to the Common Council, which consists of 206 members, and forms with the lord mayor and aldermen a species of civic parliament for the regulation of the police, and the enforcement of social and sanitary laws. The lord mayor is chosen annually by the Livery from the aldermen, generally by seniority, and may be re-elected on the conclusion of his term of office. His residence is at the Mansion House; where, and at the Guildhall, are held the civic courts of justice. He is allowed an income of 8000*l.* a year to maintain the dignity of his office. The sheriffs of London are two in number, and are chosen annually from the Common Council. They are also sheriffs of Middlesex. The Corporation thus composed has a recorder, chamberlain, town-clerk, common sergeant, remembrancer, and other officers.

The freedom of the City was rarely attainable

in ancient times unless by servitude or patrimony. The exceptions were few, and those involved the payment of a heavy fine. Within the last quarter of a century, however, important relaxations have been introduced as to the admission to such a privilege, and in the present year (1866) the expense has been reduced to the insignificant sum of 2*l.* 18*s.* 4*d.* The City archives contain the names of a large number of royal and other illustrious personages on whom the honour has been conferred. At present, the freedom of the City may be obtained—1st. By servitude, being bound to a freeman, according to the custom of the City, and served duly and truly seven years. 2nd. By patrimony: that is, being the son or daughter (unmarried or a widow) of a freeman, born after the admission of the father, and having attained the age of twenty-one years. 3rd. Gift of the City, or honorary freedom. 4th. By redemption or purchase. The admission under this head is as follows:—Persons on the parliamentary register of voters for the City are admitted upon their application to the chamberlain (either with or without the interference of a company), and without the usual presentation to the court for an order. Persons not on the parliamentary register, but who are 10*l.* householders, and rated to the police and other rates, upon producing a certificate (on their application to the chamberlain) from the beadle or other authority of their ward that they are so rated, are admitted (with or without the interference of a company) upon the chamberlain presenting their names to the court, and obtaining an order for their admission. All the foregoing pay 5*s.* on their admission, which fee goes to the Freeman's Orphan School. Persons who hold premises, or carry on their business, not having the qualification of either of the two cases before mentioned, are admitted (with or without the interference of a company) upon a fine, including the 5*s.* to the Freeman's Orphan School, of 2*l.* 18*s.* 4*d.* Lastly, persons neither holding premises, nor carrying on business within the City or its liberties, and wishing to become freemen, on their application, can be admitted (either with or without the interference of a company) on the chamberlain obtaining an order of the court, on their application. The fine in this case, including the 5*s.* to the Freeman's Orphan School, is 2*l.* 18*s.* 4*d.* The sons of aliens, born in England, &c., are now admitted the same as natural-born subjects.

Westminster is governed by a steward and a high bailiff; Marylebone, Chelsea, St. Pancras, Finsbury, Islington, and Lambeth, by vestries, whose members are elected by the ratepayers. Southwark was granted to the citizens by charter 1 Edward III., in order that they might have some control over the thieves who plundered the citizens and then passed into Southwark. It is governed by a high bailiff appointed by the citizens. It constitutes the ward of Bridge Without, and sends a representative to the court of aldermen.

The management of the streets, drains, and buildings of the metropolis was formerly in the hands of various local boards. To remedy the confusion, misgovernment, and other evils that resulted from such a conflict of authorities and interests, an Act of Parliament was passed in 1855 (18 & 19 Vict. c. 14) constituting a body of forty-five persons, to

be elected by the ratepayers, with power of levying rates, and effecting metropolitan improvements, under the title of the Metropolitan Board of Works. These elect one of their own number to act as chairman. They serve for a period of three years. This Board has built for its own use a handsome set of offices on the site of Berkeley House, Spring Gardens, at the cost of 15,000*l*. The City sewers are intrusted to the management of a commission appointed from the members of the Common Council under the Act 11 & 12 Vict. c. 163, and 14 & 15 Vict. c. 91. In 1866 the number of commissioners was increased to 100. [METROPOLITAN LOCAL MANAGEMENT.]

For parliamentary purposes London is divided into eight boroughs, whose population, registered electors, and number of representatives were, according to the latest returns (1866), as follows:—

Borough.	Estimated Population in 1866.	Electors.	Members Returned.
City of London,	104,908 ...	15,534 ...	4
City of West- minster, }	261,389 ...	12,546 ...	2
Marlybone, .	473,091 ...	23,588 ...	2
Finsbury, . .	423,560 ...	25,461 ...	2
Tower Hamlets,	710,179 ...	34,115 ...	2
Southwark, . .	204,872 ...	11,631 ...	2
Lambeth, . . .	319,403 ...	27,754 ...	2
Greenwich, . .	160,086 ...	9,805 ...	2

By the bill for the redistribution of seats, introduced by Earl Russell and Mr. Gladstone in the session of 1866, it was proposed to give two members to the important parishes of Chelsea and Kensington, whose united population amounts to 259,886. It was also proposed to make two divisions of the Tower Hamlets, and give two members to each.

Under this head reference may be made to the City Companies, seventy-five in number, relics of the old trading guilds or fraternities, which in mediæval times were all-powerful within the city in their respective occupations, and with whose privileges the most despotic of our monarchs did not dare to interfere. The names of some of them refer to branches of trade that have long ceased to exist; they now possess but little influence, and are chiefly important as social and charitable corporations; only forty of them have halls.

Twelve of the wealthiest and most ancient are known as the Great Livery Companies. They are—the Mercers, hall and chapel in Cheapside, between Ironmonger Lane and Old Jewry; the Grocers, hall in Princes Street, built 1798–1802; the Drapers, hall and gardens, Throgmorton Street; the Fishmongers, hall, Adelaide Place, London Bridge, built in 1831; the Goldsmiths, hall in Foster Lane, Cheapside, built by Hardwick in 1835; the Skinners, Dowgate Hill; the Merchant Taylors, hall in Threadneedle Street, built in 1667; the Haberdashers, hall in Gresham Street, rebuilt in 1835; the Salters, hall in St. Swithin's Lane, opened in 1827; the Ironmongers, hall in Fenchurch Street, built in 1748; and the Vintners, hall in Upper Thames Street; and the Clothworkers, hall in Mincing Lane. Of the other companies the most important are—the Apothecaries, whose hall (1670) is in Water Lane, Blackfriars; and the Stationers, Stationers' Hall Court, Ludgate Hill.

The Guildhall, belonging to the Corporation of London, was begun in 1411, finished in 1483, and partially destroyed by the great fire in 1666. It was repaired and the walls heightened in 1669, and a frontage built in 1789, from G. Dance's design. A new and handsome roof has just been completed, and at the present time (1866) extensive restorations and improvements are being effected, which, when carried out, will render the hall second only to that at Westminster. The Mansion House was erected, also from Dance's designs, in 1739–41. The principal room is the Egyptian Hall. Another civic memorial is Temple Bar, built by Sir Christopher Wren in 1670.

The revenues of the corporation amounted in the ten years 1856–1865 to 3,183,528*l*. 9*s*. 3*d*. Of that sum 1,067,722*l*. was received for rents; 169,109*l*. 13*s*. 11*d*. for tolls and rents from the several markets; 576,684*l*. 9*s*. 1*d*. for coal and corn duties and stamping weights and measures; the bequests made to the City during the same period amounted to 1356*l*. 13*s*. 4*d*., and the brokers' rents and fees, 46,343*l*. 15*s*. The fees on freedoms, Mayor's Court, and judiciary fees, show that 21,273*l*. was received in that direction. The interest arising from the sale of premises, the Finsbury Accumulation Fund, the City Accumulation Fund, and East India Debentures, 34,919*l*. 9*s*. 4*d*.; reimbursement on account of prisons, 30,731*l*. 1*s*. 1½*d*.; and reimbursement on account of criminal prosecutions, 14,482*l*. 11*s*. 1*d*. There were also reimbursements on account of the Royal Reception Committee, and the Royal Entertainment Committee, amounting to 4230*l*. In addition to these sums there were sundry and casual receipts, including sale of old materials, income duty deducted, surplus profits of the office of chamberlain and comptroller, reimbursement from Lord Mayor's Court Fund, sale of old stores and market reimbursements, amounting in all to 81,728*l*. The loans were as follows:—Loans raised for Metropolitan Cattle Market, 20,000*l*.; loans raised to meet temporary loans outstanding, 370,000*l*.; loan raised for Pauper Lunatic Asylum, 43,500*l*.; Billingsgate Market, advance repaid, 9340*l*.; Gresham Fund, advance repaid, 6972*l*.; Blackfriars Bridge Repairing Fund, advance repaid, 4989*l*. 15*s*. 5*d*.; transfers from reserve and sinking funds, 135,000*l*.; sale of premises in Finsbury, Giltspur Street, Great Tower Street, Upper Thames Street, and Clerkenwell, 32,914*l*. 14*s*. 2*d*.; sale of securities to meet outstanding bonds, 158,816*l*.; produce of Metropolitan Railway shares, 257,437*l*. 10*s*.; and sale of East India stock, 68,262*l*. 7*s*. 6*d*. The last item in the ten years' receipts is sundry balances brought to credit of City's cash, 27,774*l*. 14*s*. 6*d*.; making up the grand total of 3,183,528*l*. 9*s*. 3*d*. The expenditure for the same period amounted to 3,209,859*l*. 5*s*. 6*d*., showing an excess of expenditure over the receipts of the ten years of 26,330*l*. 16*s*. 3*d*.

B. Divisions.—The City, including the liberties, or the districts into which the municipal franchises and privileges extend, is divided into two portions: London within the Walls, and London without the Walls—a distinction which exists no longer except in name. The original wall of the City began at a fort which in part occupied the site of the present Tower of London, whence it was carried northward through the street now called the Minories to Aldgate; thence

diverging to the west it crossed Bishopsgate church-yard to Cripplegate; then southerly to Aldersgate; thence to the north of Christ's Hospital; turning directly south to Ludgate, it then again took a westerly course to New Bridge Street, and accompanied the line of the Fleet River to its junction with the Thames, where another fort marked its termination. The space within the line thus described comprehends London within the Walls, and includes 98 parishes, covering 370 acres. London without the Walls consists of 11 parishes, extending over 230 acres; besides inns of court, hospitals, and other extra-parochial districts locally connected with the above-named parishes. The whole of London Bridge is held to be within the City, together with a plot of ground at the south end of the old London Bridge on the Surrey shore, and called the Bridge-foot. The borough of Southwark, and a part of the manor of Finsbury, are for certain purposes considered to be within the jurisdiction of the City. This, however, forms but a small part of the metropolis, or of London in the large sense of the term, which comprehends the city of London within and without the walls, the city of Westminster, the borough of Southwark, and the parliamentary boroughs of Finsbury, St. Marylebone, the Tower Hamlets, and Lambeth; while, according to the limits adopted by the registrar-general, it also includes numerous other populous and flourishing districts. Taken in its largest sense, then, London now comprises:—

North of the River.

The *City Proper*, bounded on the N. and E. by the borough of Finsbury, on the W. by the city of Westminster, to which Marylebone adjoins on the N.

In the W. there are the districts of Pimlico, Brompton, Chelsea, Kensington, Bayswater, and Notting Hill.

In the N.W., St. John's Wood, Portland Town, St. Pancras, Somers Town, Kentish Town, Camden Town, Islington, Holloway, and Highbury, with Hampstead and Highgate on the ridge beyond.

In the N.E., Kingsland, Stoke Newington, Dalston, Hackney, and Clapton.

In the E., Bethnal Green, Whitechapel, Stepney, Limehouse, Poplar, Old Ford, Bow, and Bromley.

South of the River.

In the E., Southwark, familiarly known as 'the Borough,' and including the river-side districts of Bermondsey and Rotherhithe.

In the W., Lambeth, with the adjacent districts of Kennington, Walworth, Newington, Wandsworth, and Camberwell, extending to Dulwich,ulse Hill, Herne Hill, Brixton, and Battersea.

C. Population.—According to the census returns of 1861, the population of the metropolis amounted to 2,803,921 persons, living in 360,237 houses, spread over 78,027 acres of ground, or about 121 square miles.

The average number of births weekly is 2052, of deaths 1412, showing an increase of population amounting to 640 weekly, which from other sources is swelled to about 1000. The registrar-general, therefore, calculates that in 1865 the population of London had increased to 2,993,513 persons, and that in 1866 it must amount to 3,037,991. The average

annual death-rate speaks favourably as to the general healthiness of London, being only 25 in 1000; and when the new drainage system and other sanitary improvements are fully in operation, we may expect even this moderate rate to be largely reduced.

	1861.	1862.	1863.*	1864.	1865.
Births, ...	96,389	97,418	103,897	102,187	106,722
Deaths, ...	65,001	66,950	72,346	77,723	73,460
Excess of Births over Deaths, }	31,388	30,468	31,551	24,464	33,262
	* 53 weeks.				

The growth of the metropolis during the last decade has been extraordinary, surpassing the increase for a similar period of any other metropolitan city in ancient or modern times. Since the commencement of the present century, the decennial returns of the population have been as follows:—

1801, ...	958,863
1811, ...	1,138,815
1821, ...	1,378,947
1831, ...	1,654,994
1841, ...	1,948,369
1851, ...	2,362,236
1861, ...	2,803,921

By the census of 1861, the population of the City proper was only 112,247; while including that with the entire metropolis, the number was 2,803,921—or *twenty-five times* as great as the former! It may here be remarked, that the population of the City is becoming smaller every year, on account of the substitution of public buildings, railway stations and viaducts, and large warehouses in place of ordinary dwelling-houses. Fewer and fewer people *live* in the city. In 1851, the number was 127,869; it lessened by more than 15,000 between that year and 1861; while the population of the *whole* metropolis increased by as many as 440,000 in the same space of time.

Previous to the census of 1801 it was impossible to arrive at any authentic estimate of the population of London. It was computed by Graunt in 1661 to be 384,000, which number would probably be increased to 460,000, if we added the population of Westminster, Lambeth, Stepney, and other neighbouring places. Gregory Ling, a careful writer, thought that the population of the City and the out parishes amounted in 1696 to 527,560. Between 1740 and 1750 the population is known to have decreased, and at no time during the first half of the last century did it make any rapid increment. Dr. Price supposed that in 1777 it was 543,420, but there is reason to believe that this estimate is too low by 100,000.

D. Soil, Temperature, &c.—London stands, for the greater portion of its area, on a bed of clay from 100 to 200 feet thick, known as the 'London clay,' in the centre of the great chalk basin extending from Berkshire to the east coast. The prevailing wind is the S.W., and there are few places in the kingdom where less rain falls. Taking a series of twenty-one years, from 1840 to 1860, the mean temperature of the air was 49°·2 Fahr., the highest annual mean during that period being 51°·3 in 1846, and the lowest 46°·9 in 1855. The mean pressure of the air during nineteen years was 29·778 inches. The mean annual rain-fall in the same series of twenty-

one years was 23·95 inches, ranging from 17 inches in 1858 to 34·4 in 1852. The mean annual rain-fall, however, extending the computation over forty-five years, was 25·3 inches.

The following results were obtained at Greenwich for 1865:—

	Mean Temperature.	Mean of Barometer. Inches.	Rain in Inches.
Winter, . .	36·5 ...	29·616 ...	6·1
Spring, . .	50·2 ...	29·917 ...	7·2
Summer, . .	62·5 ...	29·860 ...	6·5
Autumn, . .	46·0 ...	29·739 ...	9·2

For the year, 50·3 ... 29·783 ... 29·0

The weight of vapour in a cubic foot of air in the same year was calculated to be 3·6 grains.

E. Trade and Commerce.—Although the exports from Liverpool are much in excess of those of London [LIVERPOOL], the shipping and import trade at the metropolitan port is unsurpassed in the world. The following tables, compiled from the latest official returns, give all necessary information on these subjects, and show the reader the vast extent of the commercial relations and the immense resources of the British capital.

The number of vessels registered as belonging to the port of London in 1866 was as follows:—

	Vessels.	Tons.
Sailing—under 50 tons,	770 ...	26,877
“ above “	1,793 ...	828,698
Steam—under “	181 ...	5,238
“ above “	543 ...	297,671
Total, . .	3,287 ...	1,158,484

The number of entries in 1865 was—

	Vessels.	Tons.
Coastwise—		
Sailing—British, . .	11,115 ...	1,343,589
“ Foreign, . .	3 ...	927
Steam—British, . .	3,805 ...	1,720,864
“ Foreign, . .	— ...	—
From the Colonies—		
Sailing—British, . .	2,061 ...	917,729
“ Foreign, . .	205 ...	118,039
Steam—British, . .	99 ...	64,905
“ Foreign, . .	1 ...	240
From Foreign Countries—		
Sailing—British, . .	2,781 ...	624,902
“ Foreign, . .	3,498 ...	826,796
Steam—British, . .	2,372 ...	875,193
“ Foreign, . .	593 ...	218,338
Total, . .	26,533 ...	6,711,522

The clearances in the same year were—

	Vessels.	Tons.
Coastwise—		
Sailing—British, . .	6,284 ...	433,362
“ Foreign, . .	38 ...	4,267
Steam—British, . .	1,713 ...	684,235
“ Foreign, . .	— ...	—
To the Colonies—		
Sailing—British, . .	1,185 ...	719,147
“ Foreign, . .	42 ...	21,712
Steam—British, . .	77 ...	45,590
“ Foreign, . .	— ...	—

To Foreign Countries—	Vessels.	Tons.
Sailing—British, . .	1,372 ...	251,160
“ Foreign, . .	3,015 ...	750,747
Steam—British, . .	1,840 ...	630,462
“ Foreign, . .	562 ...	208,991

Total, . . 16,128 ... 3,749,673

The imports of cotton, wheat, flour, dye-stuffs, hemp, jute, palm oil, copper ore, lead, saltpetre, and molasses, are greater at Liverpool than London: while in the articles flax, flax-seed, and iron, Hull takes the lead, and Southampton as respects silk and eggs. But in most other articles London has the precedence, and of some enjoys almost an exclusive monopoly.

The following table of the imports of some of the principal articles of foreign and colonial produce, in 1864, shows at once the relative importance of the trade of the port of London with that of the rest of England and Wales:—

	Total imported into England and Wales.	Total into London alone.
Animals, living—		
Oxen, bulls, and cows,	174,226 ...	117,008
Sheep and Lambs, .	478,178 ...	339,511
Cocoa, . . . lbs.,	7,792,259 ...	4,511,810
Corn—		
Wheat, . . . cwt.,	13,522,237 ...	3,531,900
Barley, . . . “	3,475,166 ...	995,111
Oats, . . . “	5,526,119 ...	4,944,848
Flour, ...	3,367,215 ...	686,655
Cotton manufactures, value, . . . }	£803,601 ...	£476,999
Indigo, . . . cwt.,	76,214 ...	65,172
Currants, . . . “	757,807 ...	490,275
Lemons & oranges, bshls.,	1,200,107 ...	657,196
Raisins, . . . cwt.,	309,713 ...	240,144
Hemp, . . . “	803,616 ...	245,409
Jute, . . . “	1,751,553 ...	1,113,413
Hides—dry, . . . “	267,344 ...	190,611
“ wet, . . . “	663,711 ...	273,259
“ tanned, lbs.,	6,265,871 ...	3,264,807
Mahogany, . . . tons,	39,940 ...	22,520
Oil—cocoa-nut, cwt.,	375,218 ...	369,309
Butter, . . . “	931,554 ...	439,963
Cheese, . . . “	712,323 ...	232,498
Eggs, great hundreds,	2,794,004 ...	677,063
Rice, . . . cwt.,	3,185,308 ...	1,507,522
Silk—raw, . . . lbs.,	5,655,401 ...	1,184,037
Pepper, ...	18,536,046 ...	15,656,351
Rum, . . . galls.,	5,321,352 ...	3,915,167
Brandy, . . . “	4,456,937 ...	2,941,004
Geneva, . . . “	156,954 ...	58,704
Sugar—unrefined, cwt.,	8,155,286 ...	4,712,048
“ refined, “	777,002 ...	423,799
Tallow, ...	966,038 ...	599,388
Tea, . . . lbs.,	124,335,285 ...	122,335,601
Tobacco (all kinds), “	66,154,664 ...	33,834,795
Wine, . . . galls.,	13,952,086 ...	11,204,906
Wool, . . . lbs.,	201,055,249 ...	127,160,539
Woollen manufac- tures, value, }	£1,826,394 ...	£695,148

The following were among the principal articles of British produce exported from London in the same year. The total value of the whole exports was

36,554,913*l*, which is only about half the amount of those shipped from Liverpool.

	Quantity.	Value.
Apparel, ...	—	£1,615,582
Gunpowder, ...	6,832,074 lbs. ...	213,038
Beer and ale, ...	334,652 brls. ...	1,166,817
Candles, ...	3,034,301 lbs. ...	111,603
Cotton yarn, ...	6,320,667 " ...	855,871
" manufactures, 250,435,236 yds. ...	6,658,521	
" hosiery, ...	—	293,534
Haberdashery and } millinery, ...	—	1,523,545
Glass, ...	—	406,143
Hardware and cutlery, —	—	1,018,594
Leather (wrought), —	—	1,070,719
Saddlery and harness, —	—	219,215
Linen yarn, ...	8,320,803 lbs. ...	478,504
" manufactures, 18,248,008 yds. ...	676,474	
Copper, ...	350,239 cwts. ...	1,707,472
Iron, of all kinds, 162,295 tons. ...	2,314,841	
Machinery, ...	—	1,028,512
Oil, seed, ...	2,978,824 galls. ...	456,267
Silk (thrown), ...	548,844 lbs. ...	566,616
" manufactures, —	—	241,994
Spirits, ...	998,942 galls. ...	103,121
Woollen manufactures—		
Cloths of all kinds, 4,390,017 yds. ...	893,423	
Worsted and } mixed stuffs, } 28,683,032 " ...	1,817,207	
Flannel, carpets, &c., 6,853,878 " ...	653,272	
Hosiery and other } woollen goods, } —	256,258	

In addition to the exports of British produce, a very large quantity of foreign and colonial goods are re-exported from London to every part of the civilized world. Amongst the principal articles, in 1864, were—cocoa, 1,658,905 lbs.; coffee, 72,578,252 lbs.; cotton, raw, 311,045 cwts.; currants, 88,446 cwts.; raisins, 40,471 cwts.; hemp, 295,446 cwts.; hides, 150,420 cwts.; oil (cocoa-nut), 206,036 cwts.; quicksilver, 1,704,976 lbs.; pepper, 10,616,449 lbs.; rum, 1,731,104 galls.; brandy, 613,270 galls.; spirits unenumerated and mixed in bond, 901,188 galls.; tea, 26,621,583 lbs.; wine, 1,806,762 galls.; wool, 35,727,776 lbs.

The customs revenue received at the port of London is usually as large an amount as the aggregate receipts of every other port in the United Kingdom. The following are the exact totals during the last six years:—

In 1860, ...	£11,781,819
In 1861, ...	11,905,555
In 1862, ...	12,156,115
In 1863, ...	11,974,397
In 1864, ...	11,491,412
In 1865, ...	10,942,913

The decline in the last three years is entirely owing to the great reductions which took place in the customs duties on sugar, tea, wine, and other articles, and not to any decrease in the trade of the port, which year by year continues to expand. One-fourth of the whole tonnage of England belongs to the metropolitan port.

F. Religion and Education.—In 1865 the proprietors of the *Nonconformist* newspaper instituted a most searching inquiry as to the accommodation for public

worship provided by the different religious denominations in London. The returns are admitted on all hands to be substantially accurate, and from them we gather the following rather startling facts. In 1851 the Established Church provided accommodation for 409,834 persons, out of a metropolitan population of 2,362,230. This provision had been increased 25 per cent. in 1865—or in other words, about eight new churches had, on the average, been annually erected by the Established Church since 1851; but as the population has been growing at the rate of 45,000 yearly, the Church of England is at present only able to make provision for the spiritual wants of 17 per cent. of the inhabitants of the metropolis. It is true, that by means of the bishop of London's fund, which already amounts to a quarter of a million, and other agencies, great efforts are now being made to cope with such an appalling amount of religious destitution; but at present it is still doubtful whether the Church in London has satisfactorily fulfilled the mission which the State has intrusted to her. With two exceptions, each of the ten principal Protestant denominations has made greater proportional progress in London during the past fourteen years than the Established Church. The following table will indicate their respective positions:—

	1851. Sittings.	1865. Sittings.	Increase since 1851.	per cent.
Congregationalists, ...	100,436	130,611*	30,175	30
Baptists, ...	54,234	87,559	33,325	61
Wesleyans, ...	44,162	52,454	8,292	19
U. Methodist Free Churches, 4,858	13,422	8,564	176	
Methodist New Connection, 984	6,667	5,683	577	
Primitive Methodists, ...	3,380	9,230	5,850	173
Calvinistic Methodists, ...	800	3,790	2,990	474
Church of Scotland, ...	3,886	5,116	1,250	32
English Presbyterians, ...	10,065	12,952	2,887	28
United Presbyterians, ...	4,280	4,860	580	13

* Including the few Countess of Huntingdon's chapels.

The remaining denominations stand as follow:—

	1861. Sittings.	1865. Sittings.	Increase.	Decrease.
Society of Friends, ...	3,157	3,179	22	—
Unitarians, ...	3,300	4,430	1,130	—
Plymouth Brethren, ...	230	3,360	3,130	—
Foreign Lutherans, ...	3,002	3,502	500	—
Roman Catholics, ...	18,230	31,100	12,870	—
Catholic and Apostolic } Church, ...	2,700	5,020	2,320	—
Latter Day Saints, ...	2,640	1,590	—	1,110

In 1851 the Established Church provided 59 per cent. of the entire religious accommodation, and the Dissenting denominations 41 per cent. During the last fourteen years the former has been increased 25 per cent., and the latter 40 per cent., so that the relation of the two bodies to the entire population is now—Church, 56 per cent.; Dissenters, 44 per cent.

The net result of the efforts of *all* the religious bodies in London to meet the permanent wants of its teeming population is, in the smallest compass, as follows:—

	No. of Places of Worship.	Sittings.	Population.	Proportion per cent. accommodated.
1851, ...	1,097 ...	698,549 ...	2,362,236	30.2
1865, ...	1,316 ...	917,895 ...	3,015,494*	30.4
Increase, 219 ...	219,346 ...	653,258	—	.2

* The registrar-general's estimate for the middle of 1865.

There has thus been an increase of accommodation

in fourteen years of about 31 per cent. Had the addition been three-fold, it would only have sufficed to meet the increase of population. Taking only 52 per cent. of the number of inhabitants (Mr. Horace Mann's estimate) as the maximum to be provided for, the following result is obtained:—

Number of persons unprovided for in London	
in 1851, ...	669,514
Ditto in 1865, ...	831,387

Increased deficiency, ... 161,873

It would thus appear that if all the persons in London who are not physically disqualified, or kept away for any legitimate reasons, were to attend church or chapel at the same time, 52 per cent., or more than one-half the population, would be shut out for want of room: and 161,873 more persons than in 1851 would now be excluded, notwithstanding the considerable augmentation of places of worship. Unfortunately, however, the existing accommodation is by no means well used in many parts of the metropolis, and it is estimated that 300,000, or 33 per cent., of the sittings are unoccupied at the most numerous attended services. No doubt, if the existing accommodation could be better distributed, it would be more used. This matter is put in a very clear light by means of the Summary Table published by the *Nonconformist*. The following will illustrate the great disparity between different metropolitan parishes, and it will be seen that the poorest are invariably the worst supplied:—

	Proportion per cent. of Population accommodated.		Proportion per cent. of Population accommodated.
City of London, 104'4		Shoreditch, ...	17'2
Hampstead, ...	52'7	Bermondsey, ...	19'
St. Martin's, ...	45'4	Stepney, ...	20'2
Hackney, ...	45'4	St. Luke's, ...	21'8
Wandsworth, ...	41'7	Bethnal Green, ...	23'3

The space we have already devoted to this part of our article precludes us from pursuing this interesting subject further, and we can only add that in the preceding estimates we have not included the many indirect forms in which religious zeal has found expression in London—such as the City and other Missions; the Ragged School Union; the Scripture Readers' Society; the Bible Women; and the very large number of Sunday Schools—by which many thousands of the poorer classes, who could never be induced to enter a regular place of worship, are systematically brought under the influence of Christianity.

London became the seat of a diocese about 600–10, when Ethelbert, king of Kent, founded the East Minster on the site of St. Paul's. The diocese comprises London and Middlesex, with small portions of Essex, Kent, and Surrey immediately adjoining, in the province of Canterbury. The benefices number about 350. The bishop is provincial dean of Canterbury, and dean of the Chapels Royal. He ranks next to the archbishop, and has an income of 10,000*l.*, with a seat at London House, St. James' Square, a palace at Fulham, on the Middlesex bank of the Thames, and the patronage of about 109 livings. The dean's income is 2000*l.* The dean and chapter hold the patronage of 46 livings.

G. London Newspaper Press, and Postal Facilities.—As the newspapers issued in the metropolis are conducted by the highest talent, and possess the most authentic sources of information, they necessarily exercise a great influence on public opinion throughout the kingdom, and, indeed, in every civilized country. According to the most reliable estimates, the present aggregate issue of newspapers published in London is—

Daily, ...	800,000
Weekly, ...	2,350,000

The combined annual issue, therefore, approximates to 220 millions.

Of the daily newspapers, 12 are published in the morning, and 10 in the evening. There are 186 published weekly, and 55 at various dates. Besides these there are 548 periodicals of all kinds regularly published in the metropolis.

The London Postal District, to which special rules relate, includes every town and village within twelve miles of the General Post-Office. This vast area (having nearly 4,000,000 inhabitants in 1866) now contains about 1100 post-offices, of which the majority are receiving-houses, and the rest letter-pillars. Of this total number about 400 are Money-order Offices, the whole of which (with a very few exceptions) have within a recent period been made Post-Office Savings Banks also.

There are ten Sub-postal Districts, each of which has a name, an initial abbreviation, and a chief office. They are as follows:—E.C., Eastern Central; W.C., Western Central; N., Northern; N.E., North-Eastern; E., Eastern; S.E., South-Eastern; S., Southern; S.W., South-Western; W., Western; N.W., North-Western.

The 1100 receiving-offices and letter-pillars are pretty equally distributed in these ten districts. The use of the district system is this: If a letter, arriving from the country, has on the outside the district initials as well as the address, it has a fair chance of earlier delivery; and if sent from one part of London to another, the chance of acceleration is still greater. The reason for this is, that much of the sorting is effected at the ten chief district offices, if the initials are given, to the great economizing of time; this cannot be done if they are omitted. Letters are sent out for delivery in London eleven times a day, namely, at 7, 9.30, 11, 12, 1, 2, 3, 4, 5, 6, and 7 o'clock. The whole of these deliveries apply to all the streets within three miles of the General Post-Office. Seven of them apply within the four-mile circle; five within the six-mile circle; and three within the twelve-mile. A letter posted in any part of the metropolis before four o'clock in the afternoon is (if properly initialed) delivered anywhere within the twelve-mile circle the same evening; if posted before six o'clock, it will be delivered the same evening within the six-mile circle. The number of letters now delivered in London annually is nearly 200,000,000, or a fourth of the number delivered in the whole of the United Kingdom.

H. Objects of Interest.—So wealthy and powerful a city, the metropolis of a mighty empire, and the commercial centre of the world, is necessarily rich in all those objects of art and science, of national splendour and historical interest, which attract the admiration of the stranger, and afford a constant

source of pleasure and profit to the critic. A volume might well be devoted to their enumeration, and in these pages we can do no more than point out what everybody should not fail to see, leaving out of the question all that everybody should see. The artist and connoisseur, then, must not neglect the National Gallery, which contains a noble collection of the masterpieces of the greatest painters; the Queen's private gallery at Buckingham Palace; the works of art at South Kensington; the Bridgewater and Grosvenor galleries; the Duke of Devonshire's gallery; Lord Lansdowne's, Lord Ashburton's, Lord Dudley's, Mr. Baring's, and Miss Burdett Coutts' collections; and the Dulwich Gallery. For the productions of contemporary artists, they must repair to the Royal Academy of Arts, the British Institution, and the exhibitions of the different societies of painters.

The sculptor will find ample material for thought and study in the fine specimens of ancient marbles at the British Museum, in the sculpture at St. Paul's and Westminster Abbey, the admirable collection of casts at the Crystal Palace, and Flaxman's models at University College.

The architect in every part of London will discover much to admire, and examples of the various orders on the grandest scale. Such are the Norman chapel in the Tower; Westminster Abbey; Westminster Hall; Temple Church; the Guildhall Crypt; and Lambeth Palace: Inigo Jones' works—The Banqueting House, Whitehall; St. Paul's, Covent Garden; the Water Gate anciently belonging to York House; Lincoln's Inn Chapel; and the Piazza, Covent Garden: Sir Christopher Wren's churches—especially St. Paul's Cathedral; St. Stephen's, Walbrook; St. Mary-le-Bow; St. Bride's, Fleet Street; St. Magnus', London Bridge; St. James', Piccadilly; and St. Michael's, Cornhill. We may also name Sir Charles Barry's *chef d'œuvre*, the new Houses of Parliament; St. Margaret's Church, Wells Street; the Mansion House; Burlington House; Somerset House; London, Waterloo, and Westminster bridges; the railway bridges; the Grosvenor, Charing Cross, Langham, Cannon Street, Great Northern, Great Western, Westminster Palace, and London Bridge hotels; the Bank of England; St. Stephen's Church, Rochester Row; the Reform and Carlton Club-houses; the British Museum; All Saints Church; Cavendish Square; Lincoln's Inn; Goldsmith's Hall; the Treasury, Whitehall; Bridgewater House; and the palatial buildings recently erected by various assurance societies, bankers, and merchants.

To the antiquary we may recommend an examination of the Tower, Westminster Abbey, the Chapter House (about to be restored by G. G. Scott), the London Stone and remains of old London Wall, St. John's Gate (Clerkenwell), Lambeth Palace, St. Mary Overy's, and the Temple Church.

The pleasure seeker will find enough to content him in the various theatres and music halls, the Horticultural Gardens, Kew Gardens, Hyde Park and Rotten Row, Kensington Gardens, the Zoological Gardens, Regent's, Victoria, and Battersea Parks, the Thames Tunnel, the *Times* and *Daily Telegraph* newspaper offices, Barclay & Perkins' brewery, the cricket ground of the famous Marylebone Club, Cremorne Gardens, the Dulwich Gallery, Tussaud's

Exhibition, Greenwich Park, and, above all, the Crystal Palace.

The principal theatres of the metropolis are—Her Majesty's, or the Opera House, in the Haymarket, the largest of the kind in Europe, with the single exception of La Scala, at Milan. Built, in 1790, from the designs of Michael Novosielski, it was enlarged and altered by Nash and Repton in 1816. Covent Garden Theatre, or the Royal Italian Opera House, Bow Street, Covent Garden, is the third theatre erected on the same site. In 1847 the second of these was converted into an opera house, and in 1856 was destroyed by accidental fire. The present building (E. M. Barry, architect) was completed in the space of six months, at the cost of 80,000*l.*, and nearly equals the famous La Scala in point of size, as it can accommodate 2000 persons. Drury Lane Theatre (B. Wyatt, architect) is the oldest existing theatre in London, and it was opened in 1812 with a prologue written by Lord Byron. The portico in Brydges Street was added during Elliston's management (1819–26), and the colonnade in Little Russell Street a few years after. Within the vestibule is a marble statue of Edmund Kean as Hamlet. The Haymarket Theatre was erected by Nash, and publicly opened in 1821 (July 4). Among its managers, Foote, the Colmans, and Buckstone may be named. The Adelphi Theatre, opposite Adam Street, Strand, has lately been rebuilt by its lessee, Mr. B. Webster. The first house on its site was named the Sanspareil, and was built by one Scott, a colour-maker. The present theatre, 70 feet broad by 107 feet deep, possesses seats for 1400 persons. Astley's Amphitheatre, Westminster Bridge Road, Lambeth, and the City of London Theatre, Shoreditch, are chiefly used for melodramas. St. James', King Street, was built by Braham, the singer, at a cost of 26,000*l.*, and was opened in 1835; and the Lyceum, Wellington Street, Strand, was constructed from Beazley's designs in 1830, at the expenditure of 35,000*l.* The Marylebone, Church Street, Paddington, built in 1842, enlarged in 1854, will hold 2000 persons; the Olympic, Wych Street, Strand, was constructed in 1849; the Pavilion, Whitechapel Road, was erected in 1859, and will contain 3500 persons; the Prince of Wales, Tottenham Court Road; the Princess', Oxford Street, constructed in 1830 from Nelson's designs, cost 47,000*l.*; Sadler's Wells, Islington, built in 1764, is one of the oldest theatres in London; the Garrick, Whitechapel; the new Royalty, Soho; the Surrey, Blackfriars' Road; the Victoria, Waterloo Road; the Standard, Shoreditch, stands opposite the Great Eastern Railway station; and the Strand, opposite Wych Street, is a favourite little theatre.

The Clubs of London are luxurious social institutions, to which no other city can present a parallel. The principal are situated in Pall Mall and Waterloo Place, a region which has aptly been designated *Club-land*. The Athenæum is chiefly frequented by literary men; the Senior and Junior United Service, by naval and military officers. The Reform and the Carlton are the respective head-quarters of the two great political parties. Then we have the Travellers'; the Army and Navy; the Guards'; the Conservative; Arthur's; Brook's (the famous Whig Club); White's,

and Boodle's, now principally patronized by elderly country gentlemen; the Oriental; the Oxford and Cambridge, for members of the two universities; Naval and Military; the Civil Service; the Gresham; the Volunteers' Club; the Union; the University; the City and the New City Clubs, for merchants, bankers, and professional men; and the great literary club, known as the Garrick. The stranger may obtain admission to see some of these clubs by proper introductions to their members.

I. London Worthies.—The following illustrious personages were natives of the great metropolis:—Becket, archbishop of Canterbury; Sir Thomas More; Lord Bacon; the great earl of Stafford; the earl of Chatham; William Camden; John Stow, the historian; Geoffrey Chaucer, the father of English poetry; Edmund Spenser; John Milton; Ben Jonson; Abraham Cowley; Pope, the poet; Thomas Gray; Lord Byron; Inigo Jones, the architect; Hogarth; William Penn, the founder of Pennsylvania; Horace Walpole; and Charles James Fox. It would be easy to extend the list.

K. Public Buildings of Importance.—The British Museum, Great Russell Street, Bloomsbury, was first opened to the public in 1759, the trustees having purchased Montague House from Lord Halifax for the reception of certain valuable collections, among which were those of Sir Hans Sloane and the Cottonian and Harleian MSS. A full description of the building and the new reading-room will be found in the article *BRITISH MUSEUM*.

The South Kensington Museum at Brompton is situated about one mile distant from Hyde Park Corner, near the site of the International Exhibition of 1862. The ground was bought at a cost of 60,000*l.*; and a further outlay of 140,000*l.* has been made on the building and on those parts of the collections that have been purchased. The cost of management is about 7000*l.* a year.

The collections consist of—

1. Objects of ornamental art.
2. British pictures, sculpture, and engravings.
3. Architectural models, casts, &c.
4. School furniture, books, diagrams, models, and educational appliances.
5. Building materials, stone, bricks, tiles, glass, &c.
6. Nutritive substances.
7. Animal products employed in the arts, leather, furs, feathers, wools, &c.
8. Models of patented inventions, machines, &c.
9. Reproductions, by means of photography and casting, of antique sculpture and paintings.

Visitors are also shown a treasury of preserved articles from China, and collections of rhinoceros' hides and elephants' trunks, of china and pottery ware, glass, jewellery, fancy work in metals, mosaics, carvings in wood and ivories, &c., both antique and modern. With the exception of the Turner pictures, which are now in the National Gallery, Trafalgar Square, all the paintings of the English School belonging to the nation are exhibited at the South Kensington Museum, in galleries well lighted from above.

The collection of British pictures was commenced by Mr. Sheepshanks, and bequeathed by him to the Museum. The gift has been valued at 52,895*l.*; and was followed by a gift of water-colour paintings by Mrs. Ellison, valued at 8000*l.*

The National Gallery occupies the northern side of Trafalgar Square, and stands on the site of the King's Mews. It is divided between the national collection of paintings of the old masters, filling the western half; and the Royal Academy, occupying the eastern half. Originally founded in 1824, the present building was erected in 1832–38, from the designs of W. Wilkins, R.A., at the cost of 96,000*l.* The columns of the portico were those of Carlton House.

The gallery originated in the purchase by government, in 1824, of Mr. Angerstein's collection of thirty-eight pictures for 57,000*l.* In 1826 it received a donation from Sir George Beaumont of sixteen pictures, valued at the time at 7500 guineas; and bequests by the Rev. W. H. Carr, Lord Farnborough, and others, have brought the collection, in less than half a century, to nearly 250 pictures, independently of Mr. Vernon's munificent gift of 162 English paintings.

In the Italian School, we find paintings by the great masters, Raffaele, Da Vinci, Perugino, Correggio, Titian, Caracci, Guido, Claude, Salvator Rosa, and Paul Veronese; in the Spanish School, pictures by Velasquez and Murillo; in the Flemish School, paintings by Van Eyck, Rubens, Van Dyck, Rembrandt, Cuyp, and Teniers; in the French School, by Bourdon and the two Poussins; and in the English School, by J. M. W. Turner, R.A., bequeathed to the English nation, on condition that they should hang as companions to the Claudes in the National Gallery. Considerable alterations are at present contemplated in the building, which will much improve its architectural character, and provide additional accommodation for its rapidly increasing collections.

St. Paul's Cathedral is the most prominent object in the metropolis. Its lofty dome, seen for miles around, stands at the head of Ludgate Hill, where a church is said to have existed four hundred years before the Conquest, but it was burnt down in 1666, during the great fire of London. An entirely new edifice was then erected under the auspices of Sir Christopher Wren, and was first opened for divine worship in 1697.

The cathedral is built in the form of a cross, 514 feet in length, by 286 in breadth. Outwardly, the walls exhibit a double range of windows; there are three porticoes at as many entrances on the north, west, and south, of which that on the west is the principal, facing towards Fleet Street, with twelve lofty Corinthian pillars below, and a second order carrying the pediment above. The angles are crowned with handsome bell-towers, the size of ordinary church steeples, and 222 feet high. It is strange that, in relation to the best known building in London, great discordance exists concerning the total height. Wren's son, in the *Parentalia*, simply states that the lantern is 330 feet from the ground; Maitland gives the total height at 340 feet; many authorities name 360 feet; while several hand-books and guides, following the pamphlet sold in the cathedral, raise it to 404 feet. This last statement agrees with the well-known tradition that St. Paul's is twice as high as the Monument. A careful examination of the vertical section, however, shows that the height is about 356 feet above the marble pavement of the cathedral, 375 above the level of the crypt, and 370 above the pavement of the churchyard. It

will thus be sufficiently near the truth to say that St. Paul's is 365 feet high.

There are two domes, an outer and an inner, having a brick cone between them. The inner dome has six paintings, relating to the life of St. Paul, and painted by Sir James Thornhill. The organ has been placed on the north side of the choir, and the screen on which it lately stood has been removed, thus throwing open the beautiful choir to view from the nave.

The various parts of the building comprise—the whispering gallery, which renders every whisper audible from side to side; the library, containing chiefly ecclesiastical works for the use of the chapter; and the two golden galleries, at the top of the inner and outer domes. The ball and cross, reached by more than 600 steps, are at the summit of the building; the ball, about 6 feet in diameter, being reached with great difficulty. The clock-work and great bell excite much attention from visitors. The pendulum measures 14 feet in length, while the mass at its extremity is one hundredweight. The great bell, which is only tolled when a member of the royal family dies, is placed in the southern turret above the western portico, weighs $4\frac{1}{2}$ tons, and is 10 feet in diameter.

During the administration of the present dean (the Rev. Dr. Milman) much has been done to improve and embellish the interior of the cathedral, and to complete it according to the magnificent design of its great architect.

Westminster Abbey is situate opposite the Houses of Parliament. In early times its site was a small insular tract, surrounded by the waters of the Thames, and called Thorney Island. Here a monastic institution was founded, which became a ruin during the reign of the Confessor, who raised an abbey among the shattered remains. The ground-plan, as usual, bore the form of a cross. Various privileges and endowments were granted to it, and the edifice assumed a great degree of architectural grandeur. It soon became a place for the coronation of our monarchs, and William the Conqueror was crowned here in 1066. The Abbey was enlarged by Henry III. and Edward I., and continued nearly in the state they left it, until Henry VII. added a chapel to the original structure, in the Perpendicular style, upon which the highest skill of the architect and sculptor was lavished. It was universally regarded as one of the most splendid edifices of the age, and was specially reserved as the place of sepulture of our English sovereigns.

During the reign of Henry VIII. the abbey was considerably defaced; but on the surrender of its revenues, the king raised Westminster to the dignity of a city, and its abbey was constituted a cathedral. In 1855, however, it was united to the see of London. In the reign of William and Mary it was thoroughly repaired, and the towers added to the western entrance, under the direction of Sir Christopher Wren. The present length of the abbey is 416 feet; breadth of the transept, 203 feet; at the nave, 102 feet; height of the west towers, 225 feet. The exterior measurement, including Henry VIII.'s chapel, is 530 feet.

The interior is of great magnificence, and displays grand masses of marble columns separating the nave from the side aisles. A screen, on which the organ

rests, divides the nave from the choir; whilst the walls are covered with a profusion of sepulchral monuments. The northern window is richly ornamented with stained glass. At the eastern end of the choir stands the chapel of Edward the Confessor, containing the shrine of St. Edward. Here also is the coronation chair of the Scottish kings, brought from Scone by Edward I. in 1297; and the chapel of Henry VII., in which lie the ashes of Queens Mary and Elizabeth. The magnificent tomb of Henry VII. and his queen is placed in the body of this chapel, in a curious chantry of cast brass, admirably executed, and interspersed with effigies, armorial bearings, and devices relating to the union of the Red and White Roses.

Statues are numerous in the abbey, and are chiefly contained in side chapels, of which there are several: viz., St. Benedict's, St. Edmund's, St. Nicholas', St. Paul's, St. Erasmus', John the Baptist's, and Bishop Islip's, besides those of Henry VII. and Edward the Confessor. The choir, transept, and nave also contain many specimens of sculpture, from the chisels of Flaxman, Chantrey, Roubiliac, Bacon, Westmacott, Gibson, Behnes, and others. Poet's Corner is the famous receptacle of the busts of English worthies. The last person of eminence buried in the abbey was the venerable Viscount Palmerston, so justly esteemed as an English statesman. The cloisters and the chapter house contain some curious old effigies. Westminster Abbey is a collegiate church, with a dean and chapter, who possess considerable authority over the adjoining district, and a revenue of about 30,000*l.* per annum.

The Temple Church belongs to the two Temples—the Inner and Middle. The members of the former occupy the southern half, and those of the latter the northern. The entrance doorway is of great interest. The Round Church, 58 feet in diameter, affords one of the early examples of pointed arches in this island. The clerestory is pierced by six Romanesque windows, whilst the vaulting is supported by six clustered pillars of Purbeck marble, with boldly sculptured capitals. The Rectangular Church, or Choir, is in the Early English style. It is 82 feet by 58 feet, with a height of 60 feet, the roof being painted with Arabesques, and triple lancet-headed windows admitting light. The great east window is ornamented with modern stained glass; and on the wall, beneath the windows, the hymn of St. Ambrose is inscribed. The organ was built by one Schmydt, after a competition with another builder, which Judge Jeffreys was called upon to decide. The most notable of the monuments scattered about the church are those of Plowden, the jurist; Anne Lyttleton; Howell, the old letter-writer, and an ancestor of Gibbon, the historian. In the Triforium may be seen a bust of Lord Chancellor Thurlow. The walls are inscribed with texts from the Latin scriptures. In 1839–42 70,000*l.* were laid out in restorations. The preacher at this church is designated the Master of the Temple; his house is north-east of the choir, and has a small garden attached to it.

Westminster Palace, which occupies a site close to the river and to the beautiful new Westminster Bridge, was constructed in consequence of the burning of the old Houses of Parliament in 1834. It is

the finest modern Gothic structure in the world—at least for civil purposes—and covers an area of nearly eight acres. Among the multitudinous objects of interest in this gorgeous building, which has cost more than two millions sterling, the following may briefly be mentioned:—The House of Peers is 97 feet long, 45 wide, and 45 high. It is profusely gilt and painted, and the windows are ornamented with deep-tinted stained glass. At the southern end is the splendidly canopied throne; near the centre is the woolsack; at the end and sides are galleries for the peeresses, reporters, and strangers; and on the floor of the house are the cushioned benches for the peers. Six frescoes, representing 'The Baptism of Ethelbert,' by Dyce; 'Edward III. conferring the Order of the Garter on the Black Prince,' by Cope; 'Henry, prince of Wales, committed to prison for assaulting Judge Gascoigne,' by Cope; 'The Spirit of Religion,' by Horsley; and the 'Spirit of Chivalry' and 'The Spirit of Justice,' by Maclise—occupy compartments at the ends of the chamber, and in niches between the windows stand eighteen statues of barons who signed Magna Charta. The House of Commons, 62 feet long, 45 broad, and 45 high, is less elaborate than the House of Peers. The Speaker's chair is at the north end, and there are galleries along the sides and ends. In a gallery behind the speaker sit the reporters for the newspapers.

The two chambers mentioned do not constitute the whole palace. On the side nearest Westminster Abbey are St. Stephen's Porch and Corridor, the Chancellor's Corridor, the Victoria Tower, Royal Staircase, and numerous courts. At the south end are the Guard Room, Queen's Robing Room, Royal Gallery, Royal Court, and Prince's Chamber. Libraries and committee-rooms line the river. On the north are the Clock Tower and Speaker's residence. The Victoria Tower, at the south-west angle of the palace, is one of the finest in the world, and is 75 feet square and 340 feet high. The Clock Tower is 40 feet square and 320 feet high, and has four fine bells, varying from $1\frac{1}{2}$ and $4\frac{1}{2}$ tons in weight, to strike the quarters. The clock is the largest in this country. There are four dials on the four faces of the tower, each $22\frac{1}{2}$ feet in diameter; the hour figures are 2 feet high and 6 feet apart; the minute-marks are 14 inches apart; the hands weigh more than 2 cwt. the pair; the minute-hand is 16 feet long, and the hour-hand 9 feet; the pendulum is 15 feet long, and weighs 680 lbs.; the weights hang down a shaft 160 feet deep. Besides, there is a Central Tower, rising over the octagonal hall to the height of 300 feet.

St. James' Palace is an inelegant brick structure, fronting Pall Mall. It occupies the site of a leper's hospital, dedicated to the saint. It is asserted that Holbein designed the house; which has been much favoured by royalty. Here Mary resided and died; here Charles II., the 'Old Pretender,' and George IV. were born. Queen Anne, the Georges, and William IV. have also made the palace their residence; and here the emperor of Russia, king of Prussia, and Marshal Blucher lodged in 1814. It is still used by the sovereign on state occasions, such as courts, levees, and drawing-rooms.

Westward lies the Ambassador's Court, and beyond it the Stable Yard, where stands Stafford House, the

splendid residence of the duke of Sutherland. The state rooms are in the south front, looking across the gardens into the park, and contain a few pictures, chiefly portraits.

On the site of Buckingham Palace originally stood the mansion, built in 1703, of Sheffield, duke of Buckingham. George III. purchased it in 1761 for 21,000*l*. It retained its original condition until 1825, when Nash undertook its reconstruction. In 1837 Queen Victoria took possession of the palace, and she has continued to reside there when in London ever since. Extensive alterations have been made to render it more suitable for her Majesty, and a new front erected from the designs of Mr. Blore. The private apartments extend along this front.

The east wing is 360 feet long and 77 feet high, and 70 feet in advance of the other wings, and it cost 150,000*l*. The state ball-room is 111 feet long by 60 wide, and here are hung Vandyck's Charles I. and his Queen, and portraits of Queen Victoria and the late Prince Consort, by Winterhalter; the adjoining Supper-room is 76 feet by 60. The Library contains a valuable collection of books made by the present sovereign; the Green Drawing Room, in the middle of the east front, opens upon the upper portico; the Throne Room, 64 feet long, is gorgeously decorated with crimson satin and gilding; and the Picture Gallery, 180 feet long by 26 wide, runs along the centre from north to south, opening at each side into suites of apartments.

In the gardens, 40 acres in extent, stands a pavilion, embellished with many paintings; and the chapel, where the Court attends divine service.

The Tower of London is a cluster of houses, towers, barracks, armouries, warehouses, and prison-like edifices, situated on the north bank of the Thames. The date of its erection is undecided; but it is well known that the great square tower in the centre, called the White Tower, was built by William the Conqueror. Such is the origin of the fortress: by successive monarchs it was greatly extended, and in the twelfth century received the addition of a moat, which was much improved by Charles II., and finally drained in 1843.

Of the various divisions of the Tower, the Horse Armoury is contained in a gallery 150 feet long by 33 feet wide, built in 1826 on the south side of the White Tower. The general arrangement of the gallery was confided to Sir Samuel Meyrick. The centre is occupied by a line of equestrian figures, 22 in number, and clothed in the armour of various reigns, from the thirteenth to the seventeenth century. Queen Elizabeth's Armoury, entered by a narrow staircase, is situated in the White Tower, and has walls 14 feet in thickness. The Jewel House within the Tower was kept by a particular officer called the 'Master of the Jewel House,' formerly esteemed the first knight bachelor of England. The Regalia are arranged in a glazed iron case in the centre of a well-lighted room. The Lion Tower, containing the Tower Menagerie, was one of the sights of London from the reign of Henry III. to that of William IV., when the few animals remaining were removed to the Zoological Gardens in Regent's Park.

Amongst the eminent persons at different times confined in the Tower, we can but enumerate—

Wallace; John, king of France; Queens Anne Boleyn and Catherine Howard; Sir Thomas More; Archbishop Cranmer; the Protector, duke of Somerset; Lady Jane Grey; Sir Walter Raleigh (thrice a prisoner); Lady Arabella Stuart; Sir John Eliot; Sir William Davenant, the poet; Sir Harry Vane; Lord William Russell; Algernon Sidney; Judge Jeffreys; the duke of Marlborough, 1692; Sir Robert Walpole; Bishop Atterbury, 1722; Lord George Gordon; Sir Francis Burdett, 1810; and Arthur Thistlewood, 1820, the last person sent prisoner to the fortress. Amongst the persons executed or murdered therein are—Henry VI.; duke of Clarence, brother of Edward IV.; Edward V. and the duke of York; Sir Thomas Overbury; and Arthur Capel, earl of Essex. Whilst the following were born there:—Carew Raleigh, son of Sir Walter; Mrs. Colonel Hutchinson; and the countess of Bedford, mother of Lord William Russell. Of the celebrated persons executed on Tower Hill we may name, Sir Thomas More; Cromwell, earl of Essex; the earl of Surrey, 1541; the Protector Somerset, 1552; Dudley, earl of Warwick, 1553; earl of Strafford, 1641; Archbishop Laud; Algernon Sidney; and the duke of Monmouth, as the most eminent.

The Bank of England covers a quadrangular space of four acres, with a street on every side; and its buildings are of one story, having no windows towards any of the thoroughfares. The external architecture is not such as to attract much attention, if we except the north-west corner, which was copied from the temple of the Sibyl at Tivoli. The interior, which is well arranged for business, contains nine courts in addition to the offices.

This powerful establishment, which occupies so conspicuous a position in commercial and financial affairs, was planned by a Scotchman named Pater-son, in 1691, and received its charter under the designation of 'The Governor and Company of the Bank of England,' from William III., in 1694. The capital of 1,200,000*l.* was lent to the government. The company in 1734 removed to the site of the present establishment, having previously carried on business at Grocers Hall. The history of the Bank includes many dangerous crises, amongst which are the rebellion of 1745, when its payments were made in sixpences to save time; the war with France, at the end of last century, when cash payments were suspended by Parliament and not resumed until 1823; and the commercial difficulties in 1825, when its treasure was reduced to a very low ebb. The Bank has met with some heavy losses from forgeries; by Astlett it lost 320,000*l.*, and by Fauntleroy, 360,000*l.*

The affairs of the Bank are regulated by a governor, deputy-governor, and twenty-four directors, eight of whom go out of office every year. The proprietors of stock to the value of 500*l.* are qualified to vote for the election of directors. The governor must be a proprietor to the amount of 4000*l.*, the deputy-governor to that of 3000*l.*, and a director to that of 2000*l.* The number of persons employed in the Bank are about 900. The salary of a clerk entering at seventeen is 50*l.*, and that of the head of a department 1200*l.* Altogether, the sums paid in salaries amount to 210,000*l.* annually. The profits of the Bank arise from different sources: notes are issued,

deposits received, bills discounted, loans made, &c. Besides, the remuneration derived from the management of the national debt, book-keeping, attendance to the transfers, receipt of the taxes, payment of discount, &c., amounts to about 200,000*l.* a year. [BANK OF ENGLAND.]

The Royal Exchange, a quadrangular edifice on the west side facing down Cheapside, was erected for the convenience of merchants and bankers, after the designs of William Tite, and was opened by Queen Victoria, October 28, 1844. The sculpture in the pediment was by R. Westmacott, jun. The Exchange consists of an open court surrounded by a colonnade, with a marble statue of her Majesty, by Lough, opposite the façade. It is said to have cost 180,000*l.*, but is now much disfigured externally by shops, in opposition to the firmly expressed wishes of its architect.

In the east part, up stairs, are Lloyd's Subscription Rooms, which are entered by the area, near the eastern gate. On the architrave of the north façade of the Exchange are three inscriptions in relief, each divided by a simple moulding. The one on the left of the spectator is the City motto, '*Domine, dirige nos,*' and that on the right, '*Honor Deo.*' That of the central department is '*Forton a my,*' the motto of Sir Thomas Gresham, the founder of the first Royal Exchange, 1566, which was opened by Queen Elizabeth, 1570.

The Custom House, situated in Lower Thames Street, between London Bridge and the Tower, and facing the river, occupies a site on which smaller custom houses have formerly stood. It was erected in 1814–17, after the designs of Mr. David Laing; but in consequence of a defect in the piling the original structure was pulled down, and the present front erected by Sir Richard Smirke. Nearly one-half of the customs receipts of the United Kingdom is collected here.

The most noticeable feature of the building is the Long Room, 190 feet long by 66 feet broad. The quay is a pleasant terrace fronting the Thames, whence a fine view of the shipping is obtained.

A custom house was erected in 1804; a yet larger one in 1559, which was burned down in 1666; a new one, built by Charles II., burned down in 1718, rebuilt in 1718, was again destroyed February 12, 1814; the present edifice was opened for business May 12, 1817.

The General Post-Office, near St. Paul's, Cheap-side, and Newgate Street, stands on the site of the Collegiate Church of St. Martin's-le-Grand, and was built 1825–29, from designs of Sir R. Smirke.

The building is a good specimen of the Ionic style, with a lofty portico, beneath which is the entrance to the spacious hall, 80 feet long, 60 feet wide, and 53 feet high. A money order office has been built on the opposite side of the street, and increased accommodation has been added to the Post-Office for the easier transaction of its rapidly-increasing business. At the north end is a courtyard, in which the various mail carts congregate. At other portions of the building the foreign, colonial, and Indian mails are despatched.

The palatial building in the Strand, known as Somerset House, was erected in 1549 by the duke of Somerset, Protector during a part of the minority of

Edward VI. On his attainder it became crown property and a royal residence. That edifice was entirely removed in the reign of George III.; and on the spot was erected, from designs of Sir William Chambers, about the year 1780, the fine quadrangular structure which is now devoted to the accommodation of various government offices. This building has its main front towards the Strand; while on the rear it presents a façade to the Thames, which it closely overhangs. The river frontage is 600 feet long, and is an excellent specimen of Palladian architecture. The ranges of buildings contain rooms for two or three learned societies, and offices for several government departments—especially those of such portions of the Admiralty as cannot be accommodated at Whitehall, the Inland Revenue, and the Registrar-general. Nearly a thousand clerks are employed in these various offices. Most of the other government offices sink into insignificance when compared with the three structures just described. The Admiralty, in Whitehall, is the head-quarters of the Naval Department; the front of the building was constructed about 1726; and the screen by the brothers Adam about half a century later. Most of the heads of the Admiralty have official residences connected with the building. The Horse Guards, a little further down Whitehall, is the head-quarters of the commander-in-chief. It was built about 1753, and has an arched entrance leading into St. James' Park. The Treasury, the Home Office, the Privy Council Office, and the Board of Trade, together occupy the handsome range of buildings at the corner of Whitehall and Downing Street. The interior of this building is in great part old; after many alterations and additions, the present front, in the Italian Palazzo style, was built by Sir Charles Barry in 1847. The Foreign Office, Colonial Office, and Exchequer Office, occupy gloomy and dilapidated houses in Downing Street, or near at hand. After many years of debate and difficulty, large, elegant, and costly Foreign and India Offices are being constructed southward of Downing Street.

The War Office comprises several houses thrown into one, in Pall Mall; it is a large but heterogeneous building, one among many makeshifts of the kind. An immense rental is paid by the government for the hire of private houses in various parts of Westminster, for the accommodation of numerous departments not provided for elsewhere; it is believed that this rental, if capitalized, would defray the cost of a new, extensive, and comprehensive series of government offices. The 'Battle of the Styles,' as it has been called, concerning new offices about to be built, was fought for many years between governments, commissions, and committees; it ended in a compromise; the Gothic architect (Mr. G. G. Scott, R.A.) is employed, but an Italian design is being adopted for the new Foreign and India Offices. A noble Gothic building, known as the National Record Office, now in course of completion in Fetter Lane, is destined to receive all the public documents and MSS. relating to this country of ancient and modern times.

The Metropolitan Docks are the finest and most extensive in the world. Farthest down the river are the Dagenham Docks, situated between Barking and Tilbury, on the Essex side of the Thames, now in course of completion, and destined for the accommodation of all classes of vessels entering the port of

London. The average width is 600 feet, and the length about one mile, thus affording nearly two miles of quay. The tidal basin is 450 feet long and 250 feet wide, the entrance gates 70 feet in width, with 27 feet of water on the sill at ordinary high tide, and the minimum depth 12 feet at low water. The cost of construction of the docks, including the freehold of Dagenham Lake and the adjoining lands, altogether about 140 acres, was 220,000*l.* Below Blackwall, just beyond the Lea, are the Victoria (London) Docks. These were completed in 1855, cover an area of 200 acres, and have been the means of introducing many improvements in the accommodation of shipping. The hydraulic lift for raising and supporting ships whilst under repair attracts much attention. Next are the East India Docks, commenced in 1803, and finished in 1806. These consist of two docks and a basin, and were originally constructed for the East India Company. The import dock has an area of 19 acres, the export dock of 10 acres, and the basin of 3—making a total surface of 32 acres. The cast-iron wharf, 750 feet long, is said to weigh 900 tons. The West India Docks, the most magnificent in the world, cover 295 acres, and lie between Limehouse and Blackwall, on the left bank of the Thames. The first stone was laid by the Great Commoner, William Pitt, in 1800, and the docks opened for business two years later. The import division is 170 yards long by 166 wide, and will contain 250 vessels, having an average measurement of 300 tons each. The export dock is a canal about three-quarters of a mile long, and connects Limehouse and Blackwall Reaches. Near the Tower are St. Katherine's Docks, of which the first stone was laid in 1827. They were publicly opened in 1828, 1250 houses, including the old hospital of St. Katherine, having been purchased and pulled down. The architect was Mr. Hardwick, and the celebrated John Telford the engineer of the structure, of which Sir John Hall, the late secretary, was the chief promoter. The total cost was 1,700,000*l.* The area of the docks is about 24 acres, of which 11½ are in water; and the lock is sunk so deep that ships of 700 tons burthen may enter at any time of the tide. Of the London Docks the first and largest (John Rennie, engineer) was opened in 1805, having occupied three years in construction. The New Tea Warehouses, capacious enough to receive 120,000 chests, were erected in 1844–45, and comprise an area of 90 acres. There are 20 warehouses, 18 sheds, 17 vaults, and 6 quays, with three entrances from the Thames. The entire structure cost 4,000,000*l.*, which is the capital of the shareholders. The Commercial Docks consist of five ample and commodious docks on the south side of the river, with an entrance from the Thames. They were opened in 1807, and comprise 49 acres, 40 of which are in water, principally used by vessels engaged in the Baltic trade. The grain stores will hold about 100,000 quarters. The removal of mud, deposited in the docks by the steam navigation of the Thames, costs the company on an average about 1000*l.* a year.

L. Literary and Educational Resources.—The museums and libraries in London open to the public, or easily accessible, are the following:—The British Museum, already described. South Kensington Museum, and Museum of Patent Inventions. Crystal Palace, Sydenham. There are museums and

special collections attached to University and King's Colleges; and (among others) to the Antiquarian Society, Somerset House; City Museum, Guildhall; Royal Institution, Albemarle Street; India Office, Whitehall Yard; Royal Asiatic Society, New Burlington Street; Soane Museum, Lincoln's Inn Fields; Naval Museum, Somerset House; Society of Arts, Adelphi; Trinity House, Tower Hill; Linnean Society, Piccadilly; Royal Botanic Society, Regent's Park; Practical Geology, Jermyn Street; Architectural Museum, South Kensington; War Office, Pall Mall; Royal United Service, Whitehall Yard; London Missionary House, Bloomfield Street, City; Zoological Society, Hanover Square; Entomological Society, Bedford Row; Royal College of Surgeons, Guy's Hospital, Borough; St. Bartholomew's, King's College, and other hospitals, and the Veterinary College, Camden Town, for anatomical preparations; Bank of England; Artillery Company, Armourer's Hall, the Tower, and Woolwich Repository and Arsenal, for arms and armour.

The two chief colleges in London are connected with the London University. This university is a body of persons, not (as many suppose) a building. The body was established in 1837, to confer degrees on the students or graduates of many different colleges in and about London. It occupies apartments at Burlington House, Piccadilly, lent by the government; but it neither teaches nor gives lectures. [UNIVERSITY OF LONDON.] University College, in Gower Street, was originally called London University; but since 1837 the more limited designation has been given to it. It was founded in 1828, on the proprietary system; to afford a good middle-class education at a moderate expense, without limitation as to religious tests. The whole range of university tuition is given, except divinity; with the addition of much fuller instruction in science and in modern languages than was before usual in colleges. The building, with its lofty portico, might possibly have presented a good appearance if the plans of the architect had been carried out; but through want of funds the wings have never been built, and the structure is ridiculously incomplete. King's College, in the Strand, adjoins Somerset House on the east. It was founded in the same year as University College, expressly in connection with the Established Church of England. Gordon College, or University Hall, in Gordon Square, is an establishment mainly supported by Unitarians. New College, at St. John's Wood, for Congregationalists or Independents; the Baptist College, in the Regent's Park; the Wesleyan College, in the Horseferry Road; Hackney College; and several others of less importance—are establishments maintained by various bodies of dissenters; some for educating ministers for the pulpit; some for training schoolmasters and schoolmistresses. Of the buildings so occupied, the handsomest is New College. This was established a few years ago as a substitute for Highbury, Homerton, and Coward Colleges, all belonging to the Congregationalists. Gresham College: this is not a college in the modern sense of the term; it is only a lecture-room. Sir Thomas Gresham left an endowment for an annual series of lectures, and residences and stipends for the lecturers. The charity was greatly misused during the seventeenth and eight-

eenth centuries. Public attention having been called to the subject, a new lecture hall was built a few years ago, at the corner of Basinghall and Gresham Streets, out of the accumulated fund; and lectures are delivered here at certain periods of each year. The subjects are divinity, physic, astronomy, geometry, law, rhetoric, and music. The lectures take place in the middle of the day, some in Latin, some in English; they are freely open to the public; but the auditors, at such an hour and in such a place—surrounded by the busy hum of commerce—are very few in number. Among the training colleges for school masters and mistresses are the National Society's at Chelsea, the British and Foreign in the Borough Road, and the Home and Colonial in Gray's Inn Road. The College of Preceptors, in Queen Square, resembles the London University in this—that it confers a sort of degree or academical rank, but does not teach. Many so-called colleges are either proprietary or private schools.

The chief of the public schools in London is Westminster School. It was founded in 1560, and lies south-west of Westminster Abbey, but very near it. Some of our greatest statesmen and scholars have been educated here. St. Paul's School, situated on the eastern side of St. Paul's Churchyard, was founded in 1512 by Dean Colet, for the education of 'poor men's children.' Like many others of the older schools, the benefits are not conferred so fully as they ought to be on the class designated. The presentations are wholly in the hands of the Mercers' Company. The now existing school-house, the third on the same site, was built in 1823. The Charter House School, near Aldersgate Street, is part of a charity established by Thomas Sutton in 1611. There is an hospital or almshouse for about eighty 'poor brethren,' men who have seen better days; and there is a school for the free education of forty 'poor boys,' with many more whose parents pay for their schooling. Christ's Hospital, or the Blue Coat School, as it is commonly called from the colour of the boys' dress, is situated within an inclosure on the north side of Newgate Street, and is one of the most splendid among the charitable foundations of London. The buildings stand on the site of a monastery of Greyfriars, which was granted by Henry VIII. to the city for the use of the poor; and his son and successor, Edward VI., greatly extended the value of the gift by granting a charter for its foundation as a charity school, and at the same time endowing it with sundry benefactions. The hospital was opened for the reception and education of boys in 1552. Charles II. added an endowment for a mathematical class; and with various augmentations of endowment, the annual revenue is now understood to be not less than 50,000*l*. This income supports and educates nearly 1200 children, 500 of the youngest of whom, and all the girls, are boarded at the town of Hertford for the sake of country air. The management of the institution is vested in a body of governors, composed of the lord mayor and aldermen, twelve common-councilmen chosen by lot, and all benefactors to the amount of 400*l*. and upwards. The children are admitted without reference to the City privileges of parents; about 150 are entered annually. It is undeniable, however, that many children are admitted rather through interest than

on account of the poverty of their parents. After instruction in the elementary branches of schooling, the greater number of the boys leave the hospital at the age of fifteen: those only remaining longer who intend to proceed to the university, or to go to sea after completing a course of mathematics. There are seven presentations at Cambridge, and one at Oxford, open to the scholars. The buildings of the institution embrace several structures of large dimensions, chiefly ranged round open courts, with cloisters beneath; and a church, which also serves as a parochial place of worship. The boys are dressed in the costume selected for them in Edward VI.'s reign; the outer garments consisting of a long dark-blue coat, breeches, and yellow worsted stockings. Merchant Taylor's School, situated in a close part of the city behind the Mansion House, was founded in 1561 by the Merchant Taylors' Company. The present structure was built in 1673, with the exception of some of the class-rooms, which are much more modern. About 260 boys are educated, wholly on the presentation of members of the Company; and there are numerous fellowships at St. John's College, Oxford, open to the scholars. Mercers' Free Grammar School, in College Hill, is a small establishment of similar kind. The City of London School, in Milk Street, Cheapside, is the most modern of these Grammar-schools, as they are called. It was founded in 1835, and forms a useful medium between the old grammar-schools and the modern private schools; it possesses several exhibitions for the more successful senior scholars.

The schools established under the auspices of the National Society, called National Schools, are very numerous, but need not be noticed here. The British and Foreign School Society, in the Borough Road, and the Home and Colonial School Society, in Gray's Inn Road, train up teachers without reference to religious tests; whereas the National Society is in connection with the Church of England. Many very superior schools for girls, under the designation of Ladies' Colleges, have been established in the metropolis within the last few years. Few of the school-houses in London are worth much attention, so far as concerns their architectural features.

Altogether the metropolis may be said to be well provided with the means of educating its children; and of late years a noble effort has been made, by Lord Shaftesbury and others, in the establishment of ragged schools, to extend these advantages to the 'London Arabs,' the lowest and most destitute, the very 'pariahs' of society. The experiment has been attended with so much success as to justify its development on a larger scale.

M. Charitable Institutions.—In no respect is the metropolis more worthily distinguished than in the number and splendour of its charitable institutions, which minister to every want of humanity, and whose aggregate income exceeds the revenue of several important European states. They include hospitals, almshouses, and schools. Among the former are especially noticeable the Chelsea Hospital, for old and disabled soldiers, founded in the reign of Charles II.—the buildings which face the river Thames were the work of Sir Christopher Wren; the Royal Military Asylum, to the north of the hospital, where the children of soldiers are supported and educated; the

Foundling Hospital, Guildford Street, founded in 1739 by Thomas Coram, for the maintenance of illegitimate children; St. Bartholomew's Hospital, Smithfield, founded by Henry VIII., now containing 650 beds, with an income of about 35,000*l.* yearly; St. Thomas' Hospital, opened in 1552, and about to be rebuilt; Guy's Hospital, Southwark, so named from its founder, built in 1722–24, possessing a yearly income of 25,000*l.*; University College Hospital, founded in 1833; Westminster Hospital; Charing Cross Hospital, founded in 1818; St. George's, Great Northern, King's College, the London, St. Mary's, Middlesex, Royal Free; the Dreadnought, for sick and diseased seamen of all nations, who are attended to on board the *Caledonia*, a man-of-war moored in the Thames near Greenwich; Bethlehem and St. Luke's, for the reception of lunatics; the Cancer, Consumption, and Fever hospitals, and numerous other institutions for the treatment of special diseases. These are supported by endowments, legacies, and yearly contributions from the benevolent; their annual income being supposed to be not less than 2,000,000*l.* The local and parochial charities are organized on an equally splendid scale; and their annual revenues—devoted chiefly to the education and apprenticeship of children, endowment and repair of churches, and support of almshouses—cannot be less than 200,000*l.*

Among the charities of London may properly be included its Drinking Fountains, now amounting in number to about 150, where the thirsty thousands of the metropolis may obtain water, day and night, 'without money and without price.' Several of these have been erected at the cost of private individuals, but the majority under the auspices of the Metropolitan Free Drinking Association, and all within a period of six years.

Night refuges have also been established for the poor and needy, where a supper, a bed, and a breakfast are gratuitously supplied; and in winter numerous soup kitchens supply the hungry with a bountiful and nutritious meal. There are about seventy almshouses, and 200 infirmaries, dispensaries, and asylums.

N. Police and Prisons.—An official statement recently published shows the number of men at present employed in the City police, together with the estimated expense for the year 1866, and other particulars. It appears by this return that the City police force consists of 635 men, thus divided:—One superintendent, at 4*l.* 18*s.* 6*d.* per week salary; 2 inspectors, at 3*l.* 6*s.* 7*d.*; 4 ditto, at 3*l.* 1*s.* 6*d.*; 4 ditto, at 2*l.* 16*s.* 4*d.*; 4 ditto, at 2*l.* 11*s.* 3*d.*; 14 station sergeants, at 2*l.* 1*s.*; 12 detective sergeants, at 2*l.* 1*s.*; 25 sergeants, at 1*l.* 14*s.* 10*d.*; 25 ditto, at 1*l.* 11*s.* 9*d.*; 271 constables, at 1*l.* 8*s.* 8*d.*; 150 ditto, at 1*l.* 5*s.* 1*d.*; 123 ditto, at 1*l.* 1*s.* 6*d.*; total, 635 men, at a cost of 47,048*l.* 19*s.*, which includes some extra allowances to some of the detective officers. The salary of the commissioner is 1000*l.* per annum; that of the chief superintendent, 600*l.*; that of the surgeon, 500*l.*; the receiver's salary is 350*l.*; and the clerks' salaries are 467*l.*,—namely, one at 180*l.*, one at 135*l.*, one at 100*l.*, and one at 52*l.* The total amount of expense incurred for the maintenance of the body, including rent of stations, office expenses, and all other items, in 1865 was

63,219*l.* 10*s.* 6*d.*, equal to about 10*d.* in the *l.* on the rateable value of the City property.

The chief office is situated in the Old Jewry, and there are six minor stations, connected with each other, and the central station, by electric telegraph. The Justice Rooms are at the Mansion House and Guildhall.

The Metropolitan Police, established in 1829, are placed under a chief commissioner, responsible to the home secretary of state, at the head office in Great Scotland Yard, Whitehall. The divisions are—

A Whitehall.	M Southwark.
B Westminster.	N Islington.
C St. James'.	P Camberwell.
D St. Marylebone.	R Greenwich.
E Holborn.	S Hampstead.
F Covent Garden.	T Kennington.
G Finsbury.	V Wandsworth.
H Whitechapel.	T.D. Thames Police Division.
K Stepney.	
L Lambeth.	

The body, as at present constituted, includes 21 superintendents, 217 inspectors, 798 sergeants, and 6452 constables. The superintendents receive salaries varying from 150*l.* to 325*l.* per annum; the inspectors from 81*l.* 18*s.* to 199*l.* 19*s.* 8*d.*; the sergeants from 63*l.* 14*s.* to 109*l.* 4*s.*; and the constables from 49*l.* 8*s.* to 78*l.* The total yearly expenditure amounts to 630,604*l.* 15*s.* 9*d.* This is defrayed in part by a grant from the Treasury, amounting to 156,481*l.* 1*s.* 5*d.*, and in part by a police rate levied from the various metropolitan parishes, which yielded (1865-66) 389,873*l.* 13*s.* 3*d.*

The London Prisons are as follows:—Bridewell Royal Hospital, New Bridge Street; Newgate Prison, Old Bailey, rebuilt 1782, the common gaol for Middlesex, for prisoners within the Metropolitan Police District. House of Correction, for Middlesex, Cold-bath Fields, for males only; Middlesex House of Detention, Clerkenwell, for untried prisoners; Millbank Penitentiary, general, for males and females; City Prison, or House of Correction at Holloway; for criminals apprehended in the City only; Fulham and Brixton, for female convicts; Model Prison, Pentonville, for male convicts, on the separate system; House of Correction for Middlesex, Tothill Fields, Westminster, for females only; Surrey Gaol; Horse-monger Lane, for criminals and debtors; Surrey House of Correction, Wandsworth; Debtor's Prison, Whitecross Street.

O. Public Works and General Statistics.—The management of the sewers, and the supervision of new houses and streets, and of other matters pertaining to the health and convenience of London, are placed under the control of a Metropolitan Board, elected by the ratepayers. Their new office, in Spring Gardens, has two fronts, each 85 feet long. A magnificent scheme for the drainage of the entire metropolitan district, and to be completed by the end of 1866, embraces three levels for the north side of the river, and two levels for the south side, besides extensive outfalls. The Northern High Level, from Hampstead to Old Ford, on the Lea, is 7 to 8 miles long, including branches; the Middle High Level passes at a lower elevation, in the more crowded parts; and the Low Level will most probably be

carried under an embankment bordering the river. They terminate in the Northern Outfall of 6 miles, and a reservoir at Barking. The Southern High Level, and the Low Level, terminate in the Southern Outfall and a reservoir at Crossness Point (opposite Barking), by means of a tunnel 1 mile long, under Woolwich. The total cost has been 4,000,000*l.*, for 74 miles of sewerage. [DRAINAGE, METROPOLITAN MAIN.] From a rough calculation, it is inferred that 80 million gallons of water are supplied, daily, by the water companies within the metropolitan limits; and that within the same limits 80 million gallons of sewage are poured into the Thames from 2000 miles of sewers, containing 400 tons of solid matter fit for manure.

London requires, for its annual consumption, 270,000 oxen, 30,000 calves, 1½ million sheep, 35,000 swine, 3¾ millions of poultry, 2 million sacks of potatoes, 310,000 barrels of oysters, and 5,000,000 tons of coal.

Upwards of 3500 omnibuses circulate through London, for the most part making the City their central point. About 25 coaches and omnibuses, and 500 carriers, run from the city to places in the suburbs.

The principal markets are—The Metropolitan Cattle Market, in Caledonian Road, containing 15 acres, with 3 acres of slaughter-houses, built 1855, for the Corporation, by Bunning, at a cost of 1,460,000*l.*—Monday and Thursday, cattle; Friday, horses. Smithfield Market, 5¾ acres—Tuesday, Thursday, and Saturday, for hay. Farringdon Market, 1½ acres, in Farringdon Street, for fruit and vegetables. Newgate Market, Warwick Lane, for meat and poultry. Leadenhall Market, Gracechurch Street, for meat and poultry. Spitalfields Market, for vegetables. Corn Exchange, Mark Lane, Monday, Wednesday, and Friday. Billingsgate Market, Lower Thames Street, for fish. Bermondsey Market, for leather. Covent Garden Market, for vegetables, fruit, and flowers. Clare Market, for meat, &c. Borough Market, for fruit and vegetables. Newport Market, for poultry. Whitechapel Market, for hay.

The Bazaars are—The Baker Street; Soho Square; Pantheon, Oxford Street; Western Exchange, Bond Street; London Crystal Palace, Oxford Street; Prince of Wales', Regent Street; Portland, Langham Place; Pantechnicon, near Belgrave Square; and those in the Lowther and Burlington Arcades.

The Water Companies are the following:—New River Company; office, or works, at New River Head, Clerkenwell, and Hampstead. East London; at Bow and Lea Bridge. West Middlesex; at Hammersmith. Chelsea; at Picnic and Kingston. Grand Junction; at Kensington, Kew Bridge, and Hampton. Lambeth; at Kennington, Thames Ditton, Brixton, and Streatham. Southwark and Vauxhall; at Southwark, Battersea, and Hampton. West Kent; at Deptford, Woolwich, and Plumstead. The main pipes and branches extend 2086 miles, and it is estimated that at least 80,000,000 gallons of water are distributed daily. The head-quarters of the London Fire Brigade are in Watling Street, and the force is now under the control of the Metropolitan Board of Works.

The gas works and Companies are—British Gas Works, Old Ford; Chartered Gas and Coke Com-

pany, Horseferry Road, Westminster, Brick Lane, and Curtain Road; Commercial Gas Company, Ben Jonson's Fields; Deptford Gas Works, Creek Street; Equitable Gas Works, Thames Bank, Westminster; Great Central Gas Consumers' Company, Bow Common; Imperial Gas Works, at Maiden Lane, Hackney, Shoreditch, and Fulham; Independent Gas Works, Haggerston; London Gas Company, Westminster and Vauxhall; Phoenix Gas Works, Bankside, Blackfriars Road, and Bridge Street, Greenwich; Poplar Gas Works, King Street; Ratcliffe Gas Works, Wapping; South Metropolitan Gas Company, Surrey Canal Bridge, Camberwell; Surrey Consumers', Rotherhithe Western, Kensal Green. They produce about 5000 millions of cubic feet of gas annually, and have laid down upwards of 2000 miles of pipes.

Some of the most extensive breweries are—Barclay and Perkins', Park Street, Southwark, on a site of 10 acres; Truman, Hanbury, and Buxton's, at Spitalfields; Meux', Tottenham Court Road; Reid's, at Clerkenwell; and Whitbread's, Chiswell Street.

With respect to the London poor, the following is a list of the Unions, each of which has a poorhouse, while some have more than one, making twelve additional workhouses in all:—Bermondsey, Bethnal Green, Camberwell, Chelsea, Clerkenwell, Fulham; St. George's, Hanover Square; St. George's-in-the-East, St. George the Martyr, St. Giles and St. George, Bloomsbury; Greenwich, Hampstead, Hackney, Holborn, Islington; St. James, Westminster; Kensington, Lambeth, Lewisham, London City, London East, London West; St. Luke, Middlesex; St. Margaret and St. John, Westminster; St. Martin's-in-the-Fields, St. Marylebone; Mile End, Old Town; Newington, St. Olave's, Haddington, St. Pancras, Poplar, Rotherhithe, St. Saviour, Shoreditch, Stepney, Strand, Wandsworth and Clapham, Whitechapel. In the half year ending Lady Day, 1866, the total expenditure in the Metropolitan Division, composed of 40 unions and single parishes, or 168 parishes in all, amounted to upwards of a quarter of a million pounds sterling.

There are District Schools (composed of children from several unions uniting for the purpose), at Ealing (Central London), Anerley (North Surrey), and Peckham (South Metropolitan).

The Superintendent Registry Districts correspond, with one or two exceptions, with the Poor Law Unions, and are arranged as follows:—West Districts—Kensington, Chelsea; St. George's, Hanover Square, Westminster; St. Martin's-in-the-Fields, St. James', Westminster. North Districts—Marylebone, Hampstead, St. Pancras, Islington, Hackney. Central Districts—St. Giles, Strand, Holborn, Clerkenwell, St. Luke, East London, West London, London City. East Districts—Shoreditch, Bethnal Green, Whitechapel, St. George's-in-the-East, Stepney, Poplar. South Districts—St. Saviour, Southwark; St. Olave, Southwark; Bermondsey; St. George, Southwark; Newington, Lambeth, Wandsworth, Camberwell, Rotherhithe, Greenwich, Lewisham.

The Cemeteries for London are—City of London, Little Ilford; Tower Hamlets, Mile-end Road; North of London, Colney Hatch; Kensal Green; London Company's, at Highgate and Nunhead; Necropolis, at Woking; Islington and St. Pancras,

Colney Hatch; South Metropolitan, at Norwood; Abney Park, at Stoke Newington; Victoria Park, or East London, Bethnal Green; West London, Brompton. Bunhill Fields (28½ acres), in the City Road, is now filled with graves, and disused.

The Railway Stations round the Metropolis are—Euston Square Station, for the North-Western Railway (opened in 1838). The hall, 125 feet long, contains a statue of George Stephenson, the engineer. Paddington Station, for the Great Western line (1841), on the broad gauge. Victoria Terminus, Pimlico, the West-end Station for the Chatham and Dover, and the Brighton lines (1860). Waterloo Road Station, for the South-Western Railway (1844). London Bridge Station, for the Brighton, Greenwich, North Kent, and the Croydon and Epsom lines (1841). Fenchurch Street Station, for the Blackwall, North London, and Southend lines (1841). Shoreditch, for the Great Eastern, Southend, and North Woolwich lines (1844). King's Cross Station, the Great Northern and Midland Railways (1850). The shed is 800 feet long. Farringdon Street Station, for the Metropolitan or underground railway (1862), uniting the Great Western and Great Northern lines; and the London, Chatham, and Dover Railway. Charing Cross Terminus, and Cannon Street Station, for the South-Eastern Railway (1865–66). There are large hotels close to the stations at Euston Square, Paddington, King's Cross, Charing Cross, London Bridge, Pimlico, &c.

It is estimated that these lines now bring into London, and carry out of it, 250,000 persons daily; or seven times the number they did in 1851.

The Bridges across the Thames are—London Bridge, which is reckoned part of the Ward of Bridge Within; Westminster Bridge; Southwark; Blackfriars; Blackfriars and Cannon Street Railway Bridges; Waterloo; the Charing Cross Railway Bridge; Lambeth Bridge; Vauxhall; Battersea Bridge; Battersea Park Bridge; the Pimlico Railway Bridge, 920 feet long, on 4 arches, which leads to the new Victoria Terminus; Fulham, 786 feet; Hammersmith, 688 feet. Of some of these we supply a few additional particulars.

Waterloo Bridge has been designated the noblest stone bridge in the world; it was designed by the celebrated John Rennie, and cost above a million. The first stone was laid in 1811, and the bridge opened to the public on the second anniversary of the battle of Waterloo, June 18, 1817. It consists of nine elliptical arches of 120 feet span, supported on piers 20 feet wide at the springing of the arches. The bridge and abutments are 1380 feet long.

London Bridge, 928 feet long, with five semi-elliptical arches, was constructed by the same great architect. The first stone was laid in 1825, and the bridge publicly opened six years later. It is built of granite, and is said to have cost 2,000,000*l*. The centre arch is 152 feet span, with a rise above the water mark of 29 feet 6 inches; the two arches next the centre are 140 feet in span, with a rise of 27 feet 6 inches; and the two abutment arches are 130 feet span, with a rise of 24 feet 6 inches. The lamp posts are made from cannon captured during the Peninsular war. It has been ascertained that the number of vehicles and equestrians daily crossing the bridge in the course of twenty-four hours exceeds

20,000; and that the number of pedestrians who pass across the bridge daily during the same space of time is not fewer than 107,000.

Southwark Bridge, 708 feet long, with three cast-iron arches, resting on stone piers, was also designed by Rennie, and erected by a public company at the cost of 800,000*l*. The first stone was laid in April, 1815, and the bridge opened to the public April, 1819. The span of the centre arch is 240 feet, and the entire weight of the iron employed on the bridge amounts to 5780 tons. In July, 1866, the bridge was purchased by the corporation of London for 200,000*l*, and the charge for toll removed.

Blackfriars Bridge was the work of Robert Mylne, and originally received the designation of Pitt's Bridge, by way of a compliment to the earl of Chatham. Its first stone was laid in October, 1760, and the structure opened November, 1769. It consisted of nine arches, was 996 feet in length, and cost 152,480*l*. The foundations, however, having become decayed, the bridge has been pulled down, and a magnificent new one, by Mr. Cubitt, is being built in its place. Meanwhile, a wooden bridge, of remarkable construction, with a foot-way over the carriage-way, is temporarily used, and will probably be needed until 1868 or 1869.

Charing Cross Railway Bridge, at Hungerford, is the largest structure of the kind which spans the Thames.

Westminster Bridge, built by Mr. Page, the finest and handsomest structure of the kind in the metropolis, stands upon the site of a former erection, of which the design was due to one Charles Labelye, a Swiss. It is double the width of the old bridge, measuring 85 feet, and has seven iron arches (that in the centre having a span of 120 feet), resting upon stone piers, whose foundations descend 30 feet below low water mark. It is 1160 feet long, and the centre arch rises 22 feet above high water. The piers rest upon bearing piles of elm, driven 20 feet into the London clay, and are cased with iron piles closely united, forming a sort of permanent cofferdam. Upon these is laid a stratum of concrete, forming a foundation for the blocks of Cornish granite used in the stone-work. Its construction cost about 4*l*. per square foot.

Vauxhall Bridge, connecting Kennington and Millbank, is built of iron, and has nine equal arches. It was constructed from the designs of James Walker, was commenced May 9, 1811, and opened June 4, 1816. It is 806 feet long, 36 feet wide, and is built on caissons. The total cost of erection was 300,000*l*.

Battersea Park or Victoria Bridge is an elegant iron structure, erected in 1857, from the designs of Mr. T. Page, at a cost of 88,000*l*, and crosses the river in the neighbourhood of Chelsea Hospital and the new park at Battersea. Including the abutments it is 915 feet long, the distance between the two suspension towers being 347 feet.

Lambeth Bridge spans the river half-way between the Westminster and Vauxhall bridges. It has three equal spans of wire cables, each 280 feet wide, supporting a wrought-iron platform, and has a double carriage-way and two foot-ways; the total width being 34 feet.

The Thames Tunnel, constructed by Brunel, 1825-41, is 1200 feet long. It has been purchased by a railway company.

The wharves and quays on the Thames are about fifty in number, and from them 150 steam and other vessels arrive and depart at stated intervals.

The principal canals are the Paddington, Regent's, and Grand Surrey. For the accommodation of the river passenger traffic upwards of twenty-one steam-boat piers have been erected.

The public gardens are—Zoological Gardens and Menagerie, Regent's Park, visited by 380,000 persons in 1865; Crystal Palace, Sydenham; Botanical Gardens, Regent's Park; Cremorne Gardens, Chelsea; Belvedere Gardens, North Woolwich. Lord's Cricket Ground is at St. John's Wood; Surrey Cricket Club, at Kennington Oval. The Horticultural Society's Gardens at South Kensington, of 26 acres extent, or 500 yards by 300, have been picturesquely arranged at a cost of 100,000*l*. Here stood the building for the International Exhibition of 1862; a vast pile, 1200 feet long by 700 broad, with two domes 200 feet high and 135 feet diameter, which cost 300,000*l*.

The annual cattle show of the Smithfield Club is held in the Agricultural Hall, Islington, during the second week in December.

The chief picture galleries are—National Gallery, and the Royal Academy Exhibition, Trafalgar Square; the Vernon, Sheepshanks, Turner, and National Portrait Galleries, South Kensington Museum; Soane Museum, Leicester Square; British Institution, Pall Mall; Suffolk Street Exhibition, or Society of British Artists; Society of Painters in Water Colours, Pall Mall; Houses of Parliament Frescoes; Greenwich Hospital Naval Gallery; Crystal Palace Gallery; Dulwich Gallery; and Hampton Court Gallery.

The parks are—St. James's Park, behind Whitehall; the Green Park and Hyde Park, at the end of Piccadilly; Regent's Park, in the New Road; Victoria Park, at Bethnal Green; and the parks at Greenwich, Battersea, and Kennington. Primrose Hill, Hampstead Heath, Blackheath, Woolwich Common, and Plumstead Heath, are fine, elevated, and park-like spots in the environs of London.

The squares and open places in and near the City bounds are—Gray's Inn Gardens, Charter House Square, Temple Gardens, Falcon and Bridgewater Squares, Smithfield, Bartholomew Close, Artillery Ground, Finsbury Square, and Trinity Square, near the Tower. In Westminster are—Grosvenor (6 acres), Berkeley, Hanover, Golden, Soho, Leicester, Trafalgar, and St. James' Squares. In Belgravia—Eaton, Chester, Ebury, Eccleston, Warwick, and St. George's Squares. In Kensington is Kensington Square. At Chelsea—Sloane, Trafalgar, and Oakley Squares. At Brompton—Montpellier, Trevor, Lowndes, and Cadogan Squares. At Paddington—Sussex, Gloucester, Hyde Park, Connaught, Oxford, and Cambridge Squares. In Marylebone—Blandford, Harewood, Dorset, Montague, Bryanston, Portman, Manchester, and Cavendish Squares. In St. Pancras—Harrington, Clarendon, Clarence, York, Euston, Fitzroy, Argyle, Tavistock, Gordon, Oakley, Regent, Brunswick, and Mecklenburgh Squares. In Holborn—Bedford Square, and Lincoln's Inn Fields. In Bloomsbury—Woburn, Torrington, Russell, Bloomsbury, and Red Lion Squares.

P. *Metropolitan Improvements*.—Of late years a great effort has been made to improve the appearance

and embellish the architecture of London; to open up new and splendid thoroughfares; to remove unsightly excrescences; to take advantage of favourable sites for the erection of noble edifices; and generally to render it the handsomest, as it is indubitably the wealthiest and most populous city in the world. To enumerate all these great public improvements would be impossible in our narrow limits. The greatest, the embankment of the river Thames, is fully described in the article EMBANKMENT OF THE THAMES. The Holborn Valley Viaduct, an undertaking which has been contemplated for at least fifty years, has at last been commenced, and when completed will add very materially to the facilities for traffic in that part of the metropolis.

Q. General Enumeration of Public Objects, &c.—In the City, the Monument, Fish Street Hill (built in 1677 by Wren, after the Great Fire), a Doric column, 202 feet high; Edward VI., at Christ's Hospital and St. Thomas' Hospital; Queen Elizabeth, St. Dunstan's, Fleet Street; William III., in the Bank; Queen Anne, St. Paul's Church Yard, and Queen's Square, Bloomsbury; William IV., King William Street, London Bridge; Queen Victoria, in the Exchange, by Lough; Duke of Wellington, opposite the Exchange, and in the Tower. At the West End are—Charles I., Charing Cross; Charles II., Soho Square; James II., Whitehall Yard; William III., St. James' Square; George I., Leicester Square, Grosvenor Square, and Bloomsbury Church; George II., Golden Square; George III., Cockspur Street; George IV., Trafalgar Square; Queen Victoria, Piccadilly; William duke of Cumberland, Cavendish Square; Duke of York, a column, 137 feet; Wellington, opposite Apsley House, Piccadilly; Nelson, a column, 162 feet high; General Napier, Havelock, and Jenner, in Trafalgar Square; Pitt, Hanover Square; Canning, Palace Yard; Richard Coeur de Lion, New Palace Yard, by Marochetti; Duke of Bedford, Russell Square; Fox, Bloomsbury Square; Duke of Kent, Portland Place; Major Cartwright, Burton Crescent; Captain Coram, Foundling Hospital; George Stephenson, Euston Square Station; Achilles Statue, in Hyde Park, in commemoration of the Battle of Waterloo; Guards' Memorial of the Battle of Inkermann, Waterloo Place; Westminster Memorial, in Dean's Yard. The Marble Arch, Hyde Park, was the entrance gate of Buckingham Palace.

There are about seventy churches in the city, some of the most remarkable of which, after St. Paul's Cathedral, are—Allhallows, Barking; St. Andrew, Undershaft; St. Antholin; St. Bartholomew the Great; St. Stephen's, Wallbrook, by Wren, restored 1852; St. Bride's, Fleet Street, by Wren, steeple 226 feet high; St. Dunstan's in the West; St. Giles', Cripplegate; St. Mary, Aldermanbury, by Wren; St. Mary-le-Bow, or Bow Church, Cheapside, by Wren, spire 239 feet high, and Norman crypt; St. Mary Woolnoth; St. Michael, Cornhill, by Wren, lately restored; St. Olave's, Hart Street; St. Swithin's, and the London Stone; St. Vedast, Foster Lane; Dutch Church, Austin Friars. The richest livings are St. Botolph, Bishopsgate, value 2290*l.*; St. Olave, Hart Street, 1891*l.*; St. Giles, Cripplegate, 1589*l.* The lowest is St. Bartholomew the Less, 30*l.* Fuller details of some of the more remarkable of these

public edifices have been already given in preceding portions of this article.

R. Legal Courts.—The principal courts of law, viz., the Courts of Chancery, Queen's Bench, Common Pleas, and Exchequer, have their first seat at Westminster Hall, within the verge of the new palace of the sovereign (or Houses of Parliament); and from hence they are adjourned to the Courts in Chancery Lane, and the City Courts at Guildhall. The Central Criminal Court is at the Old Bailey, near Newgate. The County Sessions Court, at Clerkenwell, is a handsome building, lately restored. The Bankruptcy Court, Basinghall Street, was rebuilt in 1820. The Courts of Probate, Divorce, and Matrimonial Causes, are held in Westminster Hall, where the High Court of Admiralty is, for the present, also held. The Inns of Court and of Chancery are as follow:—the Inner and Middle Temple, in Fleet Street, near Temple Bar, on the site of a preceptory of the Knights Templars, of which the Norman Round Church, built in 1185, remains. In the grounds and gardens are the Judges' Lodgings, Inner and Middle Temple Halls and Libraries, including the new Gothic Library, opened by the prince of Wales in 1861. Clifford's, Lyon's, Clements, and New Inns of Chancery, are members of the Temple. Lincoln's Inn, between Chancery Lane and Lincoln's Inn Fields, includes the Lord Chancellor's and Vice-Chancellor's Courts, a hall, restored in the Tudor style, library, and chapel. Furnival's and Thavies' Inns of Chancery were members of Lincoln's Inn. Gray's Inn, Holborn, includes a hall and chapel, and has Barnard's and Staple's Inns of Chancery for its members. The Rolls Court (including the old Rolls Chapel, Master's House, and Judge's Chamber, in the gardens, with the new Repository behind it, in the Tudor style), and Sergeant's Inn and Chapel, are in Chancery Lane. The College of Advocates, or Doctors of Civil Law, is at Doctors' Commons. A new Palace of Justice, which when completed will be one of the finest and most convenient buildings of the kind in the world, is about to be erected between Temple Bar and St. Clement's Church. Many of the courts, especially those which are now held at Westminster Hall, will be removed here.

The Metropolitan Sessions of the Central Criminal Court are held monthly, at the Old Bailey. Its jurisdiction is continuous with the City of London, the county of Middlesex, and the places within the Metropolitan Police district, in the counties of Essex, Kent, and Surrey, respectively. Courts of Quarter Sessions are held four times a year at the Old Bailey and Guildhall, for the City; Wellclose Square, for the Tower Liberty; Bridge House Hotel, for Southwark; Clerkenwell Sessions House, for Middlesex; Westminster Guildhall, Broad Sanctuary, for Westminster; County Gaol, Horsemonger Lane, for Surrey. The parishes on the borders of the Metropolitan Police district are arranged into eighteen petty sessional divisions.

The Metropolitan Local Courts are—Lord Mayor's Court, Guildhall; a Court of Record, with a jurisdiction extending to all places within the City and Liberties. A Court of Hustings was granted by Edward the Confessor, from whom the City received its earliest charter. The Sheriff's Court, held at Guildhall Buildings, comprises the City and Liberties,

with the precincts and extra-parochial places adjoining. The jurisdiction of the Southwark Borough Court of Record includes the parishes of St. Saviour (except the Clink Liberty), St. George, St. John, St. Olave, and St. Thomas. The Westminster Local Court is held at the Guildhall, Westminster. The City Court for the recovery of debts, is the Sheriff's Court, Guildhall.

The Metropolitan County Courts without the City are as follows:—The Westminster, St. Martin's Lane; Marylebone, Marylebone Road; Brompton, Chelsea; Clerkenwell, Duncan Terrace, Islington; Shoreditch, Charles Square, Hoxton; Whitechapel, Great Prescott Street; Bow, Bow Road; Bloomsbury, Great Portland Street; Southwark, Swan Street, Borough; Lambeth, Camberwell New Road; Greenwich, Church Street.

The London District Court of Bankruptcy comprises the City, and the counties of Middlesex, Beds, Berks, Bucks, Cambridge, Essex, Hants, Herts, Hunts, Kent, Norfolk, Northampton, Oxford, Rutland, Suffolk, Surrey, Sussex, all places in the S. division of Wilts; and the following places in the county of Dorset, viz.—Poole, Wimborne Minster, Blandford, Sturminster, Shaftesbury; and all other places in that county within a hundred miles of the General Post Office.

The Registry of Deeds and Conveyances, Wills, Judgments, &c., for Middlesex, is in Bell Yard, Temple Bar.

History and Chronology.—London is a city of great antiquity. According to some authorities, a settlement existed on its site 1107 years before the birth of Christ, and 354 years before the foundation of Rome; but putting aside all doubtful speculations, it is sufficient to date its records from 54 B.C., when it was the capital of the Trinobantes, and the royal seat of their sovereigns. In A.D. 61 it was occupied by the Romans as Londinium, or Colonia Augusta, and distinguished as the resort of native and foreign merchants. The Romans built a strong wall around their possession, which had four principal gates, and which by successive generations was enlarged, repaired, and strengthened. Numerous additional gates were also erected to meet the exigencies of a rapidly increasing population. In the Saxon era, Lundenceaster was the capital of the Saxon state of Essex, and it became the capital of the kingdom upon the downfall of the Heptarchy. After the Norman conquest it rapidly grew in prosperity and power. Its first charter was granted by William the Conqueror; but to write its annals, even in their most condensed form, would occupy a much larger space than we have at our command, and we can only supply a few of their leading incidents in chronological arrangement:—

Bishopric of London founded by Mellitus,	604
London plundered by the Danes,	839
Alfred repairs and strengthens the city,	884
The Tower built by William I.,	1078
First charter granted by the same sovereign,	1079
A great fire; St. Paul's burnt,	1086
London Bridge built, 1014; burnt,	1136
Old London Bridge begun,	1176
Henry Fitz-Alwyn, the first mayor,	1189
Charter granted by Henry II.,	1154
First stone bridge completed,	1209

Charter of King John; mayor and common council to be elected annually,	1214
Aldermen appointed,	1242
Livery companies incorporated,	1327
Charter granted by Edward III.,	1328
Terrible plague; 50,000 people perish,	1348
London first sends members to Parliament,	1355
William of Walworth, lord mayor,	1380;
Wat Tyler's rebellion,	1381
Guildhall begun, 1411; finished,	1416
Whittington thrice lord mayor, 1397, 1406,	1419
Jack Cade's rebellion,	1450
Caxton sets up his printing press,	1471
Streets first paved,	1553
St. Bartholomew's Priory converted into an hospital,	1539
Coaches introduced,	1563
Exchange built,	1566
New River water introduced,	1613
Hackney coaches first plied,	1625
Child's Bank established,	1660
The Great Plague kills 68,596 persons,	1665
The Great Fire,	1666
Monument erected,	1671-77
Bank of England established,	1694
Bank of England built,	1732-34
Blackfriars Bridge opened,	1769
Lord George Gordon's No-Popery riots,	1780
Gas first exhibited in Pall Mall,	1807
The Mint finished,	1811
Gaslight becomes general,	1814
Waterloo Bridge opened,	1817
Southwark Bridge opened,	1819
Cabs introduced,	1823
Omnibuses begin to ply,	1829
New Post-office completed,	1829
New London Bridge opened,	1831
Fearful visitation of cholera,	1831-32
Houses of Parliament burnt,	1834
Royal Exchange burnt,	1838
Penny postage begun,	1840
Thames Tunnel opened,	1843
Royal Exchange opened,	1844
Penny steamboats begun,	1845
Great Chartist demonstration,	1848
Second attack of cholera,	1849
Great Exhibition opened, May 1; closed,	
October 11,	1851
Third attack of cholera,	1854
Metropolitan Board of Works established,	1855
Metropolitan Underground Railway begun,	1860
International Exhibition opened, May 1,	1862
Metropolitan railway opened,	1863
Charing Cross railway opened,	1864
Mr. Peabody's gifts of 250,000 <i>l.</i> to the London poor,	1862 and 1866

(For further particulars relative to London, the reader is referred to the elaborate works of Stow, Maitland, and Pennant; *Chronicles of London Bridge*; *History of the Temple Church*; G. G. Scott's *Memoirs of Westminster Abbey*; Charles Knight's *London*; *Londiniana*, by E. Brayley; *London, Past and Present*, by Peter Cunningham; *Lysons' Environs of London*; Faulkner, *History of Chelsea*; Morant, *History of Essex*; *Gentleman's Magazine*; and *Handbooks to London*, published by Murray, Black, Cruchley, and Chambers.)

LONDON CLAY (Geology). The name given to a tenacious bluish clay which occurs under and in the vicinity of the metropolis, varying from 200 to 350 feet in thickness. Its stratigraphical position is about the top of the Eocene Tertiary, the earliest formation of the great Tertiary Group. It is associated with the Bognor and Woolwich beds and the Thanet sands. It contains numerous bands of *septa*, and abounds in marine shells, crustacea, teeth of sharks, bones of other fishes, reptiles, birds, trunks of trees, &c. The London Clay is believed to mark an age when the climate was much milder in England than it is now.

LONDON, NEW. [CONNECTICUT.]

LONDON UNIVERSITY. [UNIVERSITY OF LONDON.]

LONDONDERRY, a county of the province of Ulster, in Ireland, bounded N. by the Atlantic Ocean, E. by Antrim and a portion of Lough Neagh, S. by Tyrone, and W. by Donegal. It lies between $54^{\circ} 38'$ and $55^{\circ} 22'$ N. lat., $6^{\circ} 28'$ and $7^{\circ} 24'$ W. long. The greatest length N. to S. is 40 miles; the greatest breadth E. to W. is 34 miles. The area is 810 square miles, or 518,595 acres, of which 318,282 are arable, 180,709 uncultivated, 7718 in plantations, 1559 in towns and villages, and 10,327 under water. The population in 1861 numbered 184,209 (in 1851, 191,868), of whom 83,402 were Roman Catholics, and 31,218 belonged to the Established Church.

Surface and Rivers.—The county is of an irregularly triangular area. From the Bann the surface gradually rises westward for about 10 miles, forming a chain of elevations which bound the valley of that river on the west. Westward of these elevations is an extensive tract of undulating country, extending from their bases to the eastern shore of Lough Foyle, and bounded on the south by the mountain range which separates the counties of Londonderry and Tyrone.

The Lower Bann, from Lough Neagh to the sea, a distance of upwards of 30 miles, has a fall of only 48 feet. The general characteristics of this district are similar to those of the north coast of the county of Antrim. The elevations are, however, inconsiderable, and the general aspect of the country is tame and bleak. West of the sandbanks which occur at the embouchure of the Bann the coast has a bolder outline, rising in a series of precipitous cliffs over the sandy beach. Among the loftiest basaltic cliffs are Benbradagh, 1531 feet high, and Craignashock, 1773 feet high. West of the valley of Ballynascreen commences a mountain chain, which with little interruption extends to the valley of the river Foyle, forming the boundary between the counties of Tyrone and Londonderry. Its chief heights are Sawell, 2236 feet high; Muinard, 2057 feet high. The district included between these mountains and Lough Foyle, constituting the western division of the county, is divided by a central tract of high land into the valleys of the rivers Roe and Faughan.

Between the Lower Faughan and the Foyle is a range of undulating ground crossed by a valley, through which the high road, leading over a bridge, completes the communication with Londonderry city.

The most remarkable feature of the coast line is the tract which extends from the north-western

extremity of the hilly region to the low point of Magilligan and southward to the mouth of the Roe. On this tract is measured the base-line of the trigonometrical survey of Ireland, 53,200 feet in length. The same tract appears to occupy the greater portion of the bottom of the lough, and rises towards its centre in a bank which confines the navigation to that portion of Lough Foyle lying along the coast of Donegal. The lough is about 18 miles long by 10 broad. The entrance to the lough, between Magilligan Point and Ennishowen Head, is about a mile across, and from this point to Londonderry city is a safe and tolerably sheltered navigation of 23 miles. Eastward of the entrance is a shoal called the Tuns, which renders the lough difficult of access in stormy weather.

The chief rivers of the county are the Bann, Foyle, Macosquin, Agivey, Clady, Mayola, Ballinderry, Roe, Faughan, Owenreagh, and Owenbeg. The roads of Londonderry are generally excellent. There are no canals.

Geology, Soil, Productions.—The basaltic tract, which forms the eastern section of the county, corresponds in all respects to the remainder of the field on the Antrim side of the Bann [GIANTS' CAUSEWAY], with this remarkable difference, that the dip of the strata is reversed. The geological structure of the district may be described as a floor of primitive rock overlaid in part by a field of secondary formations, capped by basalt. The main constituent of the western section is mica slate. Primitive limestone occurs in many places; and on the east side of Slieve Gallion there is a granular limestone, which contains quantities of crystallized hornblende: hornblende slate is found at several places in the valley of the Roe. The structure of the south-eastern extremities of the county is more complex, the varieties of formations which appear at the surface being numerous. There are no mines worked in this county.

The soil of that part of the valley of the Bann where the subsoil is hard basalt, consists for the most part of a rusty loose grit, without sufficient strength or cohesion for wheat crops. Numerous tracts of bog, interspersed with shallow pools, and frequently separated by craggy knolls of basalt, are scattered over this part of the county. There are, however, tracts of good land along the banks of the several rivers which traverse the district, and especially at their junctions; and between the basalt and the primitive district farther west is a tract of rich open country, extending southward into Tyrone. This is the most extensive tract of good ground in the county. The best improved portions of the county are the district of Lough Neagh, the valley of the Roe, the valley of the Faughan, and the immediate vicinity of Londonderry on both sides of the Foyle. There is a very general scarcity of timber.

The progress of agriculture in this county has been materially forwarded by the establishment of an agricultural school near Muff by the Company of Grocers of London, who here hold large estates under the Crown. Oats and barley are the principal grain crops. In 1862, 297,239 acres of arable ground were cultivated. There is but little land in pasture, and the breed of cattle, as well as of pigs, of which great numbers are reared, forms a principal staple

of the wealth of the county. In 1862 the number of cattle was 93,902; sheep, 26,285; pigs, 28,214.

The manufacture and bleaching of linens is the chief trade of Londonderry. The most extensive bleach-greens lie along the rivers Roe and Faughan, on the latter of which there are abundant water-power and numerous sites admirably calculated for this branch of manufacture. The weavers and flax-dressers are numerous. The export and import trade of the county is carried on at the ports of Londonderry city and Portrush, the latter being the seaport of Coleraine.

Divisions and Towns.—Londonderry is divided into six baronies, containing altogether forty-three parishes. It is chiefly in the diocese of Derry and Raphoe. It is in the North-Western Circuit, and the assizes are held in the city of Londonderry. The county returns two members to Parliament; one is returned for the city of Londonderry, and one for the town of Coleraine. The number of parliamentary electors in the county in the year 1865 was 5512.

The following are the principal towns, with the population of each in 1861:—

Coleraine is a parliamentary borough and port, situated 4 miles from the sea, on both sides of the Bann, over which is an excellent stone bridge of three arches. The town consists of a central square, and several diverging streets on the east bank of the river and in the county of Antrim, and a portion on the west bank called Waterside, or Killowen. It contains a town-hall, a market-house, four parish churches, two Roman Catholic chapels, four Presbyterian chapels, and three or four other chapels. A fine linen called Coleraines is made here, and there are paper, soap, leather, and other manufactures. Vessels of 200 tons' burthen can discharge at the quay, and a brisk trade, chiefly by steam, is carried on with Liverpool through Portrush, the shipping port, 2 miles E. from the mouth of the Bann, and 6 miles from the town. The borough returns one member to Parliament. Population 5631, including about 250 parliamentary voters. The number of vessels which entered the port in 1864 was 413 (66,689 tons), and the clearances 162 (34,851 tons). The customs revenue in 1865 was 5442*l*.

Dungiven is a small town situated in a rich and sheltered vale watered by the Roe, about 17 miles W. by S. from Londonderry. Population, 845.

Kilrea is a small town on the west bank of the Bann, about 15 miles S. by E. from Coleraine. Population, 924.

Londonderry, commonly called *Derry*, a county of a city, parliamentary borough, municipal borough, and seaport, in 54° 59' N. lat., 7° 19' W. long., 144 miles N.N.W. from Dublin, is situated on an oval-shaped hill, 119 feet above high water, which projects into the Foyle from the western bank, and 5 miles above the entrance of the river into the estuary called Lough Foyle. The city is surrounded by an ancient wall, a mile in circumference, with six gates, beyond which the houses have been considerably extended. The streets radiate from a central square, and some of them are very steep. A wooden bridge 1068 feet long connects the city with the suburb of Waterside, on the eastern bank of the river. The principal public buildings are—the corporation hall, custom house, county and city court

house, prison, lunatic asylum, the cathedral and two other Protestant churches, two Roman Catholic, six Presbyterian, and three Methodist chapels. There are several flour mills, two flax-spinning mills, three distilleries, two breweries, and two large rope-walks. The assizes for the county are held in the city. The river is at all times navigable for large vessels, and small craft can proceed about 7 miles higher, to Johnstown village, and barges by a canal to Strabane, 14 miles. The quays are commodious, and allow vessels of 500 tons' burthen to discharge at them. The port has some foreign and colonial trade; the coasting trade is considerable, and there are seven steamers which ply to Liverpool, Glasgow, Greenock, Ardrossan, and Campbeltown. The number of vessels which entered the port in 1864 was 1313 (229,843 tons), and the clearances 710 (155,114 tons). The customs revenue in 1865 was 104,092*l*. The municipal borough is divided into three wards, and is governed by six aldermen and eighteen councillors. Population, 20,875. The city returns one member to Parliament, the number of voters being about 850. The chief event in its history is its gallant resistance of the forces of James II. in 1689, during a siege of 105 days, commemorated by a column in honour of the Rev. George Walker, at that time its governor.

Magherafelt is an improving town, with a sessions-house, union workhouse, and markets for linen, and very large monthly cattle fairs. It is situated 4 miles W. from the north-western angle of Lough Neagh. Population, 1293.

Newtown Limavady, a market town, 16 miles N.E. from Londonderry, is situated on the east bank of the river Roe, and comprises three tolerably well-built streets, and others not so good. It contains a market-house, union workhouse, a handsome church, and other places of worship. The town is respectably inhabited, and has a good retail trade. Population, 2732.

History and Antiquities.—At the most remote period this county appears to have been possessed by the septa of O'Loughlin and O'Neill. The establishment of an English garrison at Coleraine enabled the English very soon after to reduce at least the eastern and central parts of the county into shire ground. It is probable that the English law continued in force in the eastern parts of the county until the great revolt of the O'Neills in 1333. After that period the native Irish continued undisturbed masters of the country until the middle of the sixteenth century, when the rebellion of Shane O'Neill, in 1566, made it necessary to send a force to Derry. In the year 1600, Sir Henry Dockwra, with an efficient force, constructed three forts in the county; and this was the first commencement of a permanent settlement. The rebellion of Sir Cahir O'Dogherty in 1608, and the flight of Tyrone and O'Donnell in the preceding year, left the entire of this and five other counties at the disposal of the Crown. On the 28th January, 1609, negotiations were commenced between the king and the corporation of London for the purpose of settling the terms on which the forfeited lands in this county should be conveyed to the latter for the purpose of planting them with Protestant colonists. It was at first agreed that the Londoners should spend 20,000*l*. on the plantation, in consideration of which the king granted to them the old county and

town of Coleraine, with the woods of Glanconkne and Killeightra, and the town and liberties of Derry, excepting the church lands. The corporation still retains these estates, whose management is vested in a body of twenty-six, consisting of a governor, deputy-governor, and assistants, of whom one-half retire annually. In 1619 this body was incorporated by royal charter, and their estates erected into one county, hence called the county of Londonderry. Some parts of the county, however, were assigned to the civic companies. The introduction of the new colony changed the entire face of the country, which up to this period had been one of the most desolate tracts in Ireland.

There are some remains of a Cyclopean fortress at the Giant's Sconce, on the road from Newtown Limavady to Coleraine. Dungorkin is a circular mount, surrounded by a wet ditch, near Claudy. There are several cromlechs, druidical remains, caves, and tumuli. Of military edifices the only remaining are the castles of Killaloe, Dungiven, Salterstown, and Muff. The old abbey of Dungiven, which occupies a romantic site on a rock rising 200 feet above the bed of the river Roe, and the old church of Banagher, are the chief ecclesiastical remains.

LONDONDERRY, CHARLES WILLIAM STEWART, MARQUIS OF, was born in 1780, and received a commission in the 108th Foot, at the age of fourteen. In 1796 he joined the expedition under the earl of Moira, which was destined to relieve the duke of York in Flanders. On the return of the British army he was attached to Colonel Charles Crawford's mission to the Austrian armies in 1795-97; and at the battle of Donauwert was severely wounded. On his return to England he passed rapidly through the different grades of military rank, until he was appointed to the lieutenant-colonelcy of the 18th Light Dragoons. He was soon afterwards engaged in the expedition to Holland under Sir R. Abercromby, and highly distinguished himself in the attack on the enemy's positions in September, 1799. In 1803 he was made a colonel in the army, and soon afterwards assumed the command of a brigade of Hussars under Sir J. Moore, in Portugal. In 1809 Brigadier-general Stewart was appointed adjutant-general to the army under Sir Arthur Wellesley, in which capacity he highly distinguished himself during the pursuit across the Douro of the French army, under Marshal Soult. At Talavera the most honourable mention was made of his services. He also served with distinction, in 1812, at Busaco and Ciudad Rodrigo as adjutant-general. After the fall of the latter place the marquis obtained leave to return to England. In 1820 he was nominated to the command of the 10th Hussars. In 1837 he obtained the rank of general in the army; and in 1843 he was removed to the command of the 2nd Life Guards. On the death of the duke of Wellington, in 1858, he was created a Knight of the Garter. He died in 1854.

LONDONDERRY, ROBERT STEWART, MARQUIS OF, better known in history as Lord Castlereagh, was born at Mount Stewart, county Down, Ireland, June 18, 1769. He derived his title, which is Irish, from his father. He was educated at the grammar-school of Armagh and St. John's College, Cambridge. In 1789 he was returned to the Irish House of Commons for Downshire, in the Reform

interest, to which he pledged himself, but changed his politics about four or five years after, and went over to the Tories. He made his maiden speech in the English House of Commons, to which he had been returned for the borough of Tregony, October 29, 1795, in seconding the address. He vacated his seat in July, 1797; upon which he was re-elected to the Irish Parliament for the county of Down, and was made Keeper of the Privy Seal for Ireland. In the beginning of 1798 he was made Secretary to the Lord Lieutenant and an Irish privy councillor. From this date he may be regarded as having been distinctly the ministerial leader in the Irish Commons, and he was, no doubt, one of the principal promoters of the union, which took place two years after. He sat for the county of Down in the Imperial Parliament from 1801 until 1805, when he was promoted from the presidency of the Board of Control to be Secretary of State for the department of War and the Colonies. He resigned his office on the death of Mr. Pitt, but resumed it on the commencement of the Portland administration. He had meanwhile been returned for the borough of Plympton, Devonshire. The failure of the Walcheren expedition not only made him very unpopular, but involved him in a personal quarrel with Mr. Canning, who was severely wounded in the duel that resulted from it.

Lord Castlereagh, on the resignation of the Marquis Wellesley, was appointed Secretary of State for the Foreign Department. To the Parliament which met in November, 1812, he was returned for the county of Down; and he also retained that seat in the next two Parliaments.

Meanwhile in 1813 he went as British plenipotentiary to the negotiations opened with the French government at Châtillon; he also appeared as representative of the king of England at the peace of Paris, in May, 1814; at the congress of Vienna, in October of the same year; at that of Paris after the battle of Waterloo; and at that of Aix-la-Chapelle in 1818. He was made a Knight of the Garter in 1818, and became Marquis of Londonderry by the death of his father on the 8th of April, 1821.

Lord Londonderry died by his own hand at his seat of North Cray Place, in the county of Kent, on the 12th of August, 1822. A verdict of lunacy was returned by a coroner's jury.

LONG ISLAND. [NEW YORK.]

LONG VACATION, or lawyer's holiday, is a term when lawsuits are suspended in the English courts. In common law it is from the 10th of August to the 24th of October, and in Chancery to the 28th of October in every year.

LONGFORD, an inland county of the province of Leinster, in Ireland, bounded N.W. by Leitrim, N.E. by Cavan, S.E. by Westmeath, and S.W. by Roscommon. It lies between 53° 29' and 53° 56' N. lat., and 7° 19' and 7° 56' W. long. Its greatest length N. to S. is 29 miles; its greatest breadth E. to W. is 22 miles. The area is 420 square miles, or 269,409 acres, of which 191,823 are arable, 58,937 uncultivated, 4610 in plantations, 364 in towns and villages, and 13,675 under water. In 1861 the total number of inhabitants in the county was 71,592, of whom 64,810 belonged to the Roman Catholic Church, and 6114 to the Establishment. In 1851 the total population was 82,350.

Surface and Rivers.—The general slope of the surface is westward and south-westward towards the Shannon, except in the north-eastern angle towards Cavan, where the county embraces a small portion of the basin of Lough Erne. This district, forming the immediate basin of Lough Guounagh, is separated from the remainder of the county by a slightly elevated tract upon the south, and by a series of hills of low elevation on the west. Lough Guounagh is a very irregular piece of water, extending about 5 miles each way, but is rather a collection of lakes communicating by narrow channels than one sheet of water. Its chief feeders are small streams running from the surrounding hilly country. The hills called the Cairn Clonhugh present several summits nearly 1000 feet high. Between their western termination and the Shannon lies an open well-cultivated tract, while their south-eastern slope forms one side of the fertile and prosperous valley of the Camlin. The district between the Keenagh and the Shannon, which along the south-western boundary of this county expands into the extensive lake of Lough Ree, is very flat and boggy. An inlet of the lough, running about 4 miles eastward from the main sheet of the lake, bounds this part of the county on the south. Near the shore in this direction lie the small lakes of Derry and Derrymacar. The valleys of the Camlin and Inny are separated by a low tableland, rising into only one conspicuous eminence of 650 feet at Slieve Goldry. The only striking natural feature in this part of the line is Glen Lough, a sheet of water about a mile and a half in length.

The Shannon bounds the county on the west. The other rivers are the Clonard, Rinn, Camlin, Keenagh, and Inny. The Royal Canal runs through the county.

Geology, Soil, Productions.—The entire district south of the Camlin consists of floetz limestone, with the exception only of two patches of sandstone. The immediate valley of the Camlin on its southern bank, and the entire tract extending northward from it to the county of Leitrim, consist of clay-slate. Between these lies a belt of yellow sandstone and conglomerate. The low gravel region, in which the eskers occur, contains large quantities of fine calcareous sand and marl. Marly clay also underlies many of the boggy tracts. A little millstone grit appears. Iron, coal, lead, and marble are among the mineral products. In the tract sloping towards the valley of the Inny is a rich vegetable mould, producing either heavy grain crops or sweet fattening pasture. The rest of the county is chiefly grazing land. Great quantities of butter are made by the farmers and cottiers. Pigs are reared in great numbers, namely, 13,775 in 1862.

The linen manufacture is carried on with some activity in the neighbourhood of Newtown Forbes, where the first Earl of Granard took pains to introduce it. The manufacture of coarse flannels and friezes for home consumption is also carried on throughout the county.

Divisions and Towns.—The county of Longford is divided into six baronies, containing twenty-six parishes in all. It is in the diocese of Kilmore, Elphin, and Ardagh. It is in the North-Western Circuit, and the assizes are held at Longford. The county returns two members to Parliament. The number of electors on the county register in the year 1865 was 2767.

Ardagh is a small village, about 10 miles S.E. from Longford. It was formerly the seat of a separate bishopric, but is now included in the united bishopric of Kilmore, Elphin, and Ardagh.

Ballymahon, a market town, 12 miles S. by E. from Longford, is situated on the river Inny, which falls into Lough Ree about 3 miles W. from the town. The town consists chiefly of one very wide street, and contains a sessions-house, a church, a Roman Catholic chapel, and 1130 inhabitants. Oliver Goldsmith spent much of his early life here.

Granard, a market town, 14 miles N.W. by W. from Longford, contains a sessions-house, a union workhouse, a church, and a Roman Catholic chapel. The market receives weekly a large quantity of agricultural produce, but the trade of the town in other respects is not flourishing. Population, 1671.

Longford, the capital of the county, 76 miles N.W. by W. from Dublin, is surrounded by an extensive plain of bog, swamp, pasture land, and arable land. It is watered by the small river Camlin, which falls into the Shannon four miles westward from the town. A branch from the Royal Canal terminates at Longford. The town consists of regular streets, and contains a county court-house, county prison, union workhouse, barracks, a handsome church, a very fine Roman Catholic chapel of recent erection, and two or three places of worship for Dissenters. The assizes are held in Longford. The population in 1861 was 4872.

History and Antiquities.—The territory at present constituting the county of Longford was originally a portion of the kingdom of Meath, and as such was included in the grant of Meath by King Henry II. to Hugh de Lacy. On the erection of the district into a separate county, in the eleventh of Elizabeth, it retained few or no traces of ever having been under the authority of the English law or government. A reparation out of the county took place in 1615. The plantation did not take effect to any great extent, as in 1641 the entire county appears to have been temporarily recovered by the O'Farrells, excepting only Longford Castle and Castle Forbes. The confiscations which ensued extended over nearly the entire county, and introduced almost totally a new proprietary.

Among the antiquities is the rampart of Duncla, which extends 8 miles. On the island of Inch-Clorin, in Lough Ree, moulder the ruins of seven churches, and the foundation of a round tower. An abbey was established here, about 540, by St. Dermid. The remains of another round tower may be seen at Granard. The abbey at Longford was one of Patrick's foundations; on its site a fine monastery was built in 1400, the church of which is now the parish church. There are remains of the religious houses of Moydow, Clonebrone, Clone, Derg, and Innismore, a foundation of St. Columba's, on an island in Lough Guounagh. A few castles are still partially standing, of which the principal are at Castle-Forbes, Granard, Tenallick, Castlecro, Ratheline, and Ballymahon.

LONGICORNES, the fourth family of the tetramorous Coleoptera in Latreille's arrangement of insects. It includes a vast number of large and beautiful beetles, all remarkable for the length of their antennæ, which in many species are several

times longer than their bodies. They inhabit woods, where the females deposit their eggs beneath the bark of trees, effecting the operation by means of a long, strong, horny ovipositor with which they are provided. The females are usually larger than the males. The larvæ live beneath the bark of trees or in the wood, in which they bore deeply, and do much damage. The greatest assemblage of species and the largest forms are found in South America; but longicorn beetles are very generally dispersed. This family is divided into three great groups, of which the genera *Prionus*, *Cerambyx*, and *Leptura* are the respective types.

LONGINUS, the author of a treatise in Greek 'On the Sublime,' is said to have been born either in Syria or at Athens. His education was carefully superintended by his uncle Fronto, a celebrated teacher of rhetoric; and he also received instruction from Ammonius and Origen. He afterwards settled at Athens, where he taught philosophy, rhetoric, and criticism, and numbered among his disciples the famous Porphyry. He finally removed to Palmyra at the invitation of Queen Zenobia, to superintend the education of her sons, and took an active part in public affairs. After the capture of Palmyra by Aurelianus, in 273, Longinus was put to death by order of the emperor.

There is some doubt whether the treatise 'On the Sublime' (*περὶ ὑψηλοῦ*) was written by this Longinus. It has for its object the exposition of the nature of the sublime, both as to the expression and the thought, which the author illustrates by examples. As a specimen of critical judgment the work has always maintained a high rank, and in point of style is perspicuous and precise.

LONGIPENNES, Cuvier's family name for the long-winged oceanic birds, such as the *Petrels*, *Albatrosses*, &c. The genera which he includes in this family are *Procellaria*, *Puffinus*, *Halodroma*, *Pachyptila*, and *Diomedea*.

LONGIROSTRES, Cuvier's name for a family of wading birds, in which he includes the genera *Ibis*, *Namenius*, *Scelopax*, *Rhynchœa*, *Limosa*, *Calidris*, and *Tringa*, *Arenaria*, *Pelidna*, *Falciuella*, *Machetes*, *Hemipalama*, *Eurimorhynchus*, *Phalaropus*, *Strepsilas*, *Totanus*, *Lobipes*, and *Himantopus*, the greater part of which would come under the family *Scolopacidae*. He remarks that one can hardly place the *Avosets* (*Recurvirostra*, Linnæus) in any other position than at the end of the *Longirostres*.

LONGITUDE and LATITUDE. These terms mean different things as applied to a point of the earth, or a star in the heavens; and we must accordingly distinguish between *geographical* latitude and longitude, and *celestial* latitude and longitude.

The latitude of a star in the heavens is its angular distance from the ecliptic, measured on a great circle drawn through the star and pole of the ecliptic. It differs from the declination only in this, that the ecliptic is used instead of the equator. The longitude of a star is the angle made by the circle on which latitude is measured with the circle which passes through the pole of the ecliptic and the vernal intersection of the equator and ecliptic. Thus a star on the ecliptic has no latitude, and one which lies directly between a pole of the ecliptic and the vernal equinox has no longitude. The use of celestial

longitudes and latitudes has in great measure been superseded by those of right ascensions and declinations.

The meaning of the term *geographical* longitude is the same whether we consider the earth as a sphere or a spheroid. It is the angle contained between the plane of the meridian of the place, and that of some one meridian which is fixed on as the starting-place. Thus, we choose the Observatory of Greenwich, and the French that of Paris, as being in the first meridian; and while we express the relative position of the two observatories (in longitude) by saying that Paris is $2^{\circ} 20' 24''$ east of Greenwich, the French describe Greenwich as $2^{\circ} 20' 24''$ west of Paris.

It is usual to measure terrestrial longitudes in time, the whole circuit of the globe being supposed described (as in the diurnal motion) in twenty-four hours. It is also usual to reckon longitudes to 180° east or west, without proceeding farther. Thus a motion in longitude of 185° east will bring the traveller into 175° of west longitude. In astronomical writings, however, longitudes (both geographical and celestial) are measured all round the globe.

Supposing the earth to be a sphere, the latitude of a place is the angle subtended at the centre by the arc of the meridian intercepted between the place and the equator. This angle is equal to the altitude of the pole of the heavens at the place; and the determination of the altitude of the pole is the method usually resorted to for determining the latitude. But the earth not being precisely a sphere, but a spheroid, the zenith line (which is a perpendicular to the tangent plane) does not pass exactly through the centre, and the altitude of the pole is not precisely the angle subtended at the centre by the arc of the meridian. Still, however, the altitude of the pole is called the latitude of the place; and it must be distinctly understood that a latitude, astronomically determined, is the angle made by a line which is vertical at the place with its projection on the equator.

The reason why the preceding is not of more importance in the construction of maps lies in this, that when a large portion of the earth is mapped, the scale is necessarily too small to make such an error of any consequence; and when a small portion of the earth is taken, the error is nearly the same in every part of the map, and relative positions are not sensibly affected.

The determination of the longitude requires simply accurate instruments for the measurement of the positions of the heavenly bodies, and one or other of the two following—either perfectly correct watches, or perfectly accurate tables of the lunar motions. The legislature of Queen Anne, which passed an Act offering a reward for the discovery of the longitude, the problem being then very inaccurately solved for want of one or the other, good watches or lunar tables, never contemplated the invention of a method, but only of the means of making existing methods sufficiently accurate. And the legislature of George III., which repealed the former Act and substituted another, specifically limited the reward to those who should either proceed by improvement of chronometers, or of lunar tables. The rewards which were given were to Harrison for the former, and to Mayer's executors for the latter. The latter Act is now

repealed, and there does not exist any parliamentary offer of a sum of money for further improvements.

Many persons, imagining that, as in the case of the quadrature of the circle, &c., a theoretical difficulty existed, have employed themselves in endeavouring to invent a method, imagining that they should obtain the prize held out by the legislature. Some persons still occupy themselves in this manner; and it is impossible to persuade them either of the repeal of the Acts of Parliament, or of their having mistaken the nature of the difficulty, which is now, for all practical purposes, entirely conquered. It is impossible to find the latitude of a place without knowing the position of the equator in the heavens, or the longitude without knowing the meridian of Greenwich. The equator has a real existence in the heavens, since its pole is the immovable point of the heavens, which can be detected (though it is not absolutely occupied by a star) from observation of the motion of the stars, which always preserve their distance from the pole. But the meridian of Greenwich, a purely arbitrary circle of the earth, determined merely by the will of Charles II. that an observatory should be built on a certain hill near London, has no representative in the heavens. The only method, then, of finding longitude from the heavenly bodies is by finding the hour of the day which it is at Greenwich, at a particular hour on the spot whose longitude is required. It is then known how much of 360 degrees is revolved through by the earth in the period which brings a star from the meridian of the place upon the meridian of Greenwich, or *vice versa*: and this angle is the longitude. A watch which goes correctly and is set at Greenwich will carry the time at that place all over the world; or a celestial phenomenon, of which the Greenwich time may be predicted, will, if the moment of its happening be observed at any other place, give the difference of times at the moment of observation. Any proposal for finding the longitude *astronomically*, which does not depend on one or the other of these principles, is useless, unless it be that of actually measuring the distance between the given place and Greenwich, the latitudes of both being known. Whether it be possible to use any other than astronomical means for the purpose, it would be presumptuous to decide; but there certainly is no other method which offers the most distant prospect of success.

LONGLAND, or LANGELENDE, ROBERT, the reputed author of the 'Visions of Piers Plowman,' was a secular priest, born at Mortimer's Clebury in Shropshire, and afterwards fellow of Oriel College in Oxford. He lived in the reigns of Edward III. and Richard II. Longland, according to Bale, completed the 'Visions' in 1369.

LANGOBARDS, LONGOBARDI, or LANGOBARDI, *Long-beards*, a nation of ancient Germany, mentioned by Tacitus ('German,' 40) as a tribe of the Suevi. They lived east of the Elbe, towards the shores of the Baltic Sea. The Longobards joined Arminius against Maroboduus, king of the Suevi. (Tacitus 'Annal,' ii. 46.)

During the third and fourth centuries of our era the Longobards advanced to the banks of the Danube, where they became allies of Odoacer, king of Italy. Afterwards they almost exterminated the Heruli; and about the middle of the sixth century occupied

part of Pannonia, under their king Audoin. Here they came in contact with the Gepidae, a nation settled in Dacia, on the borders of the Eastern empire, and with the assistance of the Avari, totally defeated them.

In the year 568 Alboin crossed the Julian Alps, near Forum Julii, and led the Longobards to the conquest of the plains of North Italy, which have ever since been called by the name of the conquerors. [LOMBARDY.] Pavia became their capital. In 573 the nation became divided among a number of dukes, a duke of Ticino or Pavia, a duke of Friuli, a duke of Trento, a duke of Bergamo, a duke of Brescia, besides thirty dukes in as many other cities. Under these leaders the Longobards penetrated south of the Apennines, and conquered Tuscany, Liguria, Umbria, and part of Campania. The Byzantine emperors retained Ravenna, Rome, and its duchy, Padua, Genoa, Apulia, Calabria, Naples, and the southern extremity of Italy, with Sicily. After ten years of disorganization, the Longobards chose for their king Autaris, son of Clefo, 586-592, after whose death his widow Theodolinda married Agilulfus, duke of Turin, who was then raised to the throne. Agilulfus, through the persuasion of his wife, became a Catholic, most of his countrymen being Arians, and made peace with Gregory the Great, bishop of Rome. Theodolinda built the church and palace of Monza, where was deposited the iron crown (so called from a nail, said to be from the cross of our Saviour, riveted inside the crown), which was for ages employed at the coronation of the kings of Lombardy. Agilulfus died in 615, and was succeeded by his son Adaloaldus, under the regency of Theodolinda.

Rothar, son-in-law of Agilulfus, was the first king who made a compilation of the unwritten laws and usages of the Longobards, and published them in a kind of barbarous Latin, under the name of the Edict, with his own preface and observations. This edict drew a marked distinction between the Longobards and the Roman or subject population, which continued to live under the Roman law, and were looked upon as a conquered and subject race; they had neither the same political nor civil rights as the conquerors; they had no voice in their assemblies; they had no appeal against the caprice of their rulers; they lived among themselves according to Roman customs, but in any disputes between them and the Longobards were judged by Longobard judges and according to the Longobard law.

Liutprandus, who became king in 718, and reigned thirty-two years, was the most illustrious of the Longobard sovereigns. 'He was,' says Warnefrid, 'valiant in war, but fond of peace; of forgiving disposition; although destitute of learning, like most of his countrymen, yet gifted with judgment and perspicacity, and worthy of being compared with philosophers; careful of the welfare of his people, and a legislator.' Astolphus took Ravenna in 751, and put an end to the dominion of the Exarchs. [ASTOLPHUS.] Astolphus died in 756, and Desiderius, a Longobard duke, was elected his successor. Charlemagne came into Italy in 774, defeated Desiderius, and carried him prisoner into France, where he became a monk. The kingdom of the Longobards ended with Desiderius, and the Longo-

bard nation and its territories became subject to Charlemagne.

LONGTOWN. [CUMBERLAND.]

LONGUE. [MAINE-ET-LOIRE.]

LONGUS is the name of the author of a Greek pastoral romance, 'The Loves of Daphnis and Chloe,' or, according to the literal version of the Greek title, 'Pastoral Matters concerning Daphnis and Chloe,' which has been generally admired for its elegance and simplicity, and is one of the earliest specimens of that kind of composition. The author is supposed to have lived in the fourth or fifth century of our era.

LONGWY. [MOSELLE.]

LONICERA, a genus of plants, the type of the natural order *Caprifoliaceæ*. There are about sixty species of *Lonicera*, most of which have handsome flowers and emit a delicious perfume. *L. Caprifolium*, Goatsleaf, has a twining stem, with white or purplish flowers and orange-coloured berries. It is a native of the middle and south of Europe, and is found in woods and thickets in many parts of England and the south of Scotland. *L. periclymenum*, the Woodbine, or Honeysuckle, has climbing branches, flowers of a pale yellow, berries red, and accompanied with permanent bracts. This plant in early times was supposed to possess powerful medicinal properties, but it is not now used. It is, however, extensively cultivated in the gardens and shrubberies of Europe on account of the delicious perfume of its flowers. It is a native of middle Europe, and very abundant in some parts of Great Britain. *L. xylosteum*, Fly Honeysuckle, is a native of nearly the whole of Europe, in thickets, hedges, and rocky places, and by the side of woods. It is found in the same situations, but is a rare plant in Great Britain. *L. Tartarica*, the Tartarian Honeysuckle, is a native of Tartary, and is one of the most hardy of European shrubs, growing in the open air in the gardens of St. Petersburg and Stockholm. It is very common in British gardens, and is valued much on account of its early leafing and flowering.

All the species of *Lonicera* are well adapted for gardens, shrubberies, &c.

LONS-LE-SAULNIER. [JURA.]

LOO-CHOO, or LIEOU-KIEOU, or LEEU-CHEW ISLANDS, a group of islands between Japan and the Chinese island of Formosa. They lie between 24° 10' and 28° 40' N. lat., and 127° and 129° E. long., and are of different but rather small dimensions. The largest of them, called great Loo-choo, is about 65 miles by 12. The surface of these islands is mostly uneven and rugged, but the elevations do not attain a great height. They seem to be of volcanic origin. The lower tracts are of great fertility, but the most elevated are generally bare and rarely covered with wood. The fertile tracts are in high cultivation, and the produce very varied. Milk is never used; hogs, goats, and poultry, with rice and other vegetables, form the food of the inhabitants. The inhabitants are rather low in stature, but are well formed, and have an easy graceful carriage; their colour is mostly of a deep copper. Their language is similar to the Japanese. They seem to have made considerable progress in several branches of manufacturing industry, and prepare salt from sea-water in an ingenious manner. The chief products of these islands are provisions and live-stock,

with sulphur, salt, and (it is stated) copper and tin. The inhabitants manufacture cloths, paper, lacquered wares, tobacco pipes, and a liquor called *saki*. The principal foreign trade is with JAPAN, to which they are nominally subject, though they are essentially independent as regards internal administration. The government, as in China, appears to be in the hands of an aristocracy of learned men; and the king is said to be related to the imperial family of Japan. Their religion is a mixture of the doctrines and practices of Confucius, with those of Buddha. A Christian mission was established by Dr. Bettleheim, a German physician, in 1851. (Hall's *Loo-Choo*; Martin's *China*.)

LOOE, EAST and WEST. [CORNWALL.]

LOOM. [WEAVING.]

LOPE DE VEGA. [VEGA.]

LOPHIADÆ, a family of fishes of the acanthopterygious order, and forming the *Pectorales Pediculæ* of Cuvier. In this family the carpal or wrist bones are comparatively long, forming a kind of arm, at the ends of which the pectoral fins are placed. The ventral fins are in front of these. The skeleton is subcartilaginous. Under this head four genera are included, viz., *Lophius* (Cuv.), *Antennarius* (Comm.), *Malthe* (Cuv.), and *Batrachus* (Block). As a typical example of this family we may adduce the Fishing-frog, Angler, or Sea-devil, *Lophius piscatorius* (Linn.), of which an excellent account, with figures, is given in Yarrell's 'History of British Fishes,' vol. i.

LOPHIOBRANCHII, a sub-order of fishes in which the gills, instead of being pectinated, are separated into small rounded tufts, which are arranged in pairs along the branchial arches, and covered by a large operculum, so fixed as to leave only a single small orifice for the passage of the water outwards. The Pipe-fishes, *Syngnathus*, *Hippocampus*, *Solenostomus*, and *Pegasus*, are the genera included in this family.

LOPHIODON, an extinct genus of mammiferous quadrupeds, placed by Cuvier between *Palæotherium* and the *Tapirs*. M. de Blainville named the genus *Tapirotherium*.

Lophiodon differs from *Palæotherium* in the characters of the lower molar teeth, which, instead of exhibiting a continuous series of double crescents running longitudinally, are distinguished by transversal elevations, more or less oblique.

Incisors, $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{7-7}{6-6} = 42$.

LOPHYRUS (Gr. *λόφος*, 'a crest' and *ὄψα*, 'a tail'), a genus of Saurian reptiles, of the family *Agamidæ*, in which the head, body, and tail are surmounted by a spiny crest. The name also applies to a genus of Hymenopterous insects, of the family *Securiæ*.

LORANTHACEÆ, a natural order of Exogens, referred by most systematical writers to either the polypetalous or monopetalous sub-classes, but by others regarded as more closely in alliance with the apetalous *Santalaceæ* and *Protæacæ*. They are in nearly all cases true parasites, growing upon the branches of trees, below whose bark they insert their roots, incorporating them with the wood, and feeding upon the vital juices of the plants which they attack.

There is but one species, the common Mistletoe,

Viscum album, found wild in England. A species of *Loranthus* occurs in the south of Europe; but in the hot dry parts of tropical countries the species abound, swarming over the branches of trees, of which they often form a conspicuous feature, with their long-clustered gaily coloured flowers. As in this country the mistletoe does not injure in any considerable degree the plant which it attacks, unless it exists in unusual quantity, so in India, where *Loranthi* are common, the injury sustained by vegetation is according to the reciprocal size of the parasite and its stock.

LORANTHUS, a genus of plants, the type of the natural order *Loranthaceæ*. The species are evergreen shrubs parasitical on trees. *L. Europæus*, the European Loranthus, is an evergreen parasitical plant, and has the habit of the common mistletoe. It is a native of the southern parts of Europe, and is found on the oak, but inhabits no other tree.

LORCA. [MURCIA.]

LORD, a title given in Great Britain to peers of the realm and the archbishops and bishops, who have the right to sit in the House of Lords, as the Lords Spiritual and Temporal. By courtesy the title is also given to the eldest sons of dukes, marquises, and earls, prefixed to an inferior title of the peerage, and to the younger sons of dukes and marquises, prefixed to their Christian name and surname. The title is also bestowed on the following official personages by virtue of their offices—the Lord Lieutenant of Ireland and Lords Lieutenant of counties, the Lord Chancellor, Lord Privy Seal, Lords of the Treasury and Admiralty, the Lord High Admiral, Lord Great Chamberlain, Lord Chamberlain, Lord High Constable, Lord High Almoner, Lord High Steward, Lords in Waiting, Lords of the Bedchamber, Lords Justices, Lord Chief Baron of Exchequer, Lord Chief Justice, Lord Lyon, the Lord Mayors of London, York, and Dublin, and the Lord Provost of Edinburgh and Glasgow. The representative of the sovereign in the General Assembly of the Church of Scotland is called the Lord High Commissioner. All the judges of Great Britain and Ireland are addressed as ‘my lord,’ when presiding in court. The word is from the Saxon *hlaf*, ‘bread,’ and *ford*, ‘to give’—*hlaford*, ‘bread-giver.’

LORD ADVOCATE. [ADVOCATE, LORD.]

LORD LIEUTENANT OF A COUNTY. It was formerly used for the Crown to issue commissions of array, requiring certain experienced persons to muster and set in military order the inhabitants of the counties to which the commissioners were sent. In the sixteenth century these commissions gave place to commissions of lieutenancy, by which nearly the same powers were conferred on certain persons as standing representatives of the Crown. The right of the Crown to issue commissions of lieutenancy was denied by the Long Parliament, and formed a proximate cause of the rupture between Charles I. and his subjects. At the Restoration the right of the sovereign to issue such commissions was established by a declaratory Act, 14 Charles II. c. 3.

The Lord Lieutenant is the local representative of the Crown, the head of the magistracy, the militia, and the yeomanry; he nominates officers of militia and volunteers, and is considered responsible in cases of emergency for the preservation of the peace. His

authorities and duties with reference to military affairs are regulated by the militia acts.

The Lord Lieutenant also nominates to the Lord Chancellor all the justices of the peace for his county.

LORD OF MISRULE, the *Master of the Revels*. ‘First in the feast of Christmas,’ says Stowe (‘Survey of London,’ edition, 1603, p. 98), ‘there was in the king’s house, wheresoever he was lodged, a Lord of Misrule, or master of merry disports, and the like had ye in the house of every nobleman of honour or good worship, were he spiritual or temporal: amongst the which the mayor of London, and either of the sheriffs, had their several Lords of Misrule, ever contending, without quarrel or offence, who should make the rarest pastimes to delight the beholders. These lords, beginning their rule on Allhallow-Eve, continued the same till the morrow after the Feast of the Purification, commonly called Candlemas Day.’

LORD’S-DAY, the first day of the week, observed by Christians in commemoration of the Saviour’s resurrection, and in contradistinction to the Jewish Sabbath, or seventh day of the week, which the Mosaic law appointed for total cessation from labour. The characteristics of the Jewish Sabbath are, however, blended by many sects of believers with the features of the Lord’s-day, especially by the Scotch Presbyterians, and this rigid observance of religious duties has given rise to much wearisome and unprofitable discussion; the more latitudinarian worshippers stigmatizing their opponents as Sabbatarians, and the latter condemning the former as heterodox and profane.

It is clear from historical evidence that the Sabbath, as the Sabbath, was not recognized by the early Christians. In the days of the apostles it would seem that the faithful met on the evening of Saturday for the Lord’s Supper. Gradually the disorders which crept in at Corinth and elsewhere made a change needful. Men were enjoined to take their repast at home, so as not to profane the sacrament with the voracity of hunger. Thus, by degrees, passing as at Troas through a midnight service (Acts xx. 7), the Supper of the Lord crept on from what we should call the evening of the seventh day to the early morning of the first, and so ceased to be a supper in reality.

It is now, says Professor Plumptre, that we meet with the special adjective coined by St. Paul for the Lord’s Supper (*κυριακὸς*) applied to the day, probably by St. John in the Apocalypse (Rev. i. 10), and certainly in the writings of Tertullian and others. By a singular train of consequences, that which had originally received its holiness from one day now imparted a sanctity and a consecration to another. Henceforth the Lord’s-day was universally recognized in the Christian world as a day of joy and gladness—a day of rest, where rest was possible—for deeds of charity and Christian kindness, for devotional occupations, and for participation in that peculiar act of worship which gave the day its name. How the Lord’s-day of the Christian Church was transformed into the Sabbath of the Reformers, we shall consider in the article SABBATH. [SUNDAY TRADING.]

(On this subject the reader may consult Hessey’s *Bampton Lectures*; Professor Plumptre in *Contemporary Review*, January, 1866; *Sermons*, by Rev. F. W. Robertson; Coxe, *The Literature of the*

Sabbath Question; Ewald, *Altorthemer*; and the polemical tracts called into existence by Dr. Norman Macleod's speech on the Sabbath question before the Glasgow Presbytery, 1865.)

LORDS, HOUSE OF. [PARLIAMENT.]

LORDS JUSTICES. [JUSTICES, LORDS.]

LORDS OF REGALITY, in Scotch law, were persons to whom, on account of distinguished military services, a grant of jurisdiction was given along with their lands. [HERITABLE JURISDICTION.] In civil matters this jurisdiction was equal to that of a sheriff, and in criminal it embraced the crimes of murder and robbery. Rights of regality were abolished by the Act 20 Geo. II. c. 43.

LORDS OF THE ARTICLES, were a committee of the old Scottish Parliament, probably at first nominated by the king, but afterwards elected by Parliament itself, whose duty it was to prepare and digest all matters laid before Parliament. It was abolished in 1690, shortly after the Revolution.

LORD'S SUPPER. [COMMUNION.]

LORDSHIP. [LEET.]

LORETO. [MACERATA.]

LORETO, a department of North Peru, created in 1853. It extends from the Cordillera region of Pasco to the junction of the Amazon with the Javari, and is as large as all the other departments together. The western division is mountainous, but the eastern consists of vast well-watered plains, covered with luxuriant vegetation. The rainfall is excessive; and the mean temperature of the year 71° to 73° Fahr. The mineral products of the department comprise rock-salt, alum, sulphur, iron ore, and lignite; and gold is found in the river Napo. Steam navigation has recently been established in this region.

L'ORIENT, a seaport at the confluence of the Scorf and the Blavet, in the French department of Morbihan, is situated in 47° 44' 45" N. lat., 3° 21' 30" W. long., at a distance of 267 miles west by south from Paris, and has 35,462 inhabitants.

The town is of modern origin. It owes its importance to its having been made the naval dépôt of the French East India Company in 1666, from whence the place took its title of Port de L'Orient ('Port of the East.') At the dissolution of the company in 1720, it was made one of the stations for the French navy, and a free commercial port. The town is fortified; the houses are well-built; the streets wide, clean, and well-paved, and there are several pleasant promenades. The port is on the east side of the town, from which it is walled of: its length is nearly 4000 feet; its breadth is nearly 2000 feet. The royal dockyard is one of the finest in the kingdom; there are slips for laying down thirty vessels of war at a time. The harbour is bordered by fine quays, on which are large buildings connected with the dockyard, and an observatory. There is a signal-tower 123 feet high, built on an eminence south of the harbour, from which vessels can be discerned 30 miles out at sea. L'Orient has manufactures of hats, linens, braid, gold lace, and pottery; the exports consist of corn, wine, brandy, iron, lead, cotton and woollen stuffs, hardware, &c., cattle, and manufactured goods. The sardine and pilchard fishery is actively carried on.

L'Orient is the seat of a maritime prefect; it has

also a chamber of commerce, an exchange, national and communal college, town-hall, theatre, and a public library.

LORIMER, (bridle-cutter, from Lat. *lorum*, 'a thong'), is the name given to the persons employed in those trades which supply the metal fittings for saddles and harness generally. They have a guild in London, and in the Scotch burghs are comprehended as a branch of the corporation of hammermen. In the latter country, however, the term is also applied to cutlers, locksmiths, and brass founders.

LORIOL. [DRÔME.]

LORIS, a genus of *Nycticebidae*, a family of Quadrumana which links the Bats with the true Monkeys. The Loris are noted for their small ears, round head, and want of tail. They are natives of India and the islands of the Indian Archipelago. By some the generic name *Stenopis* is applied to them, by others they are set down as lemurs (*Lemuridae*); but as the true lemurs are all natives of Madagascar, it is better to associate the Indian forms with the family name given above. The Loris are nocturnal animals, seldom venturing abroad during the day. They live on fruit; their fur is much prized.

LORNE. [ARGYLESIRE.]

LOROUX. [LOIRE INFÉRIEURE.]

LORRAINE, a large province of France, which now forms the departments of VOSGES, MEURTHE, MOSELLE, and MEUSE. After having formed part of Gallia Belgica under the Romans, and of Austrasia under the successors of Clovis, the territory of Lorraine was united to the empire of Charlemagne. It was afterwards erected into a duchy, and in course of time passed to the house of Austria. By the treaty of Vienna, concluded November 18, 1736, Francis Stephen, duke of Lorraine and husband of Maria Theresa, exchanged for the duchy of Tuscany the duchies of Lorraine and Bar, which were ceded to Stanislas Leczinski, the father-in-law of Louis XV., during his life. Stanislas having died on the 3rd of February, 1766, the two duchies were reunited to France.

Lorraine included the duchy of Lorraine, the duchy of Bar, and the Pays-des-Trois-Évêchés, which had Nancy, Bar-le-Duc, and Metz, for their respective capitals.

LORRAINE, CARDINAL DE. [GUISE.]

LORRAINE, CLAUDE, a celebrated Italian artist, whose real name was Claude Gelée, was born in Lorraine, near Charnes, in 1600. Owing to the poverty of his parents he was brought up as a cook, and in that capacity went to Rome, where he was engaged as his servant and factotum by Agostino Tassi, the landscape painter. Here he had numerous opportunities of studying the mechanism of the pictorial art, and employed them to such advantage that he was soon able to abandon his menial duties. He became distinguished for his landscapes, which exhibit a wonderful fidelity to nature, and owing to the painter's exquisite management of light, produce a powerful impression on the spectator's fancy. In England his works have always been very popular, though Turner, if no other of our native artists, has shown that even in his own peculiar line of art he is by no means unapproachable. Prosperous and contented, absorbed in the study of nature, and happy in the cultivation of his remarkable genius, Claude

lived to a ripe old age. He died at Rome on the 23rd of November, 1682, in his eighty-third year.

LORY. [PSITTACIDÆ.]

LOSTWITHIEL. [CORNWALL.]

LOT, a department in France, formed of part of the old province of Guienne, between the departments of Cordeze, Dordogne, Lot-et-Garonne, Tarn-et-Garonne, Aveyron, and Cantal. Its greatest length from north-east to south-west is 65 miles, and its average breadth is 35 miles. The area is 2012 square miles, and the population 295,542.

Hydrography.—The department takes its name from the *Lot* (anc. *Oltis*), which, rising in the mountains of Lozère, flows in a general western direction across the departments of Lozère, Aveyron, Lot, and Lot-et-Garonne, where it enters the Garonne on the right bank a little above Aiguillon, after a course of 270 miles, 187 of which, from Entraignes, where it is joined by the Truyère, in the department of Aveyron, are navigable. The north of the department is drained by the DORDOGNE. The watershed between these two rivers is formed by a prolongation of the Auvergne mountains, which traverse the department from north-east to west, dividing it into two slopes, the northern one belonging to the basin of the Dordogne, the southern one to the basin of the Garonne. The *Selle*, which flows along the south-eastern side of this mountain range, and enters the Lot on the right bank near St. Cirq, is the only other river of importance. Some small feeders of the Garonne rise in the south of the department, the largest of which is the Barguelonne. The eastern districts of the department are covered with low hills which are ramifications of the Cévennes.

Soil and Products.—The deep soils of the valleys and plains yield fine crops of wheat, maize, barley, and oats; on the lighter soils, rye, rape, and buckwheat are grown; and on the strongest soils considerable quantities of hemp and tobacco are raised. The hill-slopes along the rivers are generally laid out in vineyards, which yield annually 13,200,000 gallons of wine, the best kinds being those of Cahors and Grand-Constant. About two-thirds of the whole produced is exported or distilled into brandy. The white mulberry is extensively cultivated for the production of silk. Excellent truffles are found. Plums are grown in large quantities, and, when dried, form an important article of export. Turkeys, geese, game, and poultry generally, are very plentiful. Horses, cows, and sheep are of inferior breeds; goats are numerous; and large numbers of pigs are fatted for the supply of the neighbouring departments. Wild boars are now rarely met with. Hares and rabbits are very numerous, and of large size. Fish is abundant in all the rivers, among which the Cère, a feeder of the Dordogne, is famous for eels, and the Lot for carp of enormous size.

Some iron and coal mines are worked; lead, calamine, marble, millstone-grit, granite, limestone, potter's and fuller's earth, &c., are found.

The manufactures of the department are unimportant; there are a few iron forges, potteries, and paper-mills, and numerous corn and flax mills.

Climate.—The department presents great differences of temperature and climate. Among the granitic highlands of the east, the winters are long and rude, generally lasting from November to April,

during which time snow and rain, each accompanied by cold winds, alternately succeed each other. The calcareous slopes of the Auvergne range have a drier and less rigorous climate, and a much shorter winter. In the plains and the valleys of Dordogne and the Lot, the climate is genial, except during the spring, when the night frosts are often very harsh and biting.

Divisions, Chief Towns, &c.—The area of the department is 948,062 English acres. It is divided into three arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop.in1863.
Cahors, . . .	12	129	118,151
Figeac, . . .	8	112	94,171
Gourdon, . . .	9	74	83,220
Total, . . .	29	315	295,542

Of the arrondissement of Cahors, and of the whole department, CAHORS is the capital. *Castelnau-de-Montratier* occupies the summit of a steep hill, 12½ miles S. from Cahors, and has 1015 inhabitants. Its position, its ramparts and strong castle, of which there are still some vestiges, rendered it formerly a town of considerable importance. *Montcuq*, situated on a conical hill between two valleys, 14 miles S.W. from Cahors, has 2321 inhabitants. *Puy-l'Evêque* is situated on a peninsula formed by the Lot, on its right bank, 15 miles W. by N. from Cahors, and has 2321 inhabitants.

In the arrondissement of Figeac, the chief town, *Figeac*, is situated in a pretty valley surrounded by hills, which are covered with woods, vineyards, and orchards, on the right bank of the *Selle*, 32 miles N.E. from Cahors, and has a tribunal of first instance, a college, and 8381 inhabitants. Manufactures of cotton and linen are carried on; there are also dye-works and tanneries. Two obelisks, called *Aiguilles*, one S., the other W. of the town, are remarkable for their structure and antiquity; they were used in former times as fire-beacons to guide travellers by night through the surrounding countries, which were then covered with dense forests. *Cajarc*, a town of 1928 inhabitants, is situated in a very fertile district, on the right bank of the Lot, 12 miles S.W. from Figeac. *St. Céré*, 18 miles N. by W. from Figeac, is built on an island formed by the Bave, a feeder of the Dordogne, and has 4302 inhabitants, who manufacture great quantities of hats, and trade in linens. To the north of the town are the remains of a fortified camp, said to be Roman, in which, however, several ecclesiastical structures seem to have been erected; of these, two lofty isolated towers are still standing.

The arrondissement of Gourdon takes its name from its chief town, *Gourdon*, which is situated on a hill in the west of the department, 22 miles N. from Figeac, and has a tribunal of first instance, a college, and 5099 inhabitants, who manufacture woollen stuffs, and trade in wine and truffles. The town, which is tolerably well built, and has a handsome church, was formerly surrounded by strong ramparts. *Gramat*, situated in a romantic valley, 16 miles N.E. from Gourdon, on the right bank of the Alzon, a feeder of the Dordogne, has saline baths and springs, and 4074 inhabitants. *Martel*, 11 miles N. by W.

from Gramat, has a college and 3098 inhabitants. It owes its origin and name to Charles Martel, who erected a church here which was rebuilt on a large scale in the year 1300, and is lighted through stained-glass windows remarkable for beauty of colouring and correctness of design; the subjects represented are the principal incidents of our Saviour's passion. *Souillac*, a well-built town, with a tribunal of commerce and 3128 inhabitants, is situated in a fertile valley, 12 miles N. by E. from Gourdon, on the right bank of the Dordogne, which is here spanned by a stone bridge of seven arches. Coarse woollens, agricultural implements, bar iron, leather, and iron-ware are manufactured; there is also some trade in wine, tobacco, hides, salt, groceries, oak-staves, cattle, &c.

The department forms the see of the bishop of Cahors; it is included in the jurisdiction of the Cour Imperiale of Agen and of the University Academy of Toulouse, and belongs to the twelfth Military Division, of which Toulouse is head-quarters. It returns two members to the Chamber of Deputies.

(Malte Brun, *Géographie Universelle; Statistique de la France; Annuaire pour l'An 1866.*)

LOT-ET-GARONNE, a department in France, comprising the former district of Agénois, part of the diocese of Condom, and portions of those of Bazas, Lectoure, and Cahors, takes its name from the Lot and the Garonne, which traverse it, the former from N.E. to W., the latter from S.E. to N.W., and is bounded N. by the department of Dordogne, E. by those of Lot and Tarn-et-Garonne, S. by that of Gers, and W. by those of Landes and Gironde. Its greatest length from N.E. to S.W. is 63 miles, from S.E. to N.W. 55 miles. The area is 2048 square miles, and the population 332,065.

Surface and Products.—The surface of the department presents a high plain, furrowed to different depths by river-valleys, but diversified in the south by some low swells, the last declivities of the Pyrenees northwards; the whole inclining towards the north-west and belonging to the basin of the Garonne. Nothing can exceed the beauty and fertility of the valleys of the Lot and the Garonne; the slopes that inclose them are covered with vines and other fruit trees, especially the fig and the plum, and the low lands yield abundantly wheat, maize, rye, hemp, tobacco, &c. The valley of the Baise, in the south, and that of the Dropt, in the north of the department, are also very fertile. With these exceptions, the department presents an arid, treeless surface, with a barren stony soil, especially in the eastern districts at a little distance from the Lot and the Garonne. In the upper part of Agénois, the soil is a stiff iron-coloured clay that ill repays the labour of the husbandman; and in the Landes, which extend over the south-west of the department along the Avenne, the ground is covered with arid sands, unhealthy marshes, and in some places with a scanty soil, which can with difficulty be made to produce a few ears of corn. In this last district there are also some hungry pastures and forests of pine and cork; the cork woods along the left bank of the Gelise, a feeder of the Losse, in the south of the department, are the largest in France. On the northern borders there are fine chestnut woods. The quantity of wine annually produced is 15,000,000 gallons, half of which is retained for home consumption; part of the

surplus is distilled into brandy, and the remainder is exported to Bordeaux. Cattle, horses, mules, and sheep are reared in immense numbers, and geese form an important article of export. Game and freshwater fish are plentiful. The climate of the department is in general very healthy; but long alternations of drought and rain are not uncommon.

The principal rivers are the Lot, the GARONNE, the Baise [GERS], the GERS, and the Dropt [DORDOGNE].

Natural Products, &c.—Iron mines are worked; good building stone, calcareous spar, gypsum, and marl are found. The chief manufactures are cork (for which there is a national establishment), vinegar, sailcloth, linen, swanskins, pottery, linen and cotton yarn, gloves, calico, iron, glass, paper, lime, ropes, leather, tobacco. The commerce is composed of the various industrial and agricultural articles enumerated, and of pitch and tar made from the pines of the Landes.

Divisions, Chief Towns, &c.—The area of the department is 1,320,531 acres. It is divided into four arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Agen, . . .	9	72	80,517
Marmande, .	9	98	99,389
Villeneuve-d'Agen, . .	10	84	92,241
Nérac, . . .	7	62	59,918
Total, . .	35	316	332,065

In the arrondissement of Agen, the chief town, Agen, which is also the capital of the department, and of the former district of Agénois, is situated in a wide and rich plain, on the right bank of the Garonne, in 44° 12' 27" N. lat., 0° 37' 50" E. long., at a distance of 88 miles S.E. from Bordeaux, 377 S. from Paris, and has 17,263 inhabitants. The town, which existed under the name of *Aginum* in Roman times, is ill built. The finest quarter is the suburb on the Bordeaux road, which runs along the right bank of the river, and terminates in the magnificent promenade of Gravier. This promenade, which communicates with the left bank of the Garonne, by a fine suspension bridge at one end, and by a stone bridge of eleven arches at the other, consists of an avenue formed by gigantic elms, that interlace their boughs high overhead, forming a continuous vault of living verdure, all but impenetrable to the rays of the sun; while on either hand their trunks and side branches are fashioned into elegant arcades. The principal buildings in Agen are—the cathedral church of St.-Caprais; the church of the Jacobins, the former episcopal palace, now the residence of the prefect; the ecclesiastical college; and the public library, which contains 15,000 volumes. From a rocky height near the town, called l'Hermilage, there is a magnificent view over the rich valley of the Garonne, with the Pyrenees in the distance. In a recess on its picturesque slope is shown the house of the Scaligers, the younger of whom was born here. It was also the birthplace of Palissy, the potter, and Lacépède, the naturalist. Agen gives title to

a bishop; it is the seat of the Cour Impériale for the departments of Lot, Lot-et-Garonne, and Gers, and has tribunals of first instance and of commerce, a normal school, two schools for the education of the clergy, and a communal college. The town is surrounded with plum orchards, which supply Europe with their dried produce, under the well-known name of prunes. The manufactures consist of sailcloth, starch, linen, serge, swanskins, printed cottons, brandy, leather, &c.; the commerce in corn, flour, wine, brandy, plums, woollen cloth, cotton yarn, feathers, &c., is considerable. Steam-boats ply regularly between Agen and Bordeaux. *Astafort*, on the right bank of the Gers, 10 miles S. from Agen, is said to have been built by the English and named *Stafford*. It is surrounded by old turreted half-ruined walls, and has 2434 inhabitants. A large cross marks the spot, still called *Champ des Huguenots*, on which the prince de Condé was defeated in the religious wars. *Port-Sainte-Marie*, 12 miles W. from Agen, is built at the foot of a high hill, on the right bank of the Garonne, which is here crossed by a fine suspension bridge and forms a commodious harbour for river craft. The high road to Bordeaux passes under an arcade surmounted by a lofty tower, the whole built with small square stones, and supposed to be of Roman erection. The population of the town is 2856.

In the arrondissement of Marmande, the chief town, *Marmande*, is situated in the west of the department, on a hill above the Garonne, which is here crossed by a bridge of a single arch. The town has an old-fashioned look; many of the houses are timber-framed. The most important buildings are the town-hall, the court-house, the college, and the hospital. Marmande is the seat of a tribunal of first instance, and has 8661 inhabitants, who manufacture hats, woollen stuffs, brandy, ropes, and leather. It has also a considerable trade in corn, flour, wine, brandy, plums, hemp, tobacco, &c. Steam-boats ply several times a day to Bordeaux. *Clairac*, a clean well-built town, stands in a pretty situation on the right bank of the Lot, has 2313 inhabitants, who trade in white wine, plums, flour, tobacco, &c. *Castel-Moron*, formerly a fortified town, which was held more than a century by the English, stands on the Lot, and has 2094 inhabitants. *Le-Mas-d'Agénois*, a small but ancient town, stands 8 miles from Marmande, on the left bank of the Garonne, and has 2153 inhabitants. *Tonneins*, a few miles E. of Le-Mas-d'Agénois, on the right bank of the Garonne, which is here spanned by a suspension bridge, and on the railway from Bordeaux to Cette, is a cheerful, well built town, situated on the sides of a hill, from whence there is a delightful view. The town-hall, the theatre, and the public baths are the most conspicuous buildings. Tonneins has a population of 7947, who manufacture great quantities of ropes, leather, and tobacco, and trade in these articles, as also in hemp, plums, wine, corn, and brandy, &c. There is a national tobacco factory here. Tonneins was the birthplace of Madame Cottin.

The arrondissement of Villeneuve-d'Agen takes its name from *Villeneuve*, a town of 13,830 inhabitants, 14 miles N. from Agen, situated on the Lot, which divides it into two unequal parts, united by an ancient bridge of remarkable structure. The greater

part of the town is on the north bank of the river, and consists of several wide, straight, well-built streets, that abut in a circus surrounded by arcades. Of the old fortifications, two towers and the castle still remain; the ramparts have been turned into handsome promenades. The buildings of the ancient abbey of Eysse, situated about $\frac{3}{4}$ of a mile N. of the town, now form a convict prison. Villeneuve has tribunals of commerce, and a college. Linen, leather, tiles, hammers for metal foundries, &c., are manufactured; the commerce is composed of flour, plums, wine, cattle, paper, iron, copper, &c. *Fumel*, E. by N. from Villeneuve, on the right bank of the Lot, has paper mills, and 3000 inhabitants. *Sainte-Livrade*, W. of Villeneuve, and near the left bank of the Lot, has a population of 3018, who manufacture leather, and trade largely in plums. *Monflanquin*, situated on a hill, near the left bank of the Lède, 9 miles N. from Villeneuve, had, in 1861, 3842 inhabitants. The streets are narrow, steep, and ill-paved. The neighbourhood is fertile in wine and fruits. *Tournon*, a market town, 16 miles E. from Villeneuve, situated on a hill on the right bank of the Baudusson, a feeder of the Lot, has 4569 inhabitants.

The arrondissement of Nérac comprises the southwest of the department, and takes its name from the chief town, *Nérac*, which is prettily situated on the Baise, 15 miles S.W. from Agen, and has tribunals of first instance and of commerce, a college, and 7283 inhabitants, who manufacture coarse linens and woollens, sea biscuits, corks, leather, and great quantities of flour. The old town, situated on a steep slope on the right bank of the Baise, is ill built, with narrow streets of old wooden houses; it is joined by two stone bridges to the new town, which stands on the left bank, and is larger and better built. This town has several pretty and shady walks, one of which is adorned with a statue of Henri IV. The mosaics, the remains of a palace, a temple, an aqueduct, and of baths, found here, mark the place as the site of a Roman city, the name of which is lost. The town trades in linen, hemp, flax, wine, brandy, &c., and is famous for its partridge patties. Nérac has an important corn market. *Castel-Jaloux*, 18 miles N.W. from Nérac, on the left bank of the Avance, is a pretty and well built town, not far from the commencement of the *Landes*, and has 2852 inhabitants, who manufacture coarse cloth, paper, glass, leather, &c. It has also iron forges, copper foundries, smelting furnaces, hydraulic saw mills, and a considerable trade in corn, wine, pitch, and tar, oak-bark, chestnuts, and leeches. *Mézin*, 7 miles S. from Nérac, on the right bank of the Gelise, a feeder of the Baise, is an ill built town, with 2992 inhabitants, who manufacture corks, pottery, flour, paper, and leather.

The department forms the see of the bishop of Agen, is included in the jurisdiction of the Cour Impériale of Agen, and of the Academy of Bordeaux, and belongs to the fourteenth Military Division, of which Bordeaux is head-quarters. It returns three members to the Chamber of Deputies. (*Dictionnaire de la France; Annuaire pour l'An 1866.*)

LOTHIANS, a term under which that part of Scotland is comprehended which stretches along the southern shores of the Frith of Forth, and includes the three counties of Haddington, Edinburgh, and

Linlithgow. The first of these counties is also called East Lothian, the second Mid Lothian, and the last West Lothian. This region lies between $56^{\circ} 40'$ and $56^{\circ} 5' N.$ lat., and between $2^{\circ} 24'$ and $3^{\circ} 50'$ W. long. The soil is usually fertile and repays cultivation. The Lothians were taken possession of by the Saxons in 450, and were not incorporated with the rest of Scotland until the close of the eleventh century.

LOTIONS, or washes, termed also epithems, and when intended for the eye, collyria, or eye-washes, are either mixtures of different ingredients, or solutions of various medicinal substances, in water or other menstrua, designed for external application. Many of the nostrums sold under the name of lotions are solutions of very active ingredients, and their application is often productive of very serious effects.

LOTTERIES have been encouraged by some states for the purpose of raising a revenue. The general plan has been for the government to sell a certain number of tickets or chances, and to distribute by lot a part of the money thus collected among a comparatively small number of the purchasers. Lotteries are games of chance, the aggregate number of players in which are sure to lose a part of their venture.

The earliest English lottery of which there is any record was in 1569, when 40,000 chances were sold at ten shillings each; the prizes consisted of articles of plate, and the profit was employed for the repair of certain harbours. In the course of the following century the spirit of gambling appears to have been materially increased in this direction, for *private* lotteries were early in the reign of Queen Anne suppressed 'as public nuisances.' In 1823, the last Act that was sanctioned by Parliament for the sale of lottery tickets, contained provisions for putting down all private lotteries, and for rendering illegal the sale in this kingdom of all tickets, or shares of tickets, in any foreign lottery, which latter provision is evaded to this day. On the ground of injury to public morals lotteries of all kinds were abolished in England in 1826. In Scotland lotteries have been declared illegal by a long series of statutes, commencing with the 10 & 11 Will. III. c. 17.

The system of state lotteries was very long carried on by the French government, and was the cause of still greater demoralization than in England. State lotteries were abolished in France in 1836, and in Hesse-Darmstadt in 1852, but many German states still countenance and derive a portion of their revenue from them. Experience has, however, proved that it is one of the very worst methods that could be adopted for adding to the revenue of any country.

Lotteries have been very common in the United States, and have been sanctioned by the several states, not so much as a means of raising money for state purposes, as with the view of encouraging, as they supposed, many useful objects which could only be effected by raising at once a large sum of money, such as canals, the establishment of schools, and even the publication of a book. The numerous frauds practised in lottery schemes in the United States have perhaps done more to open the eyes of the people to the mischief resulting from them than any investigation into the true principles of lotteries. The 9 & 10 Vict. c. 48, legalizes art-unions in this country. [ART-UNIONS.]

LOTTO, LORENZO, is supposed to have been one of the scholars of the Bellini, and also an imitator of Leonardo da Vinci. He lived long at Bergamo, and was generally considered a native of that place. He died at Loretto. His works range from 1513 to 1554.

LOTUS. The plants referred to by classical authors under the name of *Lotos* or *Lotus* are very numerous. No less than eleven have been enumerated. Of these some are herbaceous, others perennial. Among the former are the *Lotus sativa* and *L. sylvestris* of Dioscorides; the first is also called *trifolium*; it is supposed by some botanists to be *Melilotus officinalis*, and by others to be *M. cærulea*. Dr. Sibthorp has fixed upon *Melilotus messanensis* as the plant.

The *Lotus sylvestris* of Dioscorides, called also *Libyon*, a native of Libya, and about two feet high, with leaves like those of *Lotus trifolium*, and fruit like that of Fennugreek, is thought to be the *Trigonella elatior* of Sibthorp, which he found in Asia Minor and in Cyprus.

Lotus Ægyptia, or the Egyptian Lotus, is no doubt one of the *Nymphæaceæ*, being described as springing up in Egypt in fields inundated by the river, with a stem like that of the *νύμφες*, or Egyptian Bean (*Nelumbium speciosum*), and a white lilaceous flower, which rises out of the water at sunrise, and sinks down again at its setting, a capsule like that of the poppy, in which are contained seeds which the Egyptians roast and make into bread, with a root which is likewise eaten, both in a dressed and undressed state. The plant is no doubt the *Nymphæa Lotus* of botanists. But as in the most ancient monuments a blue-coloured lotus is likewise represented, there is no doubt that the Egyptians were also acquainted with the *Nymphæa cærulea*.

The Egyptian lotus, however, is not so celebrated as another less known tree, to which exaggerated description has assigned a fruit of the most delicious kind, upon which the Lotophagi lived, and which when strangers had once tasted, they ceased to wish to return to their native country: a legend that has suggested Tennyson's beautiful poem of 'The Lotus-Eaters,' and is given in full in the ninth book of the 'Odyssey.' This is specially described as a tree, but there is no doubt that several have been confounded under this name. One has been described by both Dioscorides and Pliny. Polybius also describes another as the African Lotus. The true lotus of the ancients, however, would seem to have been the *Nitraria tridentata*. Dr. Shaw, in his 'Travels in Barbary,' figures a species of *Zizyphus* which he calls 'Sedra Arabum, quæ et Lotus veterum.' It is a prickly branching shrub, with fruit of the size of a wild plum, and of a sweetish taste and saffron colour. He found it sold in the markets, cattle fed with it, and a liquor drawn from it. Desfontaines also found this *Zizyphus Lotus* on the same coast, and has fully described it. Mungo Park found a species of *Zizyphus* in the interior of Africa, which forms a large tree with yellow farinaceous berries of a delicious taste. The natives, he says, convert them into a sort of bread, by exposing them some days to the sun, and afterwards pounding them gently in a mortar, until the farinaceous part is separated from the stone. This meal is then mixed with a little water, and formed into cakes, which, when dried in

the sun, resemble the sweetest gingerbread. The Arabs call it *Nabk* or *Nabka*. It may be added that the fruit of several species of *Zizyphus* is eaten in India.

LOUDEAC. [CÔTES-DU-NORD.]

LOUDON, JOHN CLAUDIUS, was born at Cambuslang, in Lanarkshire, on the 8th of April, 1783. As a child he exhibited a taste for gardening, and at the age of fourteen he was placed with a nurseryman and landscape gardener. During this period he acquired the habit of sitting up two nights every week for the purpose of study, which he continued for many years.

In the year 1803 Loudon first came to London, and became a landscape gardener. One of his earliest literary efforts was a paper contributed to the *Literary Journal* entitled 'Observations on laying out the Public Squares of London.' In 1804 he published his first work, entitled 'Observations on the Formation and management of useful and ornamental Plantations.' In 1805 he published 'A short Treatise on some Improvements lately made in Hothouses;' in 1806, a 'Treatise on forming, improving, and managing Country Residences, and on the choice of situations appropriate to every class of purchasers.' In 1822 appeared his great work, 'The Encyclopædia of Gardening.' A second edition was published in 1824. Its success led him to engage in the 'Encyclopædia of Agriculture,' published in 1825. Another work was edited by him, and published in 1829, with the title 'Encyclopædia of Plants.' This was followed by the 'Encyclopædia of Cottage, Farm, and Villa Architecture,' published in 1832. 'The labour,' says Mrs. Loudon, 'that attended this work was immense; and for several months he and I used to sit up the greater part of every night, never having more than four hours' sleep, and drinking strong coffee to keep ourselves awake.' He then planned his 'Arboretum et Fruticetum Britannicum,' brought out in 1838. An attack of rheumatic fever in 1806 was so severe as to produce permanent anchylosis of his left knee. Subsequently his right arm became affected, and was amputated in 1826. In the meantime his left hand became affected, so that he could only use the third and little finger. After this period he was obliged to employ for all his works an amanuensis and a draughtsman. Early in 1843 he was attacked with chronic inflammation in the lungs, which terminated his existence on the 14th of December of that year. He continued working till the day of his death, and 'died standing on his feet.'

LOUDUN. [VIENNE.]

LOUGH, an Irish term synonymous with the Scotch *loch*, but not with the English *lake*, for 'loch' and 'lough' are applied to designate arms of the sea as well as collections of fresh water, which the word 'lake' is not.

LOUGHBOROUGH. [LEICESTERSHIRE.]

LOUGHREA. [GALWAY.]

LOUHANS. [SAONE-ET-LOIRE.]

LOUIS I., called 'le Débonnaire,' and also 'the Pious,' son of Charlemagne, was made his father's colleague in the empire in 813, and after the death of Charlemagne in the following year, succeeded him as King of France and Emperor of the West. Bernard, son of Pepin, elder brother of Louis, having conspired to supplant his uncle in the empire, was

seized by order of Louis, and his eyes were put out, in consequence of which he died in a few days. Louis showed great sorrow for this act of cruelty, to which he had been advised by his courtiers, and did public penance for it before an assembly of bishops. In 820 he appointed his son Lotharius king of Italy and his colleague in the empire. To his son Louis he gave Bavaria, Bohemia, and Carinthia, and to his other son Pepin, Aquitania. The whole of his reign was a series of revolts and contentions between him and his sons, partly caused by the conduct of the Empress Judith of Bavaria, a licentious and ambitious woman. In the midst of these troubles he died in June, 840. Lotharius was acknowledged emperor, and after a war against his brothers retained Italy, Provence, Burgundy, and Lorraine. Charles the Bald succeeded his father as King of France, and Louis of Bavaria had all Germany.

LOUIS VI., called 'le Gros,' son of Philip I., succeeded his father in 1108. The larger part of the kingdom was then in the hands of the great vassals of the Crown, over whom the king's supremacy was but nominal. The duchy of Normandy was in the possession of Henry I. of England. Henry and Louis quarrelled about the limits of their respective states, and thus began the wars between the English and the French in France which lasted for more than three centuries. Louis had the worst in several encounters.

Assisted by his minister, l'Abbé Suger, Louis succeeded in recovering for the Crown some of the power which the great vassals had usurped, and he began the creation of the third estate, or commons, as a check on their power. He died at Paris, in 1137, aged sixty, and was succeeded by his son Louis VII.

LOUIS IX., called St. Louis, succeeded his father Louis VIII. in 1226, when he was twelve years of age, under the regency of his mother Blanche of Castile. During his minority, a constant struggle prevailed between the Crown and the great feudatories, in which the latter eventually triumphed. Louis then (1248) set out on a crusade to the Holy Land. He landed in Egypt, and took Damietta, but being defeated at the battle of Mansoura, he was taken prisoner, compelled to pay a heavy ransom, and to restore his captures to the Mussulmans. From Egypt he sailed to Acre, and carried on the war in Palestine, but with no success, till the year 1254, when he returned to France. He curbed the power of the nobles; published several useful statutes, known by the title of 'Etablissements de St. Louis;' established a police at Paris; classed the various trades into companies called confraries; established the college of theology called La Sorbonne; created a French navy, and made an advantageous treaty with the king of Arragon, by which the respective limits and jurisdictions of the two states were defined. The chief and almost the only fault of Louis, which was that of his age, was his religious intolerance. A feeling of fanaticism led him to another crusade, in which he met his death. He sailed for Africa, laid siege to Tunis, and died in his camp of the plague on August 25, 1270. Pope Boniface VIII. canonized him in 1297. Louis' brother Charles, count of Anjou and Provence, took the kingdom of Naples from Manfred of Suabia, and established there the dynasty of Anjou. [ANJOU.]

LOUIS XIII., son of Henri IV. and of Mary de' Medici, succeeded his father in 1610, being only nine years of age, under the regency of his mother. In October, 1614, he was declared to be of age, and in the following year he married Anne, daughter of Philip III. of Spain. Concino Concini, *maréchal d'Ancre*, a Florentine, the favourite minister of the queen-dowager, had by his insolence and his intrigues excited considerable jealousy, and was killed at the instigation of the king. The Parliament of Paris declared him to have been guilty of treason and sorcery; and on the same charges his wife was afterwards beheaded and her body burnt. The queen-dowager was sent to Blois under arrest. De Luynes, a young courtier, now became the ruling favourite; for Louis was totally incapable of governing himself during the whole of his life. Some years after the queen-dowager escaped from Blois, and being supported by several nobles a civil war broke out; but Armand du Plessis, bishop of Luçon, known afterwards as Cardinal and Duke de Richelieu, acted as mediator, in consequence of which he obtained a cardinal's hat, in 1624 (on the death of De Luynes) became chief prime minister, which he continued to be till his death in 1642. He checked the ambition of the House of Austria, and acquired for France considerable influence in the affairs of the empire. In 1628 Richelieu captured La Rochelle, the great stronghold of the Protestants of France. The French armies took an important and generally a successful part in the Thirty Years' War; they acted on the Rhine in concert with the Swedes, and whilst another French army carried on the war in Italy against the Spaniards, a third army was fighting in Flanders, and a fourth on the frontiers of Catalonia. The great object of Richelieu was to render the government of the king absolute, and he succeeded. He at the same time patronized learning and the fine arts, established the royal press, and embellished Paris. Louis died in May, 1643.

LOUIS XIV. was born at St. Germain-en-Laye, September 16, 1638, and succeeded his father when hardly five years old. Cardinal Mazarin was the minister, under the regency of the queen-mother. The treaties of Münster and Osnabrück (1648) put an end to the Thirty Years' War, and Mazarin concluded the peace of Westphalia. The same year, however, that the war in Germany was terminated, the civil war of La Fronde broke out in France. [FRONDE.] This war lasted with some intermissions till 1652, when Condé, one of the chief leaders of the Frondeurs, emigrated to join the Spaniards, and Cardinal de Retz, another of their supporters, was imprisoned. During the continuance of the war the court were twice obliged to leave Paris, and the consequence of a temporary reconciliation was the disgrace and exile of Mazarin in 1651, who, however, returned and resumed his ministry in 1653. In 1654 Louis XIV. made his first campaign in Flanders against the Spaniards. In the following year he concluded a treaty of alliance with Cromwell against Spain. The war continued that and the next year with various success; Turenne commanded the French troops, and the prince of Condé fought on the side of the Spaniards against his own country.

In 1657 the Emperor Ferdinand III. died, and Mazarin intrigued, by means of bribery and promises,

to prevent the election of his son Leopold, and to obtain the imperial dignity for Louis XIV. But he was unsuccessful: even those who had received his pay turned in favour of Leopold, who was unanimously elected in 1658. From that time began the bitter animosity of Louis against Leopold, which lasted half a century, and was the cause of three long and bloody wars.

Meantime the war with Spain was brought to a close in November, 1659, by Cardinal Mazarin, by the treaty of the Bidassoa, in which the marriage between the Infanta Maria Theresa, daughter of Philip IV. of Spain, and Louis XIV. was concluded. Spain gave up Artois and Roussillon, and stipulated for a free pardon to the prince of Condé.

The new queen was weak in her intellect, but harmless and good-natured. Louis XIV. always behaved to her with considerate regard, but never felt any affection towards her; and he resorted to the society of a succession of mistresses, of whom Mademoiselle de la Vallière, Madame de Montespan, and Madame de Maintenon are the best known. In February, 1661, Mazarin concluded at Vincennes a third and last treaty with Charles, duke of Lorraine, by which Strasbourg, Pfalsburg, Stenai, and other places were given up to France. Nine days after this treaty Mazarin expired, at fifty-nine years of age.

On the death of Mazarin Louis XIV. took the reins of government entirely into his own hands. He banished and imprisoned Fouquet, the minister of finance, on charges of peculation and treason. In appointing Colbert in his room, Louis made a good choice, and much of the splendour of his reign is due to that able minister. [COLBERT.]

Louis XIV. completed the work begun by Richelieu; he changed France from a feudal monarchy into an absolute one. After the death of Mazarin he admitted no more ecclesiastics into his council. The spirit of jealousy of the Gallican Church made it less dependent on Rome, and more subservient to the Crown. The parliaments were also subdued, like the nobility and clergy, by the absolute will of Louis, and offered little or no impediment to the royal authority. 'L'état c'est moi,' his famous saying, explains the whole principle of his policy. He established that system of centralization in the administration which has been followed and rendered more complete by succeeding governments, and which has rendered France the most compact power in Europe. His reign was a brilliant epoch of learning in France. In his patronage of the arts he displayed more pomp than taste.

Louis XIV. hated the Protestants, not so much from religious bigotry as because he considered them as rebellious subjects. This led him to that most unjust and disastrous measure, the revocation of the Edict of Nantes in 1685, by which Protestantism was proscribed in France, and by which that country lost thousands of its most industrious citizens. The persecution of the Jansenists was another consequence of the king's intolerance.

The foreign wars of Louis XIV. proceeded in great measure from the same ruling principles or prejudices of his mind. He disliked the Dutch, whom he considered as mercantile plebeians, heretics, and republicans.

The first war of Louis XIV. against the Emperor

Leopold, Holland, and Spain, was ended by the treaty of Nimeguen, 1678. Louis kept the Franche Comté and part of the Spanish Netherlands. The war broke out again in 1689, between Louis on one side, and the Empire, Holland, and England on the other. In Germany Louis XIV. caused one of the most atrocious acts recorded in the history of modern warfare. This was no less than the devastation of the Palatinate by his commanders. A district of more than thirty English miles in length, with the towns of Heidelberg, Mannheim, Speyer, Oppenheim, Creutznach, Frankenthal, Ingelheim, Bacharach, Sinzheim, and others, was ravaged, plundered, and burnt, in cold blood, under the pretence of forming a barrier between the French army and its enemies. A cry of indignation resounded throughout all Europe at the disastrous news. The treaty of Ryswick, in 1697, terminated the war, by which Louis was compelled to acknowledge William III. as king of Great Britain and restore the duke of Lorraine to his dominions.

The third war of Louis was that of the Spanish succession. It began in 1701, and lasted thirteen years, convulsed all Europe, was illustrated by the splendid victories of Marlborough, and was terminated at last by the peace of Utrecht in 1713. Louis succeeded in establishing a Bourbon dynasty in Spain, but this was the only advantage he gained. He died September 1, 1715, seventy-seven years of age.

LOUIS XV., born in February, 1710, was the only surviving son of the duke de Bourgogne, eldest son of Louis the Dauphin, son of Louis XIV. The dauphin died in 1711, and his son the duke of Bourgogne in 1712. The mother of Louis XV. was Maria Adelaide of Savoy, who died in 1712. Philippe d'Orléans, son of Philippe de France, brother of Louis XIV., and the head of the actual Orléans branch of the Bourbons, was appointed regent. He had acquired an unfavourable reputation as a man of licentious habits, equally destitute of religious and moral principles. But he began well: he reformed several of the most outrageous abuses of the late reign, he liberated a number of individuals who had been for years immured in the Bastille, he enforced economy, reduced the army, supported the general peace of Europe, courted the friendship of England, and concluded the triple alliance of the Hague in 1717, between France, England, and Holland. Unfortunately, the depressed state in which he found the finances made him listen to the wild schemes of Law, which ended in disappointment and the ruin of thousands of families. [LAW, JOHN.]

The discovery of a conspiracy, encouraged by Philip of Spain against the Regent, led to a war with that country. But peace was concluded in 1720. In 1722 Dubois, who had been made a cardinal, became prime minister of France.

In February, 1723, Louis XV., having completed his fourteenth year, was declared of age, and the regency of the duke of Orléans terminated. Dubois died the same year, and the duke of Orléans a few months after. The duke of Bourbon Condé was made prime minister, and governed France until 1726. Louis married, in 1725, Maria Leeczinska, daughter of Stanislaus, ex-king of Poland, and in the following year the duke of Bourbon was dismissed from the ministry, and the Abbé de Fleury substi-

tuted for him. The seventeen years of Fleury's administration, which ended with his death in 1743, were the brightest period of this reign. Fleury restored order in the finances, and credit and commerce revived. In 1733, on the death of King Augustus II., the war of the Polish succession broke out, when Louis XV. took the part of his father-in-law Stanislaus against Austria and Russia, who supported the son of Augustus. [AUGUSTUS III.]

Hostilities were carried on between France and Austria both on the Rhine and in Italy. France gained great success in this war; but that of the Austrian succession, which broke out in 1741, involved her in ruinous expenses to no purpose. In her struggle with the English in America, which arose out of the Seven Years' War, France was equally unfortunate. By the peace of Paris, February, 1763, she formally ceded Canada, Nova Scotia, and her other North American colonies, besides Granada, Dominica, and Tobago, in the West Indies; her navy never after recovered from its losses, her finances were exhausted, and her commerce destroyed. The king had now abandoned himself to gross licentiousness, and had become careless of state affairs. The mad attempt of Damiens alienated him still more completely from his people. [DAMIENS.] After the death of his mistress, the marchioness of Pompadour, he became attached to more vulgar women [BARRY, MARIE JEANNE], and at last formed a regular harem after the fashion of the eastern sultans, which was called the *Parc aux Cerfs*.

Louis died at Versailles, on the 10th May, 1774, sixty-four years of age. Two sons whom he had had by his wife were both dead: the eldest, the dauphin, died in 1765, and left by his wife, a Saxon princess, three sons, who have been in succession kings of France, namely, Louis XVI., Louis XVIII., and Charles X. Louis XV. had also by his wife several daughters, besides illegitimate children.

LOUIS XVI., grandson of Louis XV., succeeded him in 1774, being then twenty years of age. He had married, in 1770, Marie Antoinette, archduchess of Austria, sister of Joseph II. He chose for his minister of finance Turgot, an honest and enlightened man, who, in concert with his colleague Malessherbes, wished the king to institute various reforms, which, had they been carried out, might perhaps have prevented the Revolution. But the clergy and the nobility strongly opposed these projects, the parliaments themselves were averse to such changes, and Turgot was dismissed. Louis, however, following his own natural disposition, effected much partial good. The deficiency in the treasury, and the debt of four thousand millions of livres left by Louis XV., were the great stumbling-block of Louis' administration. He, however, went on for some years, during which he engaged in a war against England and an alliance with her revolted American colonies. In September, 1783, peace was concluded at Versailles; England acknowledged the independence of the United States, and gave up to France Tobago and the coast of Senegal.

Meantime the financial embarrassment of the French government went on increasing. Necker, a Genevese banker, wealthy and retired from business, having become minister of finance in 1776, effected many reforms. But in November, 1783, by

a court cabal he was dismissed, and Calonne substituted in his place. Calonne soon found it impossible to reorganize the finances; and after the Assembly of the Notables, which had been convoked for the purpose, had also failed to settle the question, and several successive ministers had tried in vain to supply the financial deficiency, Necker was recalled. He stated to the king that the only resource left was to call together the States-General of the kingdom, which had not been assembled since 1614. The king convoked them at Versailles in May, 1789. These states had always consisted of the three orders—clergy, nobility, and the third estate, or commons. Each order formed a separate house; and as a majority of orders decided, any project of law displeasing to the two privileged orders was sure not to pass those two houses, and was therefore lost. Necker, to obviate this difficulty, proposed to make the number of the third estate equal to that of the other two orders, which was done, and this was in fact the beginning of the Revolution.

The third estate was joined by many of the nobility, and, having thus gained the ascendancy, constituted itself the National Assembly, and changed the constitution to a limited monarchy. But it closed its sittings on the 30th September; and the result of a general election was that the majority of the new representatives were either Jacobins or Girondists. The rest of the history of Louis XVI. is well known. He was put to death by the guillotine, January 21, 1793; and his queen, Marie Antoinette, was executed in the following October.

LOUIS XVII., Duc de Normandie, second son of Louis XVI., remained in prison in the Temple after the death of his parents, and there he died of disease in consequence of ill treatment and privation, on the 9th of June, 1795. He was then ten years of age. He had been styled Louis XVII. by the royalists after his father's death.

LOUIS XVIII. was born in 1755. He was the brother of Louis XVI., during whose lifetime he was styled 'Monsieur.' Although styled king while exiled in England and elsewhere, he did not begin to reign until after the fall of the Emperor Napoleon. He granted his subjects a liberal charter, which continued to be the fundamental law of the kingdom, with the exception of some alterations made in 1830, until the Revolution of 1848. On the return of Napoleon from Elba [BONAPARTE], Louis was obliged to escape to Ghent; but the victory of Waterloo, June, 1815, again opened to him the way to Paris.

The new Chamber of Deputies, which was elected under the excitement of this second restoration, proved ultra-royalist in principle, and went further than the king. At last Louis dissolved the chamber. In the new elections the moderate constitutional party regained the ascendancy, and the king, in 1818, appointed a liberal ministry, at the head of which was placed Count Décazès. But the assassination of his nephew the duke of Berry by a fanatical republican in February, 1820, alarmed Louis, and restored the influence of the ultra-royalists. Décazès was dismissed, and Villèle was placed at the head of the ministry. The law of election was altered, the newspapers were placed under a censorship, and other measures of a retrograde nature were adopted.

No open violation of the constitution, however, was committed. In September, 1824, Louis XVIII. died, and was succeeded by his brother Charles X. He published, in 1823, the account of his emigration, '*Relation d'un Voyage de Paris à Bruxelles et Coblenz*,' which is curious.

For the other French sovereigns of this name, see FRANCE.

LOUIS-PHILIPPE, ex-king of the French, was born at Paris in 1773, and was the eldest son of Philippe Joseph, duke of Orleans, the notorious Duc d'Égalité of the Revolution. He was carefully educated under Madame de Genlis, the eminent French writer. The title he bore in his youth was duc de Chartres; and he was then distinguished by many traits of liberalism and manly courage. In 1791 he was put in command of the 14th Regiment of Dragoons; and war having been declared against Austria in 1792, the duke entered upon his first campaign. He was actively engaged in the battles of Valmy and Jemappes, under Kellermann and Dumourier. During the violence of the Revolution the duke's father was put to death, and a few months afterwards he himself, with General Dumourier, was summoned before the Committee of Public Safety; but knowing the sanguinary character of that tribunal, they both effected their escape into the Belgian Netherlands. He then retired into private life, honourably refusing to accept the Austrian offers to take up arms against his own country. He proceeded to Zurich; whence he was soon obliged to fly, and wander, with very inadequate means, through the different countries of Europe. At length, being only twenty years of age, he obtained the situation of teacher in the academy of Reichenau, a village in the south-east of Switzerland, where he passed under the name of Chaboud-Latour. In 1794, his retreat having been discovered, he was obliged to fly, when he travelled, chiefly on foot, through Norway, Sweden, Finland, and Denmark, under an assumed name. The French Directory having in vain endeavoured to discover the place of the young prince's retreat, at length entered into negotiations for permitting him to go to the United States, to which he departed in September, 1796. In the following November he was joined by his two younger brothers at Philadelphia. They soon afterwards travelled through the western country; then proceeded to New Orleans, and subsequently to Havannah, and the Bahama Islands. From the last place they embarked for New York, and thence sailed in a private vessel to England, where they arrived in February 1800, and took up their residence at Twickenham. Here their time was chiefly passed in study: and no event occurred worth noticing, until the death of his two brothers, the duc de Montpensier, and the comte de Beaujolais, in 1807 and 1808. After fifteen years' separation he met his sister, the Princess Adelaide; and they went together in quest of their mother, whom they found at Minorca. The three then set sail for Sicily, where they had been invited by King Ferdinand. Here the duke contracted marriage with the daughter of the king, the Princess Amelia, in November, 1809. No event of importance occurred until the abdication of Napoleon, and the restoration of the Bourbon family to the throne of France, in 1814. The duke set sail immediately,

and arrived at Paris on the 18th of May, when he was soon put in possession of the honours and estates to which he was entitled. On the return of Napoleon from Elba, he was again obliged to quit France. But after the Hundred Days he revisited his native country, where he lived in comparative retirement, until the startling revolution of 1830 drove Charles X. from the country, and elevated the duke of Orleans to the throne. The friendly feeling of England towards the new order of things was illustrated by the mutual visits of Queen Victoria and Louis-Philippe, in 1843; when the king of the French was invested with the order of the Garter.

During a period of seventeen years Louis-Philippe sat peaceably on the throne of France, and contributed largely by his policy to the prosperity and greatness of the country. But at length he evinced a family sordidness, especially as regarded his son's matrimonial alliance with the Infanta of Spain, that disgusted not only France but all Europe; and in 1848 he was ignominiously driven from the throne by that very populace who had been the instruments of his previous elevation. He fled from Paris, and landed at Newhaven, in March, 1848; when Claremont, the property of his son-in-law the king of Belgium, was assigned him as a residence. Here he chiefly lived in retirement with his family until his death, which took place in August, 1850. He was privately interred at the Roman Catholic chapel at Weybridge, in Surrey.

LOUIS D'OR, a French gold coin first struck in 1640, in the reign of Louis XIII. It was valued at from 16s. 7d. to 18s. 9½d. and continued in use till 1726, when it ceased to be a legal tender. Louis d'ors, however, continued to circulate in Germany and Switzerland, where they had a certain fixed value, and upon the return of the Bourbon family to France, in 1814, their use was revived in that country, their value then being twenty francs. They are now replaced by the Napoleon.

LOUIS, ST. [MISSOURI.]

LOUISBOURG. [CAPE BRETON.]

LOUISIADE ISLANDS is the name of an extensive group of islands situated in the Pacific Ocean, south-east of the great island of Papua, or New Guinea, between 8° and 12° S. lat., and 150° and 155° E. long.

They occupy a space of more than 300 miles from N.W. to S.E., but none of them appear to be large. The inhabitants belong to the race of the Papuas, and are very averse to any intercourse with foreign vessels which visit the dangerous sea that washes their southern coast.

LOUISIANA, the most south-western of the United States of North America, comprehends the countries on both sides of the Mississippi, between 28° 56' and 33° N. lat., and 88° 50' and 94° 30' W. long. It is bounded S. by the Gulf of Mexico, W. by Texas, E. by the state of Mississippi, and N. by that of Arkansas. The greatest length, N. to S., is 290 miles; the greatest breadth, E. to W., is 210 miles. The area is 41,255 square miles. The population in 1860 was 708,002, of whom 376,280 were free, and 333,010 slaves.

Surface and Soil.—Louisiana presents a great variety of surface, though it is a plain country, and only in a very few places rises into hills of moderate

elevation. The southern part of the state comprehends the whole of the delta of the Mississippi, which below the mouth of the Red River divides into several branches. The most western of these branches is the Atchafalaya, which leaves the main stream about three miles below the mouth of the Red River, and falls into Atchafalaya Bay, in the Gulf of Mexico. The southern part of the state consists to a considerable extent of swamps and marshes, and a large part of it is annually overflowed by the Red River and the Mississippi. By this overflow more earth is deposited on the margin of the Mississippi than farther back. This rich alluvial deposit extends 400 yards, and in some places a mile and a half from the river; and to regulate the overflow, and prevent the valuable land in the rear from being inundated, an artificial embankment, called the *Levee*, is raised on both banks of the river. On the eastern side the embankment commences 60 miles, and on the western, 172 miles, above New Orleans. The northern part of the state has an undulating surface, and a heavy natural growth of timber, consisting of pine, oak, hickory, walnut, and other trees. In fact, the greater portion of this state is covered with forests, which are, however, more swampy than those of the other southern states.

Rivers.—The chief rivers in this state are the Mississippi and its affluent, the Red River. [MISSISSIPPI, River.] The Sabine River, on the west, separates Louisiana from Texas as far as 32° N. lat.; and the Pearl River on the east, in the lower part of its course, separates the state from that of Mississippi. Several other rivers flow through the state, of which the largest are the Washita, which falls into the Red River, and the Calcasieu, which falls into the Gulf of Mexico. Lakes (which are mostly formed by expansions or overflows of the rivers) are numerous in this state; Pontchartrain is the largest.

Products.—There is a great quantity of exceedingly rich land in Louisiana, and large quantities of cotton, sugar, rice, maize, indigo, and tobacco, are produced. Large herds of cattle are fed in the natural meadows, and also great numbers of horses and mules. Panthers, deer, &c., are numerous, and alligators swarm in the waters. The winters are mild, the summers very hot, and in the marshy parts very unhealthy, being liable to visitations of yellow and bilious intermittent fevers. The soil is laid out in fine plantations along the river banks. Oranges, and most other southern fruits, are grown in abundance. The manufactures and minerals are of little importance. There are salt springs in the northern districts, and coal and iron ore are found in the north-western corner of the state.

Chief Towns.—Louisiana is divided into forty-seven parishes, answering to the counties of other states. The principal towns are NEW ORLEANS, the capital, *Baton-Rouge*, and *Natchitoches*. The latter (pronounced *Nakitosh*), 368 miles north-west by west from New Orleans, is situated at the foot of a bluff on the west bank of the Red River, 200 miles above its junction with the Mississippi. It has considerable trade, and a population of about 2000, half of whom are French. The place was settled by them in 1717. *Baton Rouge*, the seat of the legislature, is 129 miles above New Orleans, on the left bank of

the Mississippi, and has a state capital, a college, United States arsenal, and barracks. The population is about 6000.

Several railroads and canals radiate from New Orleans in various directions. Owing to the great facilities of water carriage, railways were much deferred, but they have recently been constructed in the state in all directions. The state seceded from the Union early in the late war. Its capital was taken by the Federals in 1862, and was subject to military government until the close of the struggle.

Louisiana was originally settled by Roman Catholics, and they are still the most numerous sect. A large portion of the population are of French or Spanish descent.

The constitution of Louisiana was formed in 1812, in which year it was constituted a state. The governor is elected for four years, and receives 6000 dollars a year. The legislature consists of thirty-two senators, who are elected for four years, and ninety-eight representatives, who are elected for two years. Louisiana sends two senators and four representatives to Congress.

The country called Louisiana, a term which comprised much more than the present state, was first explored by the French, and was so named after Louis XIV. A colony was settled in 1699. In 1717 the interest in the province was transferred to a chartered company, at the head of which was John Law, whose Mississippi speculation was a ruinous failure. In 1731 the company resigned its rights to the English government, by which in 1762 the whole of Louisiana was ceded to Spain. In 1800 the province was transferred by the Spaniards to the French, of whom it was purchased by the United States in 1803 for 15,000,000 dollars.

LOUISVILLE. [KENTUCKY.]

LOULE', a town of Algarve, Portugal, in a broad and fertile valley, 8 miles north of Faro. The town, which is surrounded by walls, contains about 5000 inhabitants, several churches and monasteries, and gives the title of Marquis to a noble Portuguese family.

LOURDES. [PYRÉNÉES, HAUTES.]

LOUSE. [PEDICULUS.]

LOUTH, a maritime county of the province of Leinster in Ireland, is bounded N. by Armagh and Down; E. by the Irish Channel; S. and S.W. by Meath; and W. by Monaghan. It lies between 53° 43' and 54° 7' N. lat., 6° 6' and 6° 41' W. long. The greatest length, N. to S., is 25 miles; the greatest breadth, E. to W., is 15 miles. The area is 315 square miles, or 201,434 acres, of which 178,972 are arable, 15,603 uncultivated, 5318 in plantation, 1200 in towns and villages, and 813 under water. The population in 1861 (including the town of Drogheda) was 90,713, of whom 83,020 were Roman Catholics, and 6234 belonged to the Established Church. In 1851 the total population was 107,657.

Surface and Rivers.—From the Boyne to the river of Dundalk, the county is mostly flat. The only eminences in this division at all conspicuous are in the southern part of the county; the chief among them are Belpatrick, Mount Oriel, Tullyesker Hill, and Clogher-head. The Mattock River forms a boundary between Louth and Meath. The undulating plain, which extends from the hills to the river

of Dundalk, is watered by the Dee, the Glyde, the Fane, the White, the Lagan, and other small rivers. Most of this district is under tillage, and in good cultivation.

Beyond the Castletown River the surface is of quite a different character. A group of mountains, ranging from 1000 to 1900 feet in height, and extending over a district 15 miles long and 5 miles broad, stretches across the Armagh border, and extends eastward into a great peninsula forming the northern boundary of the Bay of Dundalk and the southern limit of the Lough of Carlingford and basin of the Newry River. This group is divided into two nearly equal portions by a ravine traversing it from north to south, and forming a direct line of communication between Dundalk and Newry. Through this defile the great northern road is carried at a considerable height above the bed of a mountain stream. The Kilcurry River, descending from the southern declivities, joins the Castletown River a short distance above the bridge of Dundalk. The glens and vales which lie along this border of the mountain region possess much picturesque beauty. From the eastern side of Ravensdale the mountains stretch back to the river of Newry and Bay of Carlingford, which they overhang in masses rising almost immediately from the water's edge. Towards the extremity of the peninsula and along that side bounding the Bay of Dundalk the mountains leave a considerable margin of level land between them and the sea; indeed most of the coast is skirted by a broad sandy beach. Louth is the smallest county in Ireland, and is intersected by 565 miles of roads.

Geology, Soil, Productions.—The level portion of the county south of the river of Dundalk belongs generally to the clay-slate formation. Patches of carboniferous limestone occur in many parts of the county, skirted by yellow sandstone. The mountainous region consists of a nucleus of granite supporting the clay-slate and limestone of the surrounding field on its flanks. A great protrusion of crystalline greenstone trap occurs at the eastern extremity of the range. Iron and lead ore are the only minerals which have been observed, but nowhere in sufficient quantity to warrant mining operations. The soil of the southern division of the county is well calculated for every kind of grain crop. Farming in general is carried on in a superior manner. Green crops are grown by almost all the gentlemen farmers. The fences are usually of quickset, and the lands well drained. In the mountain district the condition of the people is much inferior, and the improved system of husbandry unknown. The principal crops are corn and beans, potatoes, turnips, and clover.

The manufacture of linen is prosecuted with some activity at Ravensdale and Collon, where there are large bleach-works, but chiefly in Drogheda and its neighbourhood, where the trade is generally very brisk. The fisheries off the coast give occasional employment to several hundred persons.

Divisions and Towns.—Louth is divided into six baronies and sixty-four parishes. It is mostly in the archdiocese of Armagh, and in the north-eastern circuit, the assizes being held at Dundalk. The county returns two members to Parliament, and the borough of Dundalk has one representative. The number of voters on the parliamentary register for

the county in 1865 was 2441. The following are the principal towns, with the population of each in 1861:—

Ardee, a market town 14 miles N.W. by N. from Drogheda, is situated on the north side of the small river Dee. It appears to have been a place of some importance formerly, but now consists of one main street, with several lanes branching from it. There are remains of two ancient castles, one of which has been fitted up as a court-house. The church, which originally belonged to a monastery, is a plain building, and there is a commodious Roman Catholic chapel. Population, 2580. A considerable trade in malt and corn is carried on here. Ardee is governed by a Board of Commissioners, elected under the Towns Improvement (Ireland) Act, 1854. The name is a corruption of *Atherdee*, 'town on the Dee.'

Carlingford, a small fishing town, chiefly consisting of cabins inhabited by fishermen, is situated 14 miles E. by N. from Dundalk, on the south side of Carlingford Lough. Population, 777.

Drogheda. [DROGHEDA.]

Dundalk, the county town, a parliamentary borough and port, is situated 21 miles N. by W. from Drogheda, at the head of Dundalk Bay and at the mouth of the Castletown River. The town contains a county court-house, guild-hall, prison, barracks, market-house, linen-hall, parish church, Roman Catholic and other chapels, friary, two convents and schools, exchange, infirmary, custom-house, free library, and three endowed schools. There are several tanneries, flax and flour mills, salt works, a brewery, and a distillery. The harbour is good, the fisheries important, and timber, slates, coal, and all kinds of agricultural produce are exported in considerable quantities. Steamers ply regularly to Liverpool four times a week. The total number of vessels which entered the port in 1864 was 926 (143,571 tons), and the clearances were 337 (98,091 tons). The customs revenue in 1865 was 32,182*l*.

The borough returns one member to Parliament: constituency about 280. The port and harbour are in progress of improvement. The river has been straightened, and the bar and harbour deepened by steam-dredging from 5 to 8 feet, so that vessels drawing 16 feet water can now come up. The channel, when completed, will be 150 feet wide at the quays, and 300 feet at the point. The rise of tide at the bar is 18 feet. A lighthouse on the screw-pile principle has been erected at the bar within the last few years, and recently a fog-bell at a cost of 250*l*. Population, 10,464.

History and Antiquities.—Louth, at the time of its invasion by the English, formed a portion of the territory of Orgial or Oriel. The eastern part of Orgial, constituting the present Louth, having been conquered by De Courcy between 1179 and 1180, was erected into a county by King John in 1210. Louth was not considered a portion of Leinster until the reign of Elizabeth. The forfeitures consequent on the rebellion of 1641, and the ensuing civil wars, extended over nearly the entire county.

The numerous antiquities which occur in Louth have been made the subject of a volume entitled 'Louthiana,' published at Dublin in 1758. Of the earthen mounds and intrenchments the most remarkable in the county is that of Castle-Guard at Ardee.

Its perpendicular height is nearly 90 feet, the depth of the main trench between 30 and 40, the circumference at the top 140, and round the base upwards of 600 feet. There is another earthen intrenchment near Dundalk; stone circles at Ballirickan and Ballinahatry; a cromlech at Ballymasculan; round towers at Dromiskin and Monasterboyce; and remains of two others at Louth and Drogheda. Two beautiful stone crosses stand near the tower of Monasterboyce. The ruins of the abbey of Mellifont occupy a picturesque site on the banks of the Mattock River, near the Boyne. There are some very ancient ruins on the hill of Faughart, where Edward Bruce is said to be buried, connected with the old cell of St. Brigid. Of the various feudal buildings throughout the county the chief are the castle of Carlingford, erected by King John; Rohe's Castle, north-west of Dundalk; Torfeckan or Termonfeckin Castle, a residence of the archbishops of Armagh, inhabited last by Primate Usher; and Castletown, still kept in habitable order, on the south bank of the Castletown River, near Dundalk.

LOUTH. [LINCOLNSHIRE.]

LOUTHERBOURG, PHILIP JAMES DE, was born at Strasburg, October 31, 1730, and studied under his father and Casanova. After having been admitted a member of the Paris Academy in 1768, Louthembourg came over to England, was elected a royal academician in 1771, and was engaged as scene-painter at the Opera House. Soon after his settling in this country, he got up, under the name of the *Eidophusikon*, an exhibition displaying the changes of the elements and their phenomena. Two of his chief pictures were, Lord Howe's Victory in 1794, and the Battle of the Nile. He resided in London till his death in 1812.

LOUVAIN. [BRABANT, SOUTH.]

LOUVIERS. [EURE.]

LOUVOIS, FRANÇOIS MICHELLETELLIER, MARQUIS DE, an eminent French statesman, was born in Paris, January 18, 1641. He early entered upon a political career, and having succeeded his father as chancellor and war minister, displayed a sagacity and an energy which secured him Louis XIV.'s entire confidence. To render it impossible for the king to do without him, he promoted by every means in his power a warlike policy, and it must be owned that he evinced a consummate ability in carrying it out. With him the end justified the means, and he accordingly authorized the desolation of the Palatinate in 1674, one of the darkest deeds in the whole annals of war. From 1666 until 1691 he retained in his hands the administration of the kingdom, directed the campaigns of Turenne and Condé, and contributed to the aggrandizement of France and the development of her resources. He entirely reorganized the French armies. He founded and repaired military schools, and erected the famous *Hôtel des Invalides*. Yet, as a statesman, his views were narrow, and he was mainly responsible for the revocation of the Edict of Nantes—an act which did more harm to France than all the victories of her generals could remedy. His later years were embittered by frequent quarrels with Madame de Maintenon, who resented his arrogant assumption of power, and endeavoured to prejudice the mind of Louis against his proud but able minister. Louvois died on the

16th of May, 1691, in the fifty-first year of his age.

LOUVRE (French, *l'ouvert*). A dome or turret rising out of the roof of the hall in our ancient domestic edifices, formerly open at the sides, but now glazed. They were originally intended to allow the smoke to escape, when the fire was kindled on 'dogs' in the middle of the room. The open windows in church towers are called *louvre windows*, and the boards or bars, which are placed across them to exclude the rain, *louvre boards*.

LOVAT, LORD. Simon Fraser, afterwards Lord Lovat, was born in 1676 at Beaufort, near Inverness. The principal events of his life are connected with the two rebellions of 1715 and 1745, in which he played false both to the Stuarts and the Hanoverians. Previous to the first rebellion he was despatched by the 'Old Pretender' to Scotland, with proper credentials, arms, ammunition, and money to promote the rising. But he betrayed his trust, and fought on the side of the king, for which he received his title and estates. In 1745 he joined the party of Charles Edward, not in his own person, but by means of his son, whom he sent with the Frasers. His complicity in this design being discovered, he was arrested, tried by his peers, sentenced to death, and executed on Tower Hill, April 9, 1747. He died with a courage worthy of a better man.

LOVE, FAMILY OF, a religious sect which flourished in Europe during the middle age. Their doctrines were first promulgated in Holland by Nicholas of Leyden; and made their appearance in England about the year 1580. From their pretended sanctity the sect obtained a great number of followers among the lower orders; but Queen Elizabeth ordered their books to be burnt, and adopted measures for their suppression.

LOVE-APPLE, a fruit-bearing annual, also called Tomato, is the *Lycopersicum esculentum* of botanists, a plant much cultivated for the sake of its berries, from which are obtained various preparations used for culinary purposes. It is a native of Peru and Brazil, whence it has been carried into North America and the Old World; and it has become, as it were, naturalized in some parts of India.

LOVE-BIRD (*Psittacula*), a genus of birds of the *Psittacidae*, or parrot family, which flourish in the warm regions of America, Australia, and Africa. They receive their name in homage to the warm mutual affection which under all circumstances they exhibit. An Australian species is now common as a cage bird in our own islands, and may be fed in the same manner as the canary.

LOVELACE, RICHARD, born in 1618 at Woolwich, was the son of a Kentish knight. He entered the army under the patronage of Goring. The county of Kent deputed him to present their petition in favour of the king to the Long Parliament; for which he was imprisoned in the Gatehouse, and released only on giving bail in forty thousand pounds. In 1646 he raised a regiment in the French service, and was wounded at Dunkirk. Returning to England in 1648, he was again imprisoned, and remained in confinement till after the king's death. In 1649 he published 'Lucasta: Odes, Sonnets, Songs,' &c., the lyrical pieces in which have much spirit and vigour. He also wrote two plays, which were never published.

He died of consumption, and in great distress, in a mean lodging in London, in 1658.

LOVERC. [BERGAMO.]

LOW COUNTRIES, a district in the north of Europe, comprehending the kingdoms of the NETHERLANDS and BELGIUM, and grand duchy of LUXEMBURG.

LOWELL. [MASSACHUSETTS.]

LOWESTOFT. [SUFFOLK.]

LOW-SUNDAY. The Sunday next after Easter is popularly so called in England.

LOW-WINES. The liquor produced by the first distillation of molasses or fermented liquors.

LOWTH, WILLIAM, born 1661, died 1732. He was brought up at Merchant Taylors' School, whence he was sent to St. John's College, Oxford. Early in life he became chaplain to Mew, bishop of Winchester, who gave him a prebend in the cathedral of Winchester, and the rectory of Buriton in that diocese, where he lived, died, and was buried.

If we would form an idea of the extent of his laborious reading, we must look rather to the works of other persons than his own, and particularly to Potter's edition of the works of Clemens Alexandrinus, and Hudson's edition of the works of Josephus. To both these editors he communicated valuable notes. Of his own writings, those which are now most read are his 'Directions for the Profitable Reading the Holy Scriptures,' which was first published in 1708, and has been often reprinted, and his 'Commentary on the four greater Prophets.'

LOWTH, ROBERT, born 1710, died 1787, a prelate of the English Church, son of William Lowth last named, and, like his father, distinguished by his knowledge of the books of Scripture, and his valuable writings in the illustration of them. He was also an elegant scholar, and an inquirer into minute and curious history.

He was educated in Winchester College, whence he passed to New College, Oxford. In 1766 he became Bishop of St. David's; in the same year he was translated to Oxford; and in 1777 was made Bishop of London.

His 'Life of William of Wykeham,' published in 1758, is an admirable specimen of the results to be attained by curious and recondite biographical research. His 'Lectures on the Poetry of the Hebrews' were delivered by him at Oxford, when he was professor of poetry. They were received with great respect by the learned, not of England only, but of the Continent, where they were reprinted, with valuable notes by Michaelis. These lectures were published by Lowth in Latin, the language in which they were delivered; but there is an English translation by Dr. Gregory. In 1778 he published a 'Translation of the Prophet Isaiah,' distinguishing the poetical from the parts written in prose, and exhibiting the various forms of Hebrew parallelisms which occur in that prophet. He also published an 'Introduction to English Grammar.'

LOXA, or LOJA, a town of Spain, in the province of Granada, 30 miles west of Granada, at the north base of a ridge of hills, and in a valley watered by the river Gemil. It has manufactories of coarse woollens and paper, a clerical college, two hospitals, three churches, a convent, and is the head of a judicial district. Population, 15,698.

LOXIA, the *Cross-bill*, a genus of passerine birds belonging to the family *Fringillide*. The generic characteristics of the Cross-bills are—Bill moderate, strong, very much compressed; the two mandibles equally curved, hooked, and the elongated points crossing each other. Nostrils basal, lateral, rounded, concealed by hairs directed forwards. Feet with three toes before and one behind; anterior toes divided. Wings moderate, the first quill longest. Tail forked. The species are very few, and confined



Common Cross-bill (*Loxia curvirostris*).

chiefly to the northern parts of Europe and America. The best known is the Common Cross-bill, *L. curvirostris*, which is frequently met with in Britain during the summer. Their chief food is the seeds of coniferous trees. The structure of their bills is well fitted for opening up the cones. They are also fond of the seeds of apples, and commit great havoc when a flock of them appears in an orchard.

LOYOLA, IGNATIUS. *Don Iñigo Lopez de Recalde*, more generally known under the name of Loyola, was the youngest child of Don Bertram, lord of Oñez and Loyola. He was born in 1491, at the castle of Loyola, in Guipuscoa. In early youth he was attached to the court of Ferdinand and Isabella in the quality of a page, and afterwards distinguished himself as a soldier. In his thirtieth year, while assisting in the defence of Pampeluna against the French, he was severely wounded. A long and painful confinement was the result. To relieve its weariness he was furnished with works of mystical devotion and the lives of saints. He has graphically described the various scenes through which he passed in his introduction to a religious life, in his 'Spiritual Exercises.' From this time all his desires were directed to one great object—an entire devotion to the service of God. He resolved upon retiring to a Benedictine monastery at Mount Serrat, in order to prepare himself for a pilgrimage to the Holy Land. On his return he passed the vigil of the Annunciation, March 24, 1522, in the church of the Holy Virgin, at Mount Serrat; on its altar he hung up his arms, the trophies of his worldly triumphs, and vowed obedience to the commands of God's church. He determined to perform barefoot his intended pilgrimage, and in the coarse raiment of a beggar. On leaving Mount Serrat, he went to the hospital of the Dominican convent at Manresa, where his deeds of charity soon acquired for him celebrity in that town, and the admiration of the multitude, to avoid which he retired

to a cavern at a short distance from Manresa, where he redoubled the severity of his penances, and was one day found in a state of inanimate exhaustion at the door of his cell. After residing ten months at Manresa, he left for Barcelona, whence he embarked for Rome. In that city he obtained the blessing of the pope, Adrian VI., upon his enterprise, and resumed his journey alone, fasting daily and begging alms. From Cyprus he embarked with some pilgrims for the Holy Land, and reached Jerusalem September 4, 1523. He was refused permission of residence from the primate of the Church of Rome at Jerusalem. He reached Venice in January, 1524, and thence he returned to Barcelona. In this town he determined upon making some stay in order to study. At the age of thirty-three he began to apply himself to the rudiments of grammar. He continued studying at Barcelona till the attempts on his part to reform some irregularities in a convent of nuns exposed him to the vengeance of those who had partaken in their disorders. He then retired to the University of Alcalá. A religious address which he delivered to the students was the occasion of his dismissal from that university. In 1527 he went to Salamanca, where he fell under the displeasure of the Inquisition, who punished him by a severe confinement, and dismissed him from their city. He next repaired to Paris, where he arrived in February, 1528. He applied himself to the studies of the university, humbly placed himself in the class of the least advanced scholars, and besought their teacher to treat him as one of them. Two students shared his rooms, Peter Faber and Francis Xavier of Navarre. The three companions formed the closest intimacy, sharing each other's toils and gains. Shortly after, three more students joined his small society. On August 15, 1534, they assembled at the church of Montmartre, where they took the solemn vows of chastity, absolute poverty, devotion to the care of Christians, and to the conversion of infidels. The further history of the religious community thus established has been told under the head of **JESUITS**.

On September 27, 1540, Paul III. sanctioned, under some limitations, the establishment of the order, and finally, in 1543, made the sanction unconditional. Loyola was chosen president. He remained at Rome as the centre from which he was to direct the movements of the society. His time was spent in revising its constitutions, and in works of charity. He founded an asylum for the protection of Jews who had become proselytes to Christianity, and a penitentiary, where the victims of seduction might reform their lives. In the year 1546 Francis Borgia founded the first Jesuit college at Gandia in Spain. On July 31, 1556, Loyola died.

The memory of Ignatius was consecrated by beatification in 1609, and he was canonized as a saint by Pope Gregory XV. in 1622. His festival is celebrated on July 31.

His life has been written by Gonzales and Ribadaneira; by Maffei in Latin; and by Bartoli and Bouhours in French. His 'Spiritual Exercises' (*Exercitia Spiritualia*) were published at Rome in 1548, and have been translated into French by Drouet de Maupertuis and Clément. His 'Maxims,' translated, were published at Paris in 1683.

LOZENGES. In such cases as ulcerated or inflamed sore throat, chronic coughs, &c., lozenges

are often employed by medical men, so that the substances of which they are composed may only pass gradually into the stomach, and act as long as possible on the pharynx and laryngeal opening. They are generally composed of demulcent materials—such as farinaceous matter, sugar, isinglass, and gum—as such a combination delays the solution of the different products the longest possible time. Lozenges differ from drops in the fact that in the latter the sugar is first rendered fluid by means of heat, while no heat is employed in mixing the ingredients of lozenges.

LOZÈRE, a department in France, formed chiefly out of the old district of Gevaudan, lies between 44° 7' and 44° 58' N. lat., 3° and 4° E. long., and is bounded N. by Cantal and Haute-Loire, E. by Ardèche, S. by Gard, and W. by Aveyron. Its greatest length is 60 miles, and its mean width is 39 miles. The area is 1987 square miles, and the population 137,367.

Surface.—It is covered by the Cévennes mountains in the south-east, which rise in Mont Lozère (whence the name of the department) to the height of 4887 feet above the sea-level; by the Margeride chain in the east and north-east; by the Aubrac mountains [AVEYRON] in the centre and west; and in the south-west by high plains, called *caussées*, many of which are of great fertility. The melting of the snow, that lies on these mountains for several months in the year, gives rise to a great number of rivers, which drain the three slopes formed by the disposition of the masses before named. The north-eastern slope belongs to the basin of the Loire, and is drained by the ALLIER and some of its feeders; the south-eastern slope makes part of the basin of the Rhône, and is drained by Gardon-d'Alais and the Gardon-d'Anduze [GARD]; and the western slope, which is included in the basin of the Garonne, is drained by the river TARN, the LOT, and the Truyère [CANTAL].

Climate.—The mountains being snow-clad during a great part of the year, renders the climate severe for the latitude; winter lasts about four months in the southern part of the Cévennes, and is prolonged to six months in the north of the department; the spring is very rainy, and violent storms are frequent in summer.

Products.—The nature of the soil presents great obstacles to the labours of the farmer; yet in most instances the land everywhere that is capable of cultivation is well tilled. The chief crops raised in the north of the department are rye, some barley, oats, and hay; in the *caussées* wheat, barley, oats, fruits, &c., are grown; and in the Cévennes the chestnut and the potato are the chief support of the population. The vine is cultivated in some favourable situations; but the quantity of wine produced does not suffice for the consumption, and the same may be said for the cereal productions of the department. In the south-eastern slope of the department the mulberry is grown for the production of silk. The mountain pastures are extensive, and of excellent quality; great numbers of well-wooled sheep are reared. Horses are not numerous; but mules and horned cattle are. Amongst the wild animals are wolves, badgers, great numbers of hares and rabbits. Medicinal plants, and plants used in tanning and

dyeing, are abundant. The forest timber is composed of oak, beech, fir, chestnut, &c.

Natural Products, &c.—Iron, lead, antimony, silver, and copper, are found. In the Gardon and in the Cèze [GARD] particles of gold are found after heavy rains. Marble, porphyry, granite, gypsum, &c., are also met with. Mineral springs are numerous.

The manufactures are unimportant, and are nearly all for home use. The commerce of the department, owing to the want of water communication and good roadways, is confined to articles of mere necessity, and is altogether insignificant.

Divisions, Chief Towns, &c.—The department contains 1,276,756 acres, and is divided into three arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1863.
Mende, . .	7	63	47,744
Florac, . .	7	52	38,743
Marvejols, .	10	78	50,880
Total, . .	24	193	137,367

The arrondissement of Mende is named from its chief town, *Mende*, which is situated in a valley surrounded by high hills, on the right bank of the Lot, in 44° 31' N. lat., 3° 29' 41" E. long., and has a cathedral with two spires, an old episcopal palace, now the prefecture; a public library of 8000 volumes, a chamber of manufactures, and 6370 inhabitants. The town is surrounded by ramparts, which form a pretty walk; the streets, many of which are supplied with fountains, are narrow and crooked. There are some manufactures of coarse woollen cloths. About 8 miles from Mende, in the valley of the Lot, is *Bagnols-les-Bains*, a small village famous for its medicinal springs and warm baths. Population, 390. *Langoagne*, a small town, with an ecclesiastical school, and 3156 inhabitants, is situated on a high plateau near the source of the Allier, on the eastern border of the department. *Villefort*, a small place of 1536 inhabitants, situated at the foot of Mont Lozère, is important for its argentiferous lead and copper mines.

In the arrondissement of Florac, the chief town, *Florac*, is situated on the left bank of the Tarnon, a feeder of the Tarn, and has a tribunal of first instance, and 2141 inhabitants. *St.-Germain-de-Calberte*, S.E. of Florac, is situated in a district almost entirely covered with mulberry plantations, and has 1637 inhabitants, who raise a considerable quantity of raw silk. *Meyrueis*, near the southern border of the department, on the right bank of the Yonte, a feeder of the Tarn, has hydraulic saw mills, manufactures of hats, cheese, lace, wire for cards, and knitting needles. The population is 1995.

In the arrondissement of Marvejols, the chief town is *Marvejols*, which is situated in a valley planted with fruit trees, on the right bank of the Coulogues (a feeder of the Lot), 10 miles W. from Mende, and has a tribunal of first instance, a college, an ecclesiastical school, and 4848 inhabitants, who manufacture serges, woollen cloth and yarn, leather, bricks, &c. The town is regularly built, well paved, and ornamented with fountains. A canal from the river

Coulogues supplies the dye-houses of the town with water, and drives the machinery of several factories.

The department forms the see of the bishop of Mende, is included in the jurisdiction of the Cour Impériale of Nîmes, Academy of Montpellier, and belongs to the tenth Military Division, of which Montpellier is head-quarters. It returns one member to the Chamber of Deputies. (*Dictionnaire de la France; Annuaire pour l'An 1866*).

LÜBECK is situated in 53° 51' N. lat., 10° 41' E. long., on a long eminence between the rivers Trave and Wakenitz. Its territory is bounded E. by Mecklenburg-Strelitz, W. by Oldenburg and Holstein, and S. by Lauenburg; the northern part, between Holstein and Mecklenburg, extends to the Baltic. Its territorial possessions were formerly very scattered; some detached portions were in Holstein, some in Lauenburg, and others in Mecklenburg. By the decision of the diet in 1803, modified in 1804 by a treaty with Oldenburg, it obtained, in exchange for many of its distant districts, a continuous tract on the Trave. Lübeck is no longer a fortified town; the old ramparts are converted into public walks, and the city is very clean and cheerful. The interior is intersected by several broad and straight streets. The houses are built of stone. A great number of them are in the old-fashioned style, with the gable ends towards the street, but the more modern are in better taste. Besides the cathedral, which contains valuable paintings and remains of antiquity, there are seven churches, of which that of St. Mary (Marienkirche) is celebrated as one of the finest Gothic churches in northern Germany. It was completed in 1304, and has three naves and two towers, 382 feet high. Lübeck has a gymnasium, several charitable institutions, a school of design, a Roman Catholic chapel, and a Calvinist church. There are also an exchange, an arsenal, a mint, a valuable public library, and an operatic theatre. The senate-house, an ancient Gothic building, contains the hall where the deputies of the Hanseatic League formerly met.

The territory already mentioned, including the district of Vierlande, which Lübeck possesses in common with Hamburg, is 127 square miles in extent, with a population of 50,614, that of the city being 27,249.

Throughout the territory the soil is fertile, the principal occupation of the inhabitants being the rearing of live stock. The Stecknitz and the Trave are the only rivers of any importance.

The principal exports are corn, cattle, wool, fish, iron, and timber; the imports comprise wines, silks, cottons, hardwares, and other manufactured goods, colonial products, dye stuffs, &c. The city has an extensive commission and transit trade, and fairs for wool, cattle, and horses. There are manufactures of cigars, soap, playing cards, paper, linen and cotton stuffs, iron, copper, and brass works.

Lübeck communicates with Hamburg by railway and the Trave and Stecknitz Canal, and its trade is gradually reviving.

Lübeck has about sixty ships of its own, and the arrivals are above 1000 annually. The principal export and import trade is with Russia, Sweden, and Denmark; vessels of 9 feet draught can come up to the town, where they enter a spacious basin lined with quays; larger ships discharge their cargoes by

lighters at Travemünde, which is situated at the entrance of the Trave into the Baltic, and has a fine secure harbour. Travemünde is fortified, has a light-house, and public baths. It is 9 miles N.E. of Lübeck, has 1476 inhabitants, and is a pretty little town, much resorted to in the bathing season. Steamers ply from Travemünde to St. Petersburg, Copenhagen, Hamburg, Amsterdam, Stockholm, and Hull, &c. Small steamers convey passengers, &c., up the river to Lübeck daily.

In 1806 Lübeck was stormed by the French, and it subsequently became the capital arrondissement of the department of Bouches-du-Elbe. It was formerly the chief of the four free or Hanse towns, and is still a member of the Germanic Confederation. It contributes 679 men to the Federal army. The annual revenue and expenditure of the whole territory is between 70,000*l.* and 80,000*l.* The government was formerly purely aristocratic, but the city and state are now governed according to the constitution of December 29, 1851. The main features of this charter are two representative bodies, the Senate, exercising the executive, and the Bürgerschaft, or House of Burgesses, exercising the legislative authority. The Senate is composed of fourteen members, elected for life, and presided over by two burgo-masters, who hold office for two years each, and retire in rotation. There are 120 members in the House of Burgesses, chosen by all citizens who are members of any of the twelve colleges, or guilds of the town. A committee of thirty burgesses, presided over by a chairman elected for two years, has the duty of representing the legislative assembly in the intervals of the ordinary sessions, and of carrying on all active business. The House of Burgesses has the initiative in all measures relative to the public expenditure, foreign treaties, and general legislation; while the Senate, intrusted chiefly with the executive government, has also to give its sanction to the passing of every new law.

The High Court of Appeal for the four free cities of Germany—remnant of the old Hanseatic League—is established at Lübeck, and Lübeck law is of acknowledged authority in many questions.

LUBLIN. [POLAND.]

LUBLIN, the capital of the Russian province of Lublin, is situated on an eminence above the river Bistriz, in 51° 16' N. lat., 22° 30' E. long., and had, in 1861, 19,054 inhabitants. The city, which is surrounded with walls, ditches, and great lakes, is divided into an upper and lower town, of which the latter is chiefly inhabited by Jews. It has a dilapidated castle on a hill, and is the seat of a bishop and court of appeal. The most considerable buildings are the town-hall and the eighteen churches; there are also a Piarist college, a synagogue, the Sobieski palace, a gymnasium, several hospitals and charitable institutions. The town has three annual fairs, each lasting a month, and a considerable trade in woollen cloths, wine, corn, &c.

LUC, DE. [DELUC.]

LUC, LE. [VAR.]

LUCANIDÆ, a family of coleopterous insects, called Stag-beetles, from the extraordinary development of the mandibles of the males. Some of the foreign genera of stag-beetles are remarkable for brilliance of colouring. In Britain we have four

species, which belong to as many genera. Type, the Common Stag-beetle (*Lucanus Cervus*).

LUCANUS, MARCUS ANNEUS, was born at Corduba (Cordova) in Spain, A.D. 38. He was the son of M. Annæus Mela, the brother of the philosopher Seneca, and was carefully educated at Rome. His poetry recommended him to the notice of Nero, who bestowed upon him the dignity of quæstor and augur. Lucan did not, however, remain long in the imperial favour, for he was a poet, and his master affected to be one. Lucan, it is said, was forbidden to publish any more poems; and he entered into a conspiracy with Piso and others to assassinate Nero. (Tacitus, 'Ann.', xv. 49.) This conspiracy was detected, and the poet, being condemned to death, opened his veins A.D. 65.

Lucan wrote many poems; but the only one extant is the 'Pharsalia,' which celebrates the civil war between Cæsar and Pompey, and gives (in ten books) an account of its incidents from its commencement to Cæsar's visit to Cleopatra in Egypt. As the tenth book leaves off abruptly in the midst of a narrative, it is probable that the poet had not finished the work at the time of his death. The 'Pharsalia' contains many vigorous and animated descriptions, and the speeches are characterized by considerable rhetorical merit; but the language is often inflated, and the expressions extremely laboured and artificial.

The best editions of Lucan are by Oudendorp (1728), Burmann (1740), Bentley (1760), and Weise (1835). There are French translations of the 'Pharsalia' by Marmontel (1766), and Brébeuf (1795); in Italian, by Cristoforo Bocella (1804); in English, by Rowe (1718), and by May (1627), who also published in 1630 a continuation of the poem to the death of Julius Cæsar, which he afterwards translated into Latin verse (1640).

LUCAS, FREDERICK, many years editor of the *Tablet*, was born at Croydon, near Croydon, in Surrey, in 1812, and educated at the London University. In 1838 he was called to the bar, and the following year, although originally one of the Society of Friends, he became a member of the Roman Catholic Church. He soon afterwards established the Catholic newspaper called the *Tablet*, which in 1849 he transferred to Dublin. In 1852 he was elected M.P. for Meath, through the instrumentality of the Roman Catholic priesthood, of whom he was a zealous supporter, always advocating their right to interfere in political matters. But not being supported in these views by the Irish episcopate, in 1854 he travelled to Rome, in order to appeal to the pope against the decision of that body. But here his health broke down, and he was obliged to return to England, where he died in October, 1855.

LUCAYOS. [BAHAMAS.]

LUCCA, a province of central Italy, between latitude 43° 45' and 44° 7' N., longitude 10° 12' and 10° 42' E., is bounded N. by Modena, E. and S. by Tuscany, and W. by the sea. It is watered by the river Serchio, which rises in the Apennines, and enters the Mediterranean a few miles north of the Arno. Its area is 512 square miles. Its population in 1862 was 256,161. This territory is naturally divided into three regions: 1st, The mountainous districts among the Apennines, including the valley of the Lima, and the affluents of the Serchio; 2nd,

the valley of the Serchio, including the fine plain of Lucca, which is cultivated like a garden; 3rd, the flats near the sea, which are in part marshy, but produce good pasture for cattle. The whole province is considered one of the most fertile regions in Italy. Lucca was formerly an independent state, but was ceded to Tuscany in 1847, annexed to Sardinia in 1860, and is now incorporated in the kingdom of Italy. In the town of Lucca are, a lyceum with twenty-eight professors and a library of 16,000 volumes, two theological seminaries, a college, sixteen grammar-schools, and a great number of elementary schools.

Viareggio, with 6000 inhabitants, is, next to Lucca, the principal town of the province; it has a harbour defended by a fort, an export trade in statuary marble, and is much frequented in summer for sea-bathing.

LUCCA, the capital of the province, is situated in a rich plain watered by the Serchio, and surrounded by mountains: it is 12 miles from the sea, about 10 N.E. of Pisa, and contained, in 1861, 65,435 inhabitants. It is surrounded by ramparts, which are planted with trees, and form a very pleasant promenade. The town is well built, and well supplied with water; the streets are well paved and clean. Lucca, like most other Italian cities, is rich in churches, mostly built of Carrara marble; the cathedral, which belongs to the eleventh century, is adorned with good paintings, and with statues and monuments by the native sculptor Civitali. The archiepiscopal archives and those of the chapter contain a vast mass of historical documents, parchments, and MSS., some as old as the seventh century. The other remarkable churches of Lucca are those of San Frediano, San Francesco, and San Michele. The ducal palace (unfinished) is a vast building; it has a gallery of valuable paintings by the great masters, and a library of 25,000 volumes. The other remarkable structures are—the town-house, the aqueduct, on 459 arches, for the conveyance of water from Monte Pisano; theatre, many public fountains, the public library, and several of the mansions of the nobles. The Academy of Letters and Sciences of Lucca, instituted in 1817, which consists of thirty-six members, holds its meetings once a month, and has published several volumes of memoirs. Lucca also contains a seminary for noble ladies (founded by the sister of Napoleon I.), a botanic garden, and many benevolent institutions. It is the first place in Italy where silk was manufactured, and still has manufactures of this article, as well as of woollen fabrics and paper. An active trade is carried on in olive oil, which is esteemed the best in Italy. It is an archbishop's see. Under the Romans it was also made a *municipium*, and was often the head-quarters of Julius Cæsar. Here he made the famous alliance with Crassus and Pompey. In the twelfth century it became a free city. In 1805 Napoleon I. erected it into a principality for his sister Elizabeth's husband, Bacciochi. Lucca (Luca) is mentioned in ancient history as a town belonging to the Etruscans, after they had conquered the country between the Arno and the Macra and taken it from the Ligurians. It afterwards became a Roman colony, and there are still remains of a theatre and an amphitheatre.

Near the town are the reputed baths of Nero; and

11 miles to the north, in the valley of the Serchio, are the famous mineral baths of Lucca, the water from which is exported to all parts of Italy. Its temperature varies from 96° to 136° Fahr.

LUCERA. [CAPITANATA.]

LUCERN. [LUCERN.]

LUCERN. [MEDICAGO.]

LUCERNAL MICROSCOPE, an optical instrument invented by Mr. George Adams, an optician in London. It consists of a hollow pyramidal box, at the smaller extremity of which is a tube carrying the usual system of lenses for magnifying objects. At the larger end, which is towards the observer, there are two lenses in frames, their axes, as well as those of the small lenses at the opposite extremity, being coincident with the axis of the box; and between the exterior of the two lenses and the eye of the observer there is usually placed a plate of glass, rough-ground on one side, which serves as a screen to receive the rays of light proceeding from the object whose representation is to be viewed. The object is fixed in a small frame, as usual, and is placed in a groove made for the purpose immediately beyond the tube containing the system of lenses at the small end of the box. Instead of the plate of ground glass, a board painted white is frequently placed, to serve as a screen, at the distance of 6 or 8 feet from the instrument. Such a screen should have the form of a segment of a hollow sphere, the light being received on its concave surface.

An Argand lamp is usually placed beyond the object, with respect to the microscope, but for this the oxy-hydrogen light may be advantageously substituted: the light, after passing through a hemisphere of glass, is, when an opaque object is to be viewed, made to fall in a convergent state upon a small concave mirror, which is so inclined as to reflect the light back upon the object; and from the different points on the surface of the latter the pencils of rays proceed through the object-lenses and the box to the glass screen.

By the refraction of the light in passing through the lenses a highly-magnified image of the object is formed; and several persons may then place themselves so as to see the image on the screen at the same time; or by placing the eye at a small aperture in the produced axis of the instrument, one person may, with a pencil, draw on the glass, or on tracing-paper laid over it, the figure of the object, it being understood that by means of the proper adjusting screws the rays in each pencil are made to unite accurately in one point on the screen. The instrument is used by night or in a darkened room.

When the object to be viewed is transparent, the light is made to fall in a condensed state upon it, after having been transmitted through a convex lens, or two such; and from the object the rays proceed as before to the screen through the system of lenses which constitute the compound objective of the microscope, and through those at the opposite extremity of the box.

LUCERNARIA (Lat. *lucerna*, 'a lamp'), a genus of Polype, of the family *Lucernaidæ*, and order *Carnosi*. They resemble *Actinia*; but are of a softer substance. They fix themselves by a slender peduncle to sea-weeds and other bodies. As Cuvier describes them, the upper part expands like a parasol, and is

surrounded by numerous tentacula, arranged in bundles; and between these are eight cæca, proceeding from the stomach, and containing a red granulated matter. The species *L. quadricornis* has the edge in four forked branches with two bundles of tentacula in each. The other species, *L. auricula*, has the border octagonal, with a bundle of tentacula in each division. The annexed is a representation of the natural size.



Lucernaria auricula.

These *Lucernaria* feed upon any minute animals that may happen to come within the reach of their tentacula, which, when searching for food, are stretched out to their full extent; but as soon as any unfortunate creature comes in contact with them, they seize and at once carry it to the mouth. 'Although generally stationary,' says Mr. Couch, 'these creatures are able to swim with considerable rapidity, by alternately contracting and dilating the body. In moving about to short distances, as from place to place on the plant to which they are attached, they adopt the same plan as the *Hydra*, bending down their oral extremity until they can adhere by the tentacles, when the footstalk is loosened and thrown forward, and twirled about, till it meets with a place to suit it. It is then fixed, and the tentacula are loosened, and in this way they move from one spot to another. Sometimes they move like the *Actinæ*, by a gliding motion of the stalk.'

LUCERNINE (Lat. *lucerna*, 'a lamp'), a subfamily of the *Helicidae*, or Testaceous Snails, with discoid shells, and the aperture generally toothed; of which *lucerna* is the type.

LUCIA, ST. [ANTILLES; WEST INDIES.]

LUCIAN, a Greek writer, was born at Samósata, a city on the west bank of the Euphrates, in the Syrian province of Commagène. He was born about the latter end of Trajan's reign, lived under both the Antonines, and died in the reign of Aurelius Commodus, or shortly afterwards. His parents, who were in humble circumstances, placed him with his maternal uncle, a sculptor; but he soon quitted this trade, and applied himself to the study of the law. He afterwards practised at the bar in Syria and Greece; but not meeting with much success in this profession, settled in Gaul as a teacher of rhetoric, where he appears to have remained till he was about forty, when he gave up his profession, after having acquired considerable wealth. The greater part, if not all, of his dialogues appear to have been written after this time. During the remainder of his life he travelled about and visited successively Macedonia, Cappadocia, Paphlagonia, and Bithynia. The greater part of his time, however, was passed in Athens. Towards the latter part of his life he held a lucrative

public office in Egypt, which was bestowed upon him by the Emperor Commodus.

The dialogues of Lucian are written in pure and elegant Greek. He had great wit, and the flow of his language is easy and natural. He exposed fanaticism and imposture, the frauds of the priesthood, the folly and absurdity of the superstitious, and especially the solemn nonsense and the immoral lives of the philosophical charlatans of his age.

The best editions of Lucian's works are by Hemsterhuis, who only edited part of the first volume, and Reitz (4 vols. 8vo), by Lehmann (Leipzig, 9 vols. 8vo), and the edition published by the Bipont Society; the best translation of Lucian in German is by Wieland (6 vols. 8vo); in English, by Dr. Franklin, 1780, and by Tooke (London, 2 vols. 4to, 1820).

LUCIAN, SAINT, presbyter of Antioch, suffered martyrdom during the reign of Diocletian, in 312, and was buried at Helenópolis in Bithynia. He is frequently mentioned by ecclesiastical writers as a man of great learning and piety. His fame rests upon his profound and laborious study of the Scriptures, of parts of which he made many highly-prized versions.

LU'CIDA, a name formerly given to the brightest star in any constellation: thus we have *Lucida Hydræ*, *Lucida Lyreæ*, &c.

LUCIFER, bishop of Cagliari in Sardinia, is principally known in ecclesiastical history for refusing to hold any communion with the clergy who had, during the reign of Constantius, conformed to the Arian doctrines, although it had been determined in a synod at Alexandria, in 352, to receive again into the church all the Arian clergy who openly acknowledged their errors. Lucifer in consequence left the Catholic church, and his followers were called Luciferians. He died about the year 370.

LUCIFER MATCHES (Lat. *luciferus*, 'light-bearing'). Small slips of wood, the ends of which are dipped in melted sulphur or paraffin, and afterwards tipped with a composition of glue, phosphorus, and chlorate of potash, which ignites when smartly rubbed upon any rough substance.

They are sold in little boxes at a very cheap rate, and have become almost indispensable in domestic economy. The old tinder-box, the phosphorus bottle, the sulphurous match, and a variety of other chemical contrivances, have all given way to the simple congreve or lucifer match, the very perfection of utility and cheapness. Whether they ignite quietly, like congreves, or noisily, like lucifers, they all have the property of emitting instantaneous light simply by friction; and all have either phosphorus or chlorate of potash as one ingredient in the composition with which they are tipped. Humble and unimportant as these tiny bits of wood may appear in a commercial point of view, yet their production affords extensive employment to many thousands. Amongst the number of match manufacturers in London, we are told of one who cuts up several hundred large timber trees into splints for matches every year, and makes 10,000,000 matches per day. In this process of cutting, many forms of machinery are brought into operation. In some the wood is first cut into quadrangular blocks, which are operated upon by a long range of sharp parallel knives; and these cutting knives work with such amazing velocity, that from 30,000 to

40,000 splints can be cut up in a minute. These splints are then sold wholesale to the different match makers in the metropolis, and other large towns. Matches, however, as well as the little retail boxes themselves, are very liable to ignition, which is often fraught with great danger. To obviate this a new mode of preparing the combustible materials has been invented by Mr. Lundstrom of Jonkoping, Sweden, and patented in England by Messrs. Bryant & May, London. The peculiarity of these matches consists in the division of the combustible ingredients between the match and the friction paper, instead of their being amalgamated in the composition forming the match. Thus the phosphorus (in the amorphous state) is placed on the paper, and a minimum amount of glue and chlorate of potash is combined with the match. By this arrangement neither match nor friction paper individually takes fire from friction. It is only when the phosphorized paper and the match come into contact with each other that ignition takes place. Thus accident from casual explosion can never occur. The trade of match making was formerly exceedingly unhealthy, but improvements have been recently effected and the workshops placed under the operation of the Factory Act, in England. The trade has assumed enormous dimensions in England and Germany: immense quantities are exported from both countries. The quantity of lucifer wood imported into the United Kingdom in 1864 was 173,977 cubic feet, valued at 32,622*l*. The value of the matches exported from this country in the same year was 103,905*l*.

LUCILIUS, CAIUS, was born at Suessa Aurunca (*Sessa*), a town in the north-western part of Campania, B.C. 148. The time of his death is uncertain. Lucilius is said by Horace ('Sat.' i. 1, 61) to have been the first writer of Roman satire; by which he means that Lucilius was the first who constructed it on those principles of art which were considered in the time of Horace as essential requisites in a satiric poem. The satires of Lucilius were very popular even in the Augustan age. Besides his satires, in thirty books, Lucilius wrote a comedy entitled 'Nummularius,' epodes, and hymns, none of which are extant, with the exception of a few fragments from his satires, which were collected and published by Douza, Leyden, 1597.

LUCINA, in Conchology, the name given to a genus of conchiferous Mollusca, and the type of the family *Lucinidae*. The shell is orbicular in shape, and of a white colour. The umbones are depressed; the lunule distinct; the margins small or minutely crenulated. (See Plate, 'Conchology.') The animal has the mantle freely open below; the siphonal orifice simple; the mouth minute; the gills single on each side; and the foot, which is twice as long as the animal, is cylindrical, pointed, and slightly beeled at the base. There are about seventy species. Their geographical range is wide; they are found on the coast of Norway and of the West Indies and New Zealand. Two hundred species have been found fossil in the Upper Silurian.

LUCIUS I. II. III. [POPE.]

LUCKENWALDE. [BRANDENBURG.]

LUCKNOW, a city of British India, the capital of the province of Oude, stands on the right bank of the river Goomtee, in 26° 51' N. lat., and 80° 50' E. long. It became the residence of the court of the

king of Oude in 1775, after which it was considerably enlarged, and soon became one of the wealthiest cities of Hindustan.

Lucknow consists of three distinct quarters: the first, or oldest part, is made up of narrow and dirty streets, and is very populous. The second quarter consists of one handsome street, with a well built market-place in the centre, and with smaller streets branching from it at right angles. The greater part of the houses in this quarter were the property of the king, and were occupied by branches of his family or persons attached to the court. A space between this street and the river contains the royal palace and gardens. The remaining quarter of the city is built in a purely oriental style, and contains many splendid houses and religious edifices. The city has thus a most imposing external appearance. In some of its buildings Grecian architecture has been imitated; and many of the private palaces are filled with European furniture. The *Imambarah*, or mausoleum of Asoph-ad-Dowlah, is a fine building. Between the city and the decaying country seat, Constantia, is the Delkusha park, with an extensive menagerie. Since the mutiny Lucknow has been much improved. It has now a Christian church, an observatory, an hospital and dispensary, and a military cantonment of the British, four miles to the north-west of the city.

In 1857 the British garrison was long besieged by the rebels, but partially relieved by Sir Henry Havelock and General Outram, and completely by Lord Clyde. Here Havelock was attacked with cholera, which abruptly terminated his heroic career. The entire population of the city is estimated at 300,000. Many posts of usefulness and honour have recently been thrown open to the natives.

LUCON. [PHILIPPINE ISLANDS; VENDÉE.]

LUCRETIA. [BRUTUS, M. JUNIUS.]

LUCRETIVUS, with his full name TITUS LUCRETIVUS CARUS, was born B.C. 95, and died B.C. 52, in the forty-fourth year of his age. The poem of Lucretius entitled '*De Rerum Natura*' (*On the Nature of Things*), in six books, contains a development of the physical and ethical doctrines of Epicurus. [EPICURUS.] Notwithstanding the unpromising nature of his subject, there is no writer in whom the Latin language displays its majesty and stately grandeur so effectively as in Lucretius.

The best editions of Lucretius are by Lambinus, whose commentary is very useful, 1563, 1570; Havercamp, 1725; Wakefield, 1796-97; Eichstädt, 1801; and Forbiger, 1828. The translations most worthy of notice are, the English by Creech, 1714; and by Mason Good, with the Latin texts and notes in two vols. 4to, 1805; the English prose edition by the Rev. J. S. Watson, M.A. (London, Bohn's Classical Library, 1851); the French by Lagrange, with the Latin text, 1799; the German by Meinecke, 1795, and by Knebel, 1821; and the Italian by Marchetti, 1717, frequently reprinted. A good estimate of Lucretius and his poetry will be found in Professor Sellars' essay on '*The Roman Poets of the Republic*' (Edinburgh, 1863).

LUCRINE LAKE. [AVERNO.]

LUCULIA, a genus of the natural family of *Rubiaceæ*, sub-order *Cinchonaceæ*, tribe *Cinchoneæ*, and sub-tribe *Eucinchoneæ*, thus indicating the close affinity of this genus to that of the trees yielding

Peruvian bark, or true *Cinchonas*, in which indeed the only known species, *L. gratissima*, was placed by Dr. Wallich and figured in his '*Tent. Fl. Nepal.*' t. 21. It is found in great abundance on some of the other smaller hills in the Valley of Nepal. It delights in exposed and rather naked situations, blossoming, according to the situations where it is found, nearly the whole year round. As seen by Dr. Wallich, it attains a height of sixteen feet, but he was informed of its growing to a larger size. It has been introduced into and has flowered in this country; but from the nature of the climate where it is indigenous it is only suited to the green-houses of England.

LUCULLUS, LUCIUS LUCINIUS, descended from a distinguished Roman family, was born about B.C. 115, and served under Sulla in the Marsian war. Whilst Sulla was besieging Athens (B.C. 87), Lucullus was sent into Egypt and Africa to collect a fleet; and after the conclusion of the war with Mithridates, he was left in Asia to collect the money which Sulla had imposed upon the conquered states.

In B.C. 74 he was elected consul, and appointed to the command in the war against Mithridates. During the following eight years, and in a series of brilliant campaigns, he completely defeated Mithridates and his son-in-law Tigranes. Lucullus never appears to have been a favourite with his troops; and their disaffection was increased by the acts of Clodius, whose sister he had married. The popular party at home also attacked a general who had been the personal friend of Sulla, and who was known to be a powerful supporter of the nobility. They eventually carried a measure by which he was removed from the command, and succeeded by Pompey, B.C. 66. Lucullus, on his return to Rome, took no part in public affairs, and passed the remainder of his life in retirement. The immense fortune which he had amassed during his command in Asia he employed in the erection of magnificent villas, and he lived in a style of magnificence and luxury. He died about B.C. 57.

LUDLOW. [SHROPSHIRE.]

LUDLOW, EDMUND, was born at Maiden Bradley in Wiltshire, about the year 1620. His father was Sir Henry Ludlow, a considerable landed proprietor in that county, and its representative in the Long Parliament. Edmund Ludlow volunteered into Essex's army, and first engaged the king's forces at the battle of Edge Hill (1642.) He was one of the most active assistants in Colonel Pride's Purge, one of the foremost of the king's judges, and one of the most eager voters for the annihilation of the House of Peers. His independence rendered him obnoxious to Cromwell, who sent him to Ireland with a military command (1650). When Cromwell assumed the authority of protector, Ludlow loudly protested against his elevation, and if he had been in England might possibly have impeded it. Consistent in his advocacy of an equal commonwealth, he refused, when he left Ireland, to yield Cromwell an unqualified submission. He was regarded with great jealousy on account of this refusal, and security was required that he should not act in hostility to the government. When the king was restored Ludlow fled the country. In 1689 he returned to England; but an arrest was threatened, and he was compelled again to fly to Vevey, where he died in 1693, aged about seventy-three years.

His memoirs were first printed at Vevay, two volumes in 1698, and a third in the following year. (Ludlow's *Memoirs*.)

LUDOLPHUS, JOB (the Latinized form of his real name Leutholf), was born at Erfurt, the 15th June, 1624, and was educated at the University of Leyden, where he principally studied jurisprudence and the Oriental languages. During the latter part of his life he resided at Frankfort-on-the-Main, where he died on the 8th April, 1704.

Ludolph was one of the most eminent Oriental scholars of his age, and appears to have been the first European who acquired a knowledge of the Ethiopic language, which he learned with the assistance of a native of Abyssinia. Ludolph also paid great attention to the Amharic language, of which he published a dictionary and grammar in 1698. Among the most important of Ludolph's other works are a 'History of Æthiopia' in Latin, Frankfort, 1681, of which there is an English version.

LUFF, a nautical term: the order to the helmsman to put the tiller towards the lee side of the ship, in order to make her sail nearer to the wind. A ship is said to *spring her luff* when she obeys the helm. *Luff round*! is to throw the ship's head up in the wind. *Luff tackle*, a large tackle, not destined for any particular part of the vessel, but movable at pleasure.

LUGANO. [**TICINO.**]

LUGGER, a vessel which carries a lugsail on each of its masts, and occasionally a topsail. The lugsail is of a quadrilateral shape, and is bent, by the upper side, upon a straight yard, which is slung on the mast in an oblique position, one-third being to the windward and two-thirds to the leeward side of the mast. Luggers, in England, scarcely ever exceed large fishing vessels in size, but in the French navy ships as large as British schooners are often lugger-rigged. The form of the sail enables them to beat close to the wind.

LUG-WORM. [**ARENICOLA.**]

LUIGI, ANDRE'A DI, commonly called *L'Ingegno*, and sometimes, *Andrea d'Assisi*, was born at Assisi about the middle of the fifteenth century. He was a painter of some eminence, and appears to have assisted Perugino in his works in the Vatican.

LUINI or **LOVINI, BERNARDINO**, was born at Luino, on the Lago Maggiore, about the middle of the fifteenth century. He is believed to have been the pupil of Leonardo da Vinci. Many of his greatest works, in oil and in fresco, are still in a good state of preservation in the Ambrosian library at Milan, and in the gallery of the Brera at Milan. There are many easel pictures in oil by Luini, both in and out of Italy, in public and private collections. Luini was still living in 1530, but the date of his death is not known. He had two sons, Evangelista and Aurelio, who are both praised by Lomazzo, their contemporary.

LUKE, ST., the Evangelist. Respecting the birth and early life of this evangelist we have no certain information; of his later history we learn something from his own work, the 'Acts of the Apostles.' A considerable knowledge of the Greek language is displayed in his writings, especially in his introduction to his Gospel, which is written in elegant Greek. On the other hand, his language contains many Hebraisms, and he was evidently well acquainted

with the religious rites of the Jews, whose mode of computing time he follows. (Luke xxii. 1; Acts ii. 1; xii. 3, 4; xx. 6, 16, &c.) Hence it has been much disputed whether he was a Jew or a Gentile before he embraced Christianity. It was a tradition current in Jerome's time, that Luke was a Greek by birth, but became a proselyte to Judaism early in life. The general belief is that he was by descent a Hellenistic Jew, and that he was born at Antioch. From Col. iv. 14, and from the testimony of Eusebius, Jerome, and other early writers, it appears that Luke was a physician.

The first distinct mention of Luke in the New Testament is in Acts xvi. 10, 11, where, in relating the vision which Paul saw at Troas, the writer suddenly begins to use the first person plural, whence it is inferred that Luke here joined the apostle (about A.D. 53), whom he accompanied to Philippi (ver. 12). He seems to have remained at Philippi during Paul's journey to Athens and Corinth; for he drops the first person at ver. 17, and does not resume it till he relates Paul's return to Philippi (xx. 5, 6). From this time it appears from the Acts that Luke was Paul's constant companion till his arrival at Rome (about A.D. 61 or 63), where he remained with the apostle for some time, probably during Paul's first imprisonment. He is mentioned more than once in Paul's epistles, written during this period. (Col. iv. 14; 2 Tim. iv. 2; Philem. v. 24.) Respecting the end of Luke's life, the tradition is, that after Paul's liberation from his first imprisonment, he retired to Achaia, where he resided some few years, wrote his Gospel and the Acts of the Apostles, and died at an advanced age (some say eighty, others eighty-four years), probably by a natural death.

LUKE, ST., THE GOSPEL OF, is a narrative of the life of Jesus Christ written by the evangelist, and one of the canonical books of the New Testament. Its most probable date is about A.D. 63 or 64. It is closely connected with the Acts of the Apostles, and was probably written not long before that book. (Acts, i. 1.) Some writers place it in A.D. 53. Theophylact asserts that it was written fifteen years after Christ's ascension. The common tradition is that it was written in Greece; Jerome says in Achaia and Boeotia.

Like the Acts of the Apostles, this Gospel is dedicated to Theophilus. The conjectures of critics respecting this personage are as numerous as is usual on such points; the conclusion at which most arrive is that he was a converted Gentile, living without the bounds of Palestine. This dedication, the testimony of early writers, and some marks in the work itself, such as the explanation given of matters exclusively Jewish, prove that the Gospel was designed for the benefit of Gentile converts.

LULLY, RAYMUND, surnamed the Enlightened Doctor, an enthusiastic and remarkable character of the thirteenth century, was born at Palma, in the island of Majorca, in 1234. In early life he followed his paternal profession of arms in the service of the king of Arragon, and abandoned himself to all the licence of a soldier's life. Passing from one extreme to another, Lully subsequently retired to a desert, where he pursued a life of solitude and rigorous asceticism. Here he pretended to have had visions, and, among others, a manifestation of Christ on the

cross, who called him to his service and the conversion of the Mohammedans. He accordingly divided all his property among the poor; and in his thirtieth year he began to prepare himself, by diligent study, for the labours and duties of a missionary. Learning Arabic from a slave, he read in that language several philosophical works, the perusal of which, in all probability, suggested those new views of grammar and dialectic by means of which he hoped to reform science, and thereby the world itself. Full of this idea, he had a second vision of the Saviour in the semblance of a fiery seraph, by whom he was expressly enjoined to commit to writing and to publish the treatise to which he himself gave the name of 'Ars Lullia,' but which his followers and admirers dignified by the title of the 'Great Art' (Ars Magna). Having besought James king of Aragon to establish a monastery in Majorca for the education of thirteen monks in the Arabic language and the duties of missionaries, he went to Rome to seek the countenance of Pope Honorius IV. for similar institutions and his own mission. Receiving, however, little encouragement, he visited Paris and Genoa with the same design, and with as little success. From Genoa he crossed to Africa, where he was in danger of losing his life in consequence of his dispute with a Mohammedan whom he sought to convert, but was saved by the intercession of an Arabian mufti, on the condition of quitting Africa for ever. This promise, however, he subsequently considered not to be binding; for, after revisiting Italy, and in vain seeking to excite sympathy and co-operation in his designs, he reassumed, unassisted, his enthusiastic enterprise. Proceeding first to Cyprus, and thence to Africa, he was nearly stoned to death, and, when cast into prison, owed his liberty to the generosity of some Genoese merchants. Upon his return to Europe Lully visited its principal cities, preaching the necessity of a crusade for the recovery of the Holy Land, a plan of which he laid before Pope Clement V., by whom it was received with little or no favour. Unchecked, however, by so many disappointments, and with the ardour of his enthusiasm still unabated, Lully returned a third time to Africa, where his zeal for conversion entailed upon him dreadful torments, from which he was a second time rescued by the generosity of the Genoese. The sufferings, however, to which he had been exposed were so great, that Lully died on his passage home, within sight of his native country, in the year 1315.

LULLY (or LULLI), JEAN BAPTISTE, the father of French dramatic music, was the son of a miller, and born at Florence in 1633. Having attracted the notice of the Chevalier Guise, he was by that nobleman recommended to Mademoiselle de Montpensier, niece of Louise XIV., as a page, and sent to Paris in his fourteenth year. Not being prepossessing in person, he was sent into the kitchen, but his musical talents soon commanded the notice of the king, and then he rose quickly in public estimation. When the Académie Royale de Musique was founded, Lully was placed at its head; and his success in this capacity was so great, that he realised a handsome fortune, and was raised to the situation of Secrétaire du Roi.

On the recovery of Louis from a severe operation, Lully composed a 'Te Deum,' and during its re-

hearsal, while beating the time to the band with his cane, he struck his foot a violent blow, and, having placed himself in the hands of a quack, his life paid the forfeit of his credulity. He died in Paris, in 1687.

LUMBAGO. [RHEUMATISM.]

LUMBRICUS, Earth-worms, a genus belonging to Cuvier's third order of *Annelids*, and to the first family (*Abranches Sétigères*) of that order. In recent classification it is ranked as a genus under the order *Terricolæ*, class *Annelida*.

The common Earth-worm (*L. terrestris*) is the type of the order. They are for the most part nocturnal in their habits, seldom venturing from their holes during the day. Worms are hermaphrodite and very prolific. Air for the oxygenation of the blood is taken in by pores on the sides. A series of microscopic hooks lie on the belly.

The Earth-worm is not only of great service to the agriculturist in loosening the earth, and rendering it permeable by air and water, but is also a most active agent in adding to the depth of the soil, and in covering comparatively barren tracts with a superficial layer of good mould. See a valuable paper 'On the Formation of Mould by means of the Earth-worm,' read before the Geol. Soc. London, by C. Darwin, Esq., F.G.S. It is probable that every particle of earth in old pasture land has passed through the intestines of worms, and hence in some sense the term 'animal mould' would be more appropriate than 'vegetable mould.' [ANNELEIDA.]

LUMINOSITY OF ORGANIC BEINGS. Recent observations have proved that various organic beings, both animal and vegetable, are endowed with a peculiar faculty of giving forth light. Every housewife will have noticed this circumstance in the case of dead mackerels and herrings, where it arises from a species of slime or organic matter collected on the outer surface of the fish. In the common mollusc, the *Pholas*, the property is singularly powerful, a single specimen rendering seven ounces of milk so luminous as to light up the faces of individuals. It is also found in the *Noctiluca miliaris*, and in the *Pyrosoma Atlantica*—the latter occurring in such myriads that the ocean is occasionally illuminated for miles with a brilliant phosphorescent glow. In polypes, rhizopoda, echinoderms, infusoria, annelides, medusæ, and the like, luminosity exists, as well as in several phanerogamic plants—the nasturtium and marigold, for instance; in certain genera of the Coleoptera, as in the glow-worm and fire-fly; and of the Hemiptera, as the lantern-fly.

LUMPERS. Labourers employed to load and unload merchant ships when in harbour.

LUMP-SUCKER. [DISCOBOLI.]

LUNACY. The subject of Lunacy, treated from a medical point of view, will be found in the article INSANITY. Unsoundness of mind is perhaps the most accurate definition of the present legal meaning of lunacy. Formerly a legal distinction was made between lunatics and idiots: a lunatic was one who has had understanding, but has lost the use of his reason; and an idiot, one who has had no understanding from his nativity. The distinction between these two classes of persons of unsound mind also produced some important differences in the management of their property, which have now fallen into disuse. Strictly speaking, perhaps, a lunatic is one who has

lucid intervals; but this distinction may also at the present day be disregarded.

Persons of unsound mind may inherit or succeed to land or personal property either by representation, devise, or bequest, but they cannot be executors or administrators, or make a will, or bind themselves by contract. A person of unsound mind, though he afterwards be restored to reason, is not permitted to allege his own insanity in order to make his own act void; for no man is allowed to plead his own disability (13 Vesey, 590), unless he has been imposed upon in consequence of his mental incapacity (2 Carr. & P., 178; 3 Carr. & P., 1, 30); and an action will lie against a lunatic for the supply of necessities suitable to his station. Acts done during a lucid interval are valid; but the burden of proving that, at the time when the act was done, the party was sane and conscious of his proceedings, lies upon the person asserting this fact. The marriage of a person of unsound mind, except it be solemnized during a lucid interval, is void.

As a general rule, it may be laid down, that where unsoundness of mind, of such a nature as to render the party incompetent to exercise any self-control, is established, criminal punishment will not be inflicted; but that he will be kept in safe custody during the pleasure of the Crown (39 and 40 Geo. III. c. 94, and 1 & 2 Vict. c. 14). On the subject of criminal responsibility, and what constitutes unsoundness of mind in a legal point of view, the reader is referred to the various treatises on medical jurisprudence, particularly to that by Dr. Ray, published at Boston, in the United States: and also generally to Dr. Haslam's 'Observations on Madness and Melancholy,' 'Medical Jurisprudence as it relates to Insanity,' 'Illustrations of Madness,' and his other works. Dr. Forbes Winslow on 'The Plea of Insanity in Criminal Cases' is a valuable book.

In an inquisition of lunacy the question to be decided is, not whether the individual be actually of sound mind, though a jury on an inquisition held under a commission of lunacy must express their opinion or finding in the form that the alleged lunatic is of unsound mind ('In re Holmes,' 1 Russell, 182); but, though such must be the finding in order to make a man legally a lunatic, the real question is, whether or not the departure from the state of sanity be of such a nature as to justify the confinement of the individual, and the imposition of restraint upon him as regards the disposal of his property. In all such inquiries it should be kept in mind that insanity varies infinitely in its forms and degrees. Persons may be of weak mind and eccentric, and even be the subjects of delusions on certain subjects, and yet both inoffensive and capable of managing pecuniary matters. The individual's natural character should be taken into consideration as accounting for eccentricities of manner and temper, and his education in estimating his ignorance and apparent want of intellect; and lastly, due allowance must be made for the irritation and excitement produced in a mind, perhaps naturally weak, by the inquiry itself, and the attempt to deprive a man of his liberty and the management of his property.

A lunatic is responsible for acts committed during 'lucid intervals,' a term by which is understood, however, not mere remissions of the violence of the

disease, but periods during which the mind resumes its perfectly sane condition. In forming an opinion concerning such lucid intervals, the absence of the signs of insanity must have considerable duration before it can be concluded that the mind is perfectly sane; for lunatics, when apparently convalescent, are subject to sudden and violent paroxysms.

One of the most difficult points to be determined is with regard to the mental capacity of old persons, in whom the mind is impaired. The decay of intellect in old age is first manifested in the loss of memory of persons, things, and dates, and particularly with respect to recent impressions. But it is not the mere liability to forget names, and such matters, which will render the will of an old person invalid; it should be shown that in conversation about his affairs, and his friends and relations, he did not evince sufficient knowledge to dispose of his property with sound judgment. Many old men appear stupid and forgetful; but when their attention is fairly fixed on their property, business, and family affairs, they understand them perfectly, and display sagacity in their remarks.

The care and custody of idiots and lunatics form a branch of the royal prerogative, and were formerly administered by the king himself. Since the dissolution of the Court of Wards, the lord-chancellor has been specially appointed to exercise this power. The method of proving a person to be of unsound mind, for the purpose of depriving him of the control of his property, and where the circumstances require it, providing for the safe custody of his person, is by the inquisition of a jury, summoned under a commission granted by the lord-chancellor. If the fact of lunacy be established, the care of the lunatic is committed to some fit person, and the care of his estate either to the same or to some other fit person.

The following acts have made alterations in the proceedings under commissions of lunacy.

An Act of the 3 & 4 Will. IV. c. 36, entitled 'An Act to diminish the Inconveniences and Expenses of Commissions in the nature of writs De Lunatico Inquirendo; and to provide for the better care and treatment of idiots, lunatics, and persons of unsound mind, found such by Inquisition.'

An Act of the 5 & 6 Vict. c. 84, entitled 'An Act to alter and amend the practice and course of proceeding under commissions in the nature of writs De Lunatico Inquirendo.' The first section empowers the lord-chancellor to appoint two sergeants or barristers-at-law, to be called 'The Commissioners in Lunacy,' and enacts that in future all commissions in the nature of writs De Lunatico Inquirendo shall be directed to such Commissioners, and that such Commissioners shall jointly and severally have and execute all the powers, duties, and authorities now had and executed by commissioners named in commissions in the nature of writs De Lunatico Inquirendo.

By the 8 & 9 Vict. c. 100, s. 2, the two commissioners of lunacy are henceforth to be called Masters in Lunacy, and take the same rank and precedence as the masters in ordinary of the High Court of Chancery. Some other regulations as to the duties of the masters in lunacy are contained in 8 & 9 Vict. c. 100, s. 95-98. The other sections of the Act 5 & 6 Vict. c. 84, make regulations as to fees and other matters, for which the Act must be consulted.

The term lunatic is only properly applied to a person who is found to be a lunatic by the verdict of a jury under an inquisition. But the term lunatic is also applied to those who, being considered lunatics, are confined in lunatic asylums or hospitals, and also to any single patient who is boarded or lodged for pay as a lunatic in a house not licensed; and also to any person who is under the care of any person who receives or takes the charge of such one lunatic only, and derives no profit from the charge.

Extensive alterations were introduced into the law and practice in lunacy by the Act of 1855, and the orders thereunder. Of these we name the principal:—A general commission has been issued to the masters in lunacy in lieu of the special commission formerly issued in each case. Juries are dispensed with, unless in particular cases it be found important to call them. The inquiry as to the state of mind is, except under special circumstances, not carried back, but limited to the present time. All matters affecting the person and property of the lunatic may, after the inquisition, be proceeded on before the masters without any special order of the lord chancellor for the purpose; and the provisions for insuring through the visitors and masters the proper care and treatment of the lunatic are made more comprehensive.

The following Acts contain amendments: 18 & 19 Vict. c. 13; 25 & 26 Vict. c. 86. This Act provides that every lunatic shall be visited by the proper officers at least four times a year. And the 26 & 27 Vict. c. 110. The chief amendments comprised in this Act are—That the inquiry as to the state of mind shall be confined to the question whether the person is at the time of inquiry of sound mind, and no evidence as to anything done or said by such person, or as to his demeanour more than two years before the time of inquiry, shall be received as evidence of insanity.

That upon a trial before a jury the person himself shall be examined before the taking of any evidence, and at the close of the proceedings; and such examination shall be taken in public or private as the judge may direct. The alleged lunatic may demand a jury.

The lord chancellor is given power to apply in certain cases the property of a lunatic for such lunatic's benefit.

The Act contains other regulations as to the practice in lunacy not necessary to insert here.

The law of Scotland recognizes two distinct kinds of mental incapacity—fatuity or idiocy, and furiosity or insanity. Persons labouring under mental disease in either form are protected by law, both as regards their persons and estates. But the amount and nature of the protection accorded to them varies, according as their incapacity is total and permanent, or partial and intermittent.

Total Incapacity.—When the incapacity is of this kind, the person labouring under it is placed under guardianship by the Supreme Court. But the necessity for this step must, in all cases where there is resistance or any conflicting right, be established by the verdict of a jury, proceeding upon a *briefe* of Chancery obtained at the instance of the next of kin of the insane person, and directed to the judge-ordinary of the territory in which the person to be cognosed resides. The *briefe* is directed to ascer-

tain either his fatuity or furiosity, as the case may be; and the jury, from the evidence of the witnesses and examination of the person himself, must return a verdict as to his present condition of mind, the date at which the malady commenced, and whether or not there are lucid intervals in his disease. They must also ascertain who is his nearest male cognate, upon which his curatory may be conferred. The *briefe* is then returned to Chancery and becomes the warrant upon which to apply for letters of curatory from the Supreme Court. Where the necessity for a cognition does not exist, the court will, on petition of the lunatic's next of kin, appoint a guardian to him *ex nobili officio*. Total incapacity may further be established in relation to any particular deed or transaction by an action of reduction. This may be brought after the death of the granter of the deed sought to be reduced, and in this action it is not necessary to prove the time at which the insanity commenced, but only that it existed at the date of the deed in question. When insanity exists attended with lucid intervals, the general rule of law is that acts done during these intervals are valid.

Partial Incapacity.—In all cases of *imbecility* arising either from age, from facility of temper, or from organic affection, by which a person is incapacitated from attending to his own affairs, the court will on cause shown appoint either a judicial factor or *curator bonis* to undertake their management. The same rule holds with regard to *temporary incapacity*, occasional delirium, absence abroad, or by the interval before a cognition can take place.

Interdiction.—In order to protect persons of a profuse or prodigal disposition, or of a weak and facile nature, from the effects of their own improvidence, the law has provided the remedy of *interdiction*, by which such persons are disabled from burdening or alienating any part of their heritable estate, without the consent of certain persons who are called their interdictors. Interdiction is either judicial or voluntary, that is, it may proceed either upon a judgment of court finding and declaring the person to be of a weak and facile disposition, or by a bond granted by the person himself in which he expresses his consciousness of facility, and lays himself under an obligation to grant no deed without the consent of his interdictors. Letters of publication then follow thereon, and are executed by a messenger-at-arms at the market-cross of the jurisdiction where the prodigal resides, and the interdiction is then recorded in the Register of Inhibitions of the county where any of his lands lie.

Plea of Insanity in Criminal Cases.—In criminal cases insanity may be pleaded either in bar of punishment, or in bar of trial. The old test of insanity—that the pannel did not know the distinction between right and wrong—is now completely exploded. Wherever there is clear proof of the existence of mental disease clouding and dethroning the mind, the defence of insanity will be admitted.

By the Roman law persons of unsound mind might be deprived of the management of their property and persons on application to the *pretor* by their next of kin. This regulation dates back to the time of the Twelve Tables. The curatory was given to the nearest cognate of the lunatic, and when there were none, the *pretor* or the *præses* in the provinces

named on. (Dig. 27, 10, 1.) An insane person could not make a will or exercise any other civil right so long as his malady lasted. When it ceased, the curatory fell at once. By the code of the Twelve Tables prodigals were placed under the same restraints as lunatics with regard to the management of their affairs.

LUNAR CAUSTIC, a term applied to the fused nitrate of silver, when produced in small cylindrical cakes. It bears a whitish-striated appearance, decomposing and turning black when exposed to the air. In surgery it is frequently employed, sometimes to cauterize warts, ulceration of the mucous membrane of the throat, and the 'proud flesh' which grows up about wounds and ulcers. It is also used to stimulate the action of lethargic ulcers as well as ophthalmic affections, and many varieties of skin disease.

LUNAR OBSERVATION generally means an observation of the moon's distance from a star, for the purpose of finding the longitude.

LUNAR THEORY. By the theory of a planet is meant the deduction of its motion from the law of gravitation.

LUNATIC ASYLUMS. The subject of insanity and asylums for the insane has of late years occupied a very large share of public attention, particularly as an opinion has prevailed that insanity is on the increase in this kingdom beyond the ratio of population. For reasons which will be presently stated it is, however, believed that this increase is more apparent than real.

Two acts passed in 1845 (8 & 9 Vict. caps. 100 and 126) placed the powers vested in the Commissioners in Lunacy on an entirely new footing, and in many respects modified the constitution of asylums. The first Act appoints six commissioners, three of whom are physicians, and three barristers, with salaries; and five other commissioners, who act gratuitously. The rule that none of these shall be connected with any asylum is continued. Licenses to receive lunatic patients are granted by these commissioners at each of their quarterly meetings. No license is to remain in force more than thirteen months, and the notice of a wish to renew must give the number of patients then confined. The jurisdiction of the commissioners extends to the whole of London and Middlesex and Southwark, and to all places within seven miles of London, Westminster, and Southwark: in the country the licenses are to be granted by the justices of the peace in quarter session, who are bound to appoint three of their number, together with one physician, surgeon, or apothecary, as visitors of the asylums licensed by them. Strict regulations are enforced for the reception of patients; it is required that every person not being a pauper, received as insane, shall be certified to be so by two physicians or surgeons, who shall visit such patient separately, and shall have no interest in the asylum in which such patient is to be confined; and certain entries of these particulars are to be kept at each asylum. For a pauper the certificate of one medical man and the order of two justices is required.

Penalties are fixed for neglecting these rules, or those which direct notice to be given of every admission, death, discharge, or escape. Houses having

100 or more patients are to have a resident medical attendant, and those of smaller size are to be visited by a medical attendant at defined periods, according to their size. Every house within the immediate jurisdiction of the commissioners shall be visited by them at least four times a year, and every other house at least twice in every year. Similar powers are given to the visitors in the country.

The commissioners are to present an annual report to the lord-chancellor of the state of the different asylums visited by them, which report shall be laid before Parliament.

An important alteration is made in the law concerning the care of single patients. Orders and medical certificates must in future be procured for the care of one patient similar to those used for the admission of patients into licensed houses; and copies of these documents are to be privately sent to and registered by the secretary to the commissioners. This Act only extends to England and Wales, and it does not affect Bethlehem Hospital, London. The persons appointed to hold commissions 'De Lunatico Inquirendo,' heretofore styled commissioners, are in future to be termed 'Masters in Lunacy.'

The second Act, which repealed 9 Geo. IV. c. 40, and which is now repealed by 16 & 17 Vict. c. 97, relates to the regulation of lunatic asylums for counties and boroughs, and the maintenance and care of pauper lunatics, and gives to the commissioners a greater power over these institutions. The justices of every county and borough are now to be compelled to erect or join in the erection of an asylum when none such already exists; and all proposals, agreements, and plans, and the rules and regulations of each asylum, are to be submitted to the commissioners, and they and all contracts and estimates approved by the secretary of state. Contracts for the care of insane persons in licensed houses do not exempt any county or borough from the obligation of providing an asylum. This Act extends only to England and Wales, and does not apply to Bethlehem Hospital. Medical men signing false certificates are made guilty of a misdemeanor; and certain penalties are inflicted on officers and servants illtreating lunatics.

The justices of the peace are to appoint a visiting committee to whom everything is to be submitted. The visitors have to grant retiring allowances to the officers not exceeding two-thirds of their salaries; to draw up rules for the regulation of the asylum, the same to be submitted to the secretary of state; to fix weekly rates for the maintenance of each pauper lunatic; to appoint a chaplain, medical officer, clerk, and treasurer; and to audit the accounts.

Every pauper lunatic not in an asylum or licensed house is to be visited by the medical officer of the union once a quarter.

The Act contains provision as to the care of lunatics wandering at large, and also the certificate under which one is to be received into an asylum. It provides for raising the funds for the maintenance of the asylum; enacts the penalties for breaches of the Act; and contains ample directions as to the disposal of the lunatic's property.

The Act has been amended in some points not here necessary to mention by the 18 & 19 Vict. c.

105; 19 & 20 Vict. c. 87; 25 & 26 Vict. c. 111; 26 & 27 Vict. c. 110.

The leading Act regulating the care and treatment of lunatics in Scotland is the Act 20 & 21 Vict. c. 71, 1857. But various amendments have been made thereon by 21 & 22 Vict. c. 89; 25 & 26 Vict. c. 54; 27 & 28 Vict. c. 59. A bill is presently before Parliament (Lunacy (Scotland) Act, 1866) for the purpose of still further amending the law on the subject.

Management of Lunatic Asylums.—For a very long period it was unfortunately taken for granted, both in England and in other countries, that insanity was incurable, and coercion and confinement were the chief appliances used in all cases where any restraint appeared necessary. When they were supposed to be harmless, lunatics and idiots were suffered to wander about the country, trusting to precarious charity, and subjected to occasional whippings. The worst cases only were admitted to the asylums which were so sparingly provided, and the treatment of the inmates in these institutions was often brutal in the extreme. In the old Bethlehem Hospital, for instance, the patients were made a show of like wild beasts, and they were often excited to rage to make the exhibition more stimulating. Such scenes were not peculiar to England, but could be paralleled in almost every country in Europe. At length in 1792, a benevolent Frenchman, named Pinel, made the first systematic attempt to restore the insane to a position among human beings. His plan, which was designated the non-restraint system, was at first ridiculed and scoffed at; but by dint of great perseverance and continuous personal exertions, he at length induced the governors of the Bicêtre, a hospital near Paris, to permit him to unchain some of the inmates, and so salutary were the effects of his experiment, even on the first day, that the old plan was soon entirely abolished and a course of milder treatment pursued. England is proverbially slow in adopting improvements, and for twenty-three years after the chains had been removed from the inmates of the Bicêtre, the old mode of treatment continued in full force in this country. It is true that nearly simultaneously with the early measures of Pinel, and, as is believed, without any knowledge of them, Mr. William Tuke, a Quaker, conceived the plan of founding a hospital for the treatment of the insane, upon principles more enlightened and humane than those which then prevailed; and his idea was carried out by the construction of 'The Friend's Retreat' for the insane, at York, which was opened in 1796.

But it was not till the year 1813 that the English Government took up the matter. In that year a committee of inquiry was appointed to investigate the state of the York asylum—special attention having been directed to this particular institution in consequence of the success of the Friend's establishment in that city—and the horrors which were then divulged could scarcely be credited if they were not well attested by facts. The state of the patients at Bethlehem was next inquired into, and they were found to be even worse treated than those at York. From this time a gradual, but very slow, improvement in the condition of the insane may be noticed. Chains were removed and leather restraints of much milder kinds substituted, and more care was

given to the warming and clothing of the patients. Between 1815 and 1830 many large asylums were opened in England. They were built on the then most approved principles, and in all of them the milder methods of treatment were adopted. Things continued to gradually improve, and in 1839 Mr. Hill, the surgeon of the Lincoln asylum, published a work in which he advanced the following proposition as a principle:—'In a properly constructed building, with a sufficient number of suitable attendants, restraint is *never necessary, never justifiable, and always injurious, in all cases of lunacy whatever.*' The doctrine was at first declared, even by those in favour of the milder treatment, to be too decided, and likely to produce a bad effect; but fortunately the lapse of thirty years has proved its perfect truth, by its adoption in all the most important asylums in the kingdom.

The following noteworthy table, compiled from the records of the Lincoln Asylum, by Mr. Hill, well illustrates not only the extent to which mechanical restraint was once employed, but the statistical history of its reduction.

Year.	Total number in the house.	Total number restrained.	Total number of instances of restraint.	Total number of hours under restraint.
1829, .	72	39	1,727	20,424
1830, .	92	54	2,364	27,113 $\frac{3}{4}$
1831, .	70	40	1,004	10,830
1832, .	81	55	1,401	15,671 $\frac{1}{2}$
1833, .	87	44	1,109	12,003 $\frac{1}{2}$
1834, .	109	45	647	6,597
1835, .	108	28	323	2,874
1836, .	115	12	39	334
1837, .	130	2	3	28

In connection with the foregoing, it must be mentioned that the entries of the visitors and the reports of the physicians alike agree in describing the condition of the patients as much improved, the quiet of the house increased, and the number of accidents and suicides materially reduced.

In their general report, the Commissioners of the Census of the United Kingdom for 1861, state that 'The laws for the protection of the person and property of lunatics in England continue to be carried out with vigour and success. By a system of inspection and control, both of public and private establishments for the reception of the insane, the number of patients is restricted within the limits of the accommodation afforded, and salutary regulations are enforced. Every care which experience can suggest is bestowed on the internal arrangements and organization of the larger establishments, and the more recently constructed asylums are regarded as models of their kind.'

The treatment of insanity, as pursued at the present day, is properly divided into two parts. One of these might be termed the *direct*, the other the *indirect*, but they are generally called the *medical* and the *moral* treatment. The medical treatment

consists in the use of such medicines as, in each particular case, will be likely to restore the body to a healthy condition. This treatment, as a method, has undergone a radical change within the last fifty—mostly within the last thirty—years. Formerly, based upon the hypothesis that insanity was a disease of strength, or of active inflammation, it chiefly consisted in the liberal employment of blisters, purgatives, cupping, and blood-letting. Now, founded upon the well-supported theory that the disorder originates in debility, its principal remedies are stimulants and tonics. The success of the present method demonstrates not only the excellence of the practice, but the truth of the theory.

The moral treatment includes the exercise of a mild but firm directive and disciplinary power over the actions of the patient, by which he is gradually restored to healthful habits and wholesome self-restraint, and the attempt to win him from the vagaries of his delusions to those mental and manual pursuits which give solidity, strength, and activity to the normal mind. The means adopted for the attainment of these ends are, the regular hours of hospital life, appropriate manual labour, walking, athletic and other games, attendance upon religious services, reading and other literary pursuits, lectures upon scientific and miscellaneous subjects, dramas, concerts, balls, and other recreations, entertainments, and amusements. In the method of moral treatment the change has been no less than in medical treatment.

This change may be comprehended in two brief generic statements: first, the almost absolute disuse of mechanical appliances for bodily restraint: and secondly, the introduction of the conveniences, comforts, and to some extent the luxuries that appertain to civilized life, into the apartments of the patients, and to all parts of the hospital establishments where such means will benefit them. By this gentle and judicious treatment a large increase has taken place in the number of cases of insanity which have been cured, especially in the early stages of the disease.

So many public asylums have been built that there has been a very great variety of construction. The chief requisites insisted on by the Commissioners are light, ventilation, proper means of warming, convenience and cheerfulness in the furniture, and, above all, ample means for out-door exercise. The only doubtful part of the arrangement is the dormitories, some good authorities preferring open wards, as admitting the most effective superintendence at night; others advocating separate sleeping apartments, as being less likely to admit of any one patient disturbing another. Both plans have been adopted; and the results do not appear to differ materially.

A great improvement has taken place in the class of persons appointed as attendants, or, according to the old phraseology, keepers. That all such persons should possess benevolence and intelligence is essential to the effective working of a humane and enlightened system; and they should be liberally paid. The proportion of attendants to patients in the different English public asylums varies from one to ten, to one to twenty; the former does not seem too much, and is far less than that in all well-managed private asylums. No ward, however small, should have less than two attendants, in order that it should

never be left without one: this is enforced by the rules of several asylums, and is most essential whenever a night attendance is adopted. In some asylums this is endeavoured to be effected by making the day attendants undertake night duty in turns; but this is taxing their physical powers too severely, even when they are released from duty for half the succeeding day.

The private asylums for the wealthy classes are assimilated in their arrangements to ordinary dwelling-houses, and it has been proposed to place the least affected of the indigent in cottages near the public asylums, with a view to their more speedy recovery.

Before the close of the eighteenth century, German students in the medical school of Paris had carried home the new theory and practice of Pinel, and had begun that work of reformatory regeneration of the institutions for the insane in their native land, which, though small at its beginning and repressed by hindrances similar to those already alluded to, has since been prosecuted with perhaps no less vigour or success than in France or England.

The spirit of the enterprise crossed the Atlantic more slowly than it traversed the boundaries of the German states, but the success of the 'Friend's Retreat' at York having become known on the other side of the Atlantic, the Society of Friends, in Pennsylvania, erected a similar institution near that city. Shortly afterwards the eminent philanthropist, Miss D. L. Dix, began a series of benevolent and beneficent labours, to which female biography, throughout the history of the world, probably exhibits no equal. Beginning in Massachusetts, and subsequently proceeding to other states, she traversed the counties and townships within their several jurisdictions, visited all the public receptacles for the insane, together with all the private hovels, dens, garrets, and cellars for solitary maniacs, to which access could be gained. She stimulated individuals to exertions and contributions in the cause, and in memorials to legislatures and by appeals to Congress, called upon the governments to extend the assistance of the commonwealth to this class of suffering people.

There are now rather more than fifty public asylums in America. A large proportion of them will not suffer in comparison with the better class of similar institutions in Great Britain, France, and Germany. It is believed that, in executive administration, they are governed with prudence, benevolence, and kindness; that their officers are generally earnest labourers, emulous of improvement; and that the unfortunate insane may be committed to them in full confidence of immunity from cruelty or abuse.

Besides the public institutions, a few private establishments for the treatment of the insane have been opened in the United States, in the course of the last forty years. Although some of those which have been discontinued were directed by able and humane men, and several others still in operation are considerably patronized and well conducted by men of high character, yet a consciousness of the undeniable tendency to abuse involved in a purely private pecuniary enterprise of this kind, has operated to discourage their multiplication and prosperity.

America has a journal devoted entirely to insanity, the first number of which was issued in July, 1844.

Intended not alone for the benefit of professional readers, but also for the dissemination of more accurate views of insanity among the people, its editor endeavoured to adapt its contents to the attainment of this twofold object. The journal is still continued, but has assumed a more purely scientific and professional character, and has done great service in the cause to which it is devoted.

Statistics of Lunacy.—At the date of the census of 1861, there were in the principal civil lunatic asylums and establishments for the reception of the insane in England and Wales 24,345 persons—viz., 11,249 males and 13,096 females. This number is defective as regards the total amount of persons labouring under aberration of mind, as it not only excludes some lunatics in licensed houses, where a very small number are received, and lunatics at large or in the custody of their relatives, but also the patients in military and naval asylums, as well as lunatic paupers in workhouses, and a few lunatics in jails, who are not distinguished from other inmates in the returns from those institutions. The number thus understated furnishes a ratio of one lunatic patient in an asylum to every 824 inhabitants of England and Wales. In 1851 the aggregate number in like manner was 16,426 or 1 in every 1091 of the population. It will be observed that the excess in the number of lunatics in asylums in 1861 over those in 1851 amounts to no less than 7919.

To what is this increase to be ascribed? Are we to conclude that there is an increased liability to mental maladies among the people of this country; or are we to look to other circumstances for an explanation of this remarkable difference? The

explanation is partly to be found in the fact that the increase has been principally in public asylums, and is limited almost entirely to pauper and criminal patients. Since 1851 pauper lunatics, returned in that year at the workhouses, have been freely removed to county lunatic asylums; but making every allowance for this circumstance, it is obvious that other influences have been in operation which have had the effect of increasing the number in asylums.

The Commissioners in Lunacy are of opinion that the increased number of pauper lunatics is chiefly due to the agency of three causes—(1.) The discovery of fit objects for treatment previously unnoticed, and the classification as insane of many persons formerly looked upon as ordinary paupers; (2.) The increased number of these sent to asylums; and (3.) The prolongation of their life when thus brought under care. To what extent the removal of pauper lunatics from workhouses and cottages has tended to prolong life has not been determined; but there can be no doubt that when destitute and diseased persons are placed under care in well-regulated establishments, specially adapted for their protection and treatment, and in which they receive an abundant diet and careful medical attendance, the result will be a diminution of the rate of mortality amongst them. These considerations furnish sufficient reason for rejecting the inference suggested by the increased return of paupers in asylums, that the inhabitants of this country are more prone than formerly to attacks of insanity.

The following table, compiled from the last report of the Lunacy Commissioners, gives the most recent statistics relating to this painful subject:—

	Number of Patients, 1st January, 1863.			Admissions during 1865.	Discharges during 1865.	Number Recovered.	Deaths during 1865.	Patients Remaining 1st January, 1866.			Number deemed Curable.
	Private.	Pauper.	Total.					Private.	Pauper.	Total.	
County and Borough Asylums, . .	208	22,077	22,285	7,468	3,593	2,530	2,517	229	23,414	23,643	2,333
Hospitals, ...	1,815	363	2,178	776	513	289	176	1,885	380	2,265	441
Metropolitan Licensed Houses, . .	1,485	870	2,355	942	595	217	269	1,536	897	2,433	280
Provincial Licensed Houses, . . .	1,669	453	2,122	837	871	205	157	1,627	304	1,931	330
	5,177	23,763	28,940	10,023	5,572	3,241	3,119	5,277	24,995	30,272	3,384
Naval, Military, and State Criminal Asylums, ...	485	—	485	318	172	41	34	597	—	597	95
Totals, ...	5,662	23,763	29,425	10,341	5,744	3,282	3,153	5,874	24,995	30,869	3,479

As regards the ages of the patients in lunatic asylums, a summary of the tables prepared at the time of the last census, gave the following results with regard to England and Wales:—

	Males.	Females.
Under 20 years, ...	364	298
20 and under 40 years, ...	4,700	4,763
40 " 60 "	4,583	5,687
60 " 80 "	1,530	2,252
80 and upwards, ...	72	96
	11,249	13,096

After the fortieth year, mental maladies are more

common amongst women than men, but the excess of females above sixty must be considered as partly due to the superior longevity of that sex.

The former occupations of the insane were given according to the best information which the principal resident officers of the institutions could furnish. It deserves an attentive examination, as it proves that the professional and educated classes furnish a large number of patients: of clergymen and ministers of various religious denominations 95 were returned; of barristers and solicitors, 82; physicians and surgeons, 66; officers of the army and navy, 113 (the military and naval asylums are excluded); schoolmasters and others engaged in tuition—men, 77,

women, 250. Amongst the largest items were—agricultural and other labourers, 2587 (both sexes); female and domestic servants, 2707; shoemakers, 560; milliners, dressmakers, seamstresses, &c., 884; tailors, 296.

The number and distribution of the insane in *Scotland* on 1st January, 1865, exclusive of unreported lunatics placed in private dwellings and maintained from private resources, were as follows:—

Mode of Distribution.	Number.	Private.	Pauper.
In Public and District Asylums, . . .	3125	826	2299
“ Private “ . . .	788	229	559
“ Parochial “ . . .	497	...	497
“ Lunatic Wards of Poorhouses, . . .	428	...	428
“ Private Dwellings, . . .	1630	21	1609
Total, . . .	6468	1076	5392

The following table shows the number of private and pauper lunatics, on the 1st January of each year, since the institution of the General Board of Commissioners in Lunacy for Scotland:—

On 1st January.	Number of Pauper Lunatics.		Number of Private Insane.	
	In Asylums and Lunatic Wards of Poorhouses.	In Private Dwellings.	In Asylums.	As Single Patients under the Sheriff's order.
1858, .	2953	1784	1012	20
1859, .	3103	1877	1011	24
1860, .	3379	1847	971	21
1861, .	3470	1787	992	22
1862, .	3548	1741	1031	21
1863, .	3604	1679	1023	21
1864, .	3683	1637	1018	21
1865, .	3783	1609	1055	21

This table shows, on the whole, great steadiness in the extent and occurrence of lunacy; but it appears from the last report of the Board, that the tendency in most counties, even as regards pauper lunacy, has latterly been rather towards a diminution than an increase. Indeed, in only one county—that of Lanark—has an increase of any magnitude taken place; and the increase there, which in 1863 comprised thirty-nine patients, was more than equal to the total increase for the whole country in that year.

The expenditure for pauper lunatics has increased from 80,652*l.* in 1858 to 102,682*l.* in 1864.

In *Ireland* two inspectors, with the requisite assistants, superintend the various lunatic asylums. There are altogether about twenty district establishments in operation, several of them being for the reception of patients from two or more counties, which have associated themselves for that purpose, and a central one, supported entirely by the Government, and under the immediate control of the inspectors, at Dundrum, county of Dublin. On the 1st January, 1865, there were in public asylums in Ireland, 4672; in poor-

houses, between actual lunatics, epileptics, and imbeciles, 2455; in gaols, ‘criminal’ and ‘dangerous,’ 389; in private licensed houses, 556; and at Dundrum, or the criminal asylum, 127, besides 73 formerly in the Houses of Industry, but now maintained by Government, making an aggregate of 8272. At the corresponding date in January, 1866, the relative proportions were as follows:—In public asylums, 4835; in private asylums, 583; in gaols, 505; in poorhouses, 2733; in Lucan, supported by Government, 64; in central asylum for criminal lunatics, 125, constituting a total of 8845 registered lunatics. This shows a considerable increase (573) in one year. Of the whole, 4403 were males, and 4442 females.

In addition to the above numbers the inspectors believe that there are a great number of persons in some way mentally affected in different parts of the country, who are, comparatively speaking, unprovided for.

In *France* a report was addressed, in 1866, to the Emperor Napoleon by the minister of commerce and public works on the lunatics confined in public and private asylums. It states that at the close of 1860 there were 57 public and 42 private asylums in the 86 departments of France. These were divided among 60 departments, leaving 26 unprovided with any refuge for insane persons. It appears, further, that the number of lunatics in asylums has gradually increased since 1835, when the first official returns were completed, to the 1st of January, 1861, at which period the report concludes. The number confined in asylums was:—

On the 1st of January, 1835, . . .	10,539
“ “ 1842, . . .	15,280
“ “ 1849, . . .	20,231
“ “ 1856, . . .	25,485
“ “ 1861, . . .	30,239

The increase in the number of lunatics within this period of twenty-six years was, on the average, 750 annually.

It appears that the women in the asylums increase in a greater proportion than the men.

Four-fifths of the inmates of the asylums are regarded as incurable. This result is attributable to the lunatics’ relatives, who keep them at home until all cure becomes impossible.

A census was taken throughout France on the 1st of January, 1851, the 1st of January, 1856, and the 1st of January, 1861, of all lunatics, distinguishing those treated at home from those in the asylums. It appeared that in 1851 there were 24,333 lunatics treated at home, and 20,537 in asylums; in 1856, 34,004 at home, and 26,286 in asylums; and in 1861, 53,160 at home, and 31,054 in asylums. These returns show that the lunatics increased within ten years from 44,970 to 84,204. By comparing the number of lunatics according to their sex with the entire population, it will be found that there is one male lunatic for 915 men, and one female lunatic for 839 women. The minister directs the attention of the emperor to the greater mortality among men than among women in lunatic asylums. The average is 130 deaths among men to 100 among women. The following is the number admitted into lunatic asylums between the years 1854 and 1860 inclusive, and the number discharged or deceased:—

	Admitted.	Discharged or Deceased.
1854, . . .	9,234	8,862
1855, . . .	9,302	8,714
1856, . . .	9,246	8,426
1857, . . .	10,024	9,301
1858, . . .	10,314	9,464
1859, . . .	10,686	9,203
1860, . . .	10,785	9,307

During this series of seven years, 68,992 patients were received into lunatic asylums, and 63,277 were discharged or died. Four-fifths of the patients admitted into lunatic asylums are supported by public charity at an expense of a little more than 1s. a head per diem.

In the *United States* the number of insane returned at the last census (1860) was 23,999, and the aggregate number of patients in the different hospitals 11,133, or less than one half; so that the wants of that country in this respect are far from being supplied.

Prevention.—Science has hitherto discovered no medicine which acts as a specific cure for insanity, and none which is a prophylactic or preventive of the disease. The chief power of prevention in the case of each person, lies with that person himself. The man of sound judgment and prudent self-control will be 'moderate in all things,' avoiding those habits, practices, or excesses which exhaust or depress the vital force, allowing himself sufficient sleep to enable the brain and body fully to re-invigorate themselves from the fatigue of ordinary and wholesome labour, and living as near to nature as our multifold artificialities will permit.

The public authorities may do much towards decreasing the proportionate prevalence of the disease. The intemperate use of spirituous drinks is the most fertile exciting cause of insanity. Hence, whatsoever diminishes intemperance reduces, indirectly, the number of the insane. Legislatures may enact wholesome laws aiming at such a diminution; and among those laws let provision be made for the establishment of hospitals or asylums for the treatment of inebriates—a class of institutions which are now one of the greatest of public needs. They would be a blessing not only to the people in general, but also to the hospitals for the insane, to which persons labouring under delirium tremens are now taken, but where they are out of place, almost invariably a detriment to the other patients, and notorious infringers of rules and regulations.

Although the temptation is great to an indefinite prolongation of this article, we shall close with a few words upon some of the popular errors in respect to the insane.

It appears to be generally thought that a belief in the exaltation of self to sovereign power is almost a necessary concomitant of mental alienation. This is far from being the fact, although every hospital for the insane has its kings or its queens, its dukes or its duchesses. The proportion who enjoy this, to them, pleasant delusion, is probably not more than three, certainly not over five, per cent. of the whole number of the insane.

Again, it is almost universally believed that insanity develops or increases deceit, artfulness, craftiness, trickery—that the insane are shrewd, sly, or to

express the whole in one word, the word generally used, 'cunning.' In very rare and exceptional cases this is true, but as relating to the great mass of the insane it is truth's opposite. Remove the patients from any one of our hospitals, and substitute in their places and under the same circumstances, except the one condition of mental disorder, an equal number of persons not insane, and the amount of 'cunning' would suddenly be greatly, and, to the officers and care-takers of the hospital, very annoyingly augmented. With all the modern improvements in the hospitals, the introduction of comforts and the abolition of the means and even the appearances of restraint, still those establishments are, and must ever be, in respect to most of their inmates, places of involuntary detention—of forcible detention, indeed, although the force is exerted with as little demonstration as possible. Now, were the insane one-half as 'cunning' as the sane, there is hardly a hospital in the country that, with its present arrangements and means of confinement, and under its ordinary exercise of oversight and restraint, would not be evacuated by its patients within four-and-twenty hours. In short, we must acknowledge, although it be with sorrow for the latter, that the insane are more truthful, less artful, and less 'cunning' than the sane.

Superadded, however, to the lack of 'cunning,' there is another peculiarity of the insane which renders their detention easy. They form no very intimate alliances. They have not the element of cohesion. They do not confide one in another. Cabals cannot be created. Conspiracies can have no existence. Plots, if involving more than one person, cannot be matured. A disposition of general distrust, and the fact that, as a rule, each insane person perceives the insanity of his fellow patients, though, for the most part, oblivious of his own, sufficiently account for this peculiarity.

But of all the prevalent errors in regard to the insane, there is none other fraught with such deleterious consequences, as the impression that they are most easily governed by deception. It is truly marvellous to one accustomed to their treatment, to perceive how almost universal is the practice, the moment a person loses the healthy use of his mental faculties, for his friends or guardians to resort to falsehood in word and falsehood in action, to lying and all kinds of deception, in the attempt to manage him. How truthful soever men may be towards others, they appear to consider themselves justified in converting themselves into everything that is false toward the insane. This course of conduct usually defeats the very object for the attainment of which it is pursued; for, as a general thing, the insane are suspicious, watchful for deceit, and not obtuse in the power of detecting it; and if it be but once perceived by them, all confidence in the person who has practised it is lost. There will be no further listening to his counsel, no further submission to his wishes, unless he frankly acknowledges his error, promises amendment, and faithfully adheres to that promise. The dislike and even hatred of the nearest relatives and the dearest friends, which is a common and prominent characteristic of the insane, may doubtless, in a great measure, be justly attributed to this grossly faulty method of treatment.

The insane, as is manifest in many things, are much like children. The same policy which will insure a cheerful and wholesome obedience from a child, will meet with a like response from a person suffering under mental disease. As, in the case of parent and child, the mature mind must, as being right in the nature of things, assert and preserve its prerogative over the mind that is immature, so, in the case of a guardian and insane ward, or patient, the sound mind must, because reason is higher than unreason, assume and retain a directing superiority over the mind that is unsound. But this superiority cannot be retained without kindness, candour, truthfulness, and unflinching firmness. Let no false word escape the lips. Let no promise be made hastily; but, being made, let it be most scrupulously fulfilled. Threaten nothing which is not seriously intended. Let 'No' be an absolute negative, and 'Yes' a positive affirmative. Let no course of action be decided upon without mature deliberation; and then, whatever is to be done with or for the patient, let him be freely and candidly told of it, together with the reasons, if demanded, which induce such action. If this be properly done, most patients will quietly submit. With some, however, force will be required; but let it ever be remembered that any necessary amount of force is a thousand times better than deception. We apprehend that there is more than one physician to a hospital for the insane who has had more than one patient say to him, 'I will do as you wish, for you never have deceived me.'

LUNATION, the time between two new moons. [MOON.]

LUND. [SWEDEN.]

LUNDY ISLAND. [DEVONSHIRE.]

LUNE, LUNULE, the figure formed on a sphere or on a plane by two arcs of circles which inclose a space.

LUNE, River. [LANCASHIRE; WESTMORELAND.]

LÜNEBURG, a province of Hanover, situated between 52° 15' and 53° 30' N. lat., 9° 16' and 11° 40' E. long., is bounded N. by the Elbe, which separates it from Holstein, Hamburg, and Lauenburg; N.E. by Mecklenburg-Schwerin and Prussia; E. by Saxony; S.E. and S. by Brunswick and Hildesheim; and W. by Calenberg. The area is 4488 square miles, and the population in 1861 was 367,669. The country is an immense sandy plain, broken by chains of low hills. The surface is chiefly covered with heath, extensive turf moors, and forest woods, mostly fir. Fertile arable land is rare; but on the banks of most of the rivers, especially the Elbe and the Aller, there is very rich marsh land. The principal river is the Elbe, which runs along the frontier, and receives several small feeders in this province. The Aller, in the south of the province, belongs to the valley of the Weser. The country has a very gradual fall towards the Elbe and the Weser, especially towards the former, against the inundation of which the land is secured by dikes. The highest land between the two rivers is the Lüneburg Heath. This tract has some villages and seats of rich land-owners on the small streams that run through it. A breed of small coarse-woolled sheep is kept on this heath. The villagers derive their chief subsistence from tending bees (there are upwards of 200,000 hives

in the district, yielding honey to the value of 40,000*l.* per annum) and gathering bilberries, juniper-berries, and cranberries, of which vast quantities are sent to Hamburg and Bremen. The quantity of corn raised is not sufficient for the population. Flax is extensively cultivated. The land produces also hops, potatoes, garden vegetables, and turnips in abundance, but only a little fruit. The breeding of cattle is more profitable than tillage; the sheep are very numerous, but their wool is in general indifferent. The breed of horses has been lately improved. The manufactures are confined to articles of common household use.

Lüneburg, the capital, is situated in 53° 15' N. lat., 10° 17' E. long., on the Ilmenau, which is here navigable about 15 miles above its junction with the Elbe, and on the Hanover and Harburg Railway. The population in 1861 was 14,411. The town was formerly surrounded with walls, but the fortifications are now dismantled. The principal buildings and public institutions are the royal palace, the gymnasium, St. Michael's church, in the vaults of which are the monuments of the ancient princes, the convent of St. Michael, the town-hall, the arsenal, military academy for nobles, cavalry barracks, hospital, &c. The inhabitants carry on a considerable trade in the products of the country, such as linen, salt, wax, honey, woollens, linen thread, flax, horses, of which 70,000 are annually brought hither to market, &c. There are very productive salt works in a part of the city which is separated from the rest by a wall, and is called the Sülze. Great quantities of lime are burned in the Kalkberg, a hill near the town, and sent to Hamburg and Holland. There are manufactures of soap, breweries, distilleries, a paper-mill, &c., and a very active transit trade is carried on with Hamburg and the interior of Germany. Of the other towns in the province the most important is *Celle* or *Zell*, a tolerably well built town, on the left bank of the Aller, which here becomes navigable, and on the Hanover and Brunswick Railway, 23 miles N.E. of Hanover. It has Lutheran, Calvinist, and Roman Catholic churches, a medical college, and royal agricultural society. Population, in 1861, 14,139. Manufactures of chicory, linen fabrics, hosiery, soap, tobacco, and brandy, are carried on; and there is a good transit trade by the Aller. In the suburbs, which are very extensive, there is a palace with a large garden, in which Matilda, sister of George III., is buried. *Harburg*, on the Elbe, opposite Hamburg, has linen and woollen factories, gunpowder mills, tanneries, wax-bleaching, and stocking-weaving establishments, sugar refineries, and a great trade in timber. Population, 12,243. It is on the Hanover and Brunswick Railway, 4½ miles from Hamburg. Of late years the shipping trade has greatly increased, between 1000 and 1500 vessels now entering and leaving the port annually. There is a custom-house and a citadel, with draw-bridges. *Uelsen in the Heath*, on the Ilmenau, has 3000 inhabitants, who grow flax, and manufacture woollen cloth, camlets, and starch.

LUNEL. [HÉRAULT.]

LUNETTE, in Fortification, is a work similar to a ravelin, or demi-lune, but generally of smaller dimensions. Each lunette is protected in front by a ditch, beyond which is a covered way, as usual.

To give the more advanced lunettes, which are generally those placed beyond the ravelins, all the advantages of which they are susceptible, the magistral lines of their faces should coincide with the sides of an equilateral triangle whose base is a line joining the faces of the two collateral bastions at points about twenty or thirty yards from their flanked angles; for thus the ditches before the faces of the work can be defended by two or more pieces of artillery conveniently placed on the faces of the bastions. The ditches of the retired lunettes should in like manner be defended by artillery placed on the faces of the collateral ravelins. This rule for placing the advanced lunette will permit the ditch and covered-way of the latter to be defended by a fire of musketry from the retired places of arms and from the covered-way before the bastion; and that such fire may graze the bottom of the ditch of the lunette, this ditch ought to be an inclined plane.

Advanced lunettes about a fortress form strong posts for artillery, by which an enemy is compelled to commence his approaches at a greater distance than would otherwise be necessary. The length of their faces may be from sixty to seventy yards, and that of their flanks from fifteen to twenty. The rampart should have the same height above the natural ground as is given to that of the ravelins. But lunettes are only proper for fortresses of the first magnitude, since they would require a large garrison; and the troops, on being compelled to retire, might not find sufficient room in a small place.

LUNÉVILLE, a town in the French department of Meurthe, in 48° 35' 35" N. lat., 6° 29' E. long., and 180 miles E. from Paris, is situated at the confluence of the Vezouse and Meurthe. It has a tribunal of first instance, a college, and 15,528 inhabitants. Léopold, duke of Lorraine, resided here, and built a palace, which was subsequently much improved by Stanislaus, ex-king of Poland. Both these princes made great improvements in the town, which presents wide, straight, and well built streets, and some handsome squares. Behind the palace is the parade ground or Champ de Mars, which covers a space of 500 acres. The other remarkable objects in Lunéville are the parish church; the immense cavalry barracks, with stabling for 6000 horses; the riding school, which is considered the finest in France, being large enough for 200 horse soldiers to exercise in; the hospitals; Jews' synagogue; a theatre, and the Place Neuve, which is ornamented with handsome buildings. Great bodies of cavalry are frequently collected at Lunéville in the autumn for the purpose of manœuvring on a large scale. The town has manufactures of woollen cloth, yarn, hosiery, lace, gloves, earthenware, sheet iron, and beer; it has also a good trade in wine, corn, brandy, hemp, flax, wood, &c. By the treaty of peace signed at Lunéville, February 9, 1801, the Rhine was made the limit between France and Germany.

LUNGS. [RESPIRATION.]

LUNGS, DISEASES OF THE. The highly organized structure of the lungs, and the incessant exercise of their important function, frequently under noxious circumstances, render these organs perhaps the most liable to disease of any in the body. Exposure to damp and cold, sudden atmospherical changes

and transitions of temperature, want of proper nourishment, inattention to personal cleanliness, and some of the mechanical employments in which the confined and heated atmosphere of workshops is impregnated with minute particles of foreign substances, such as steel, wool, &c., may be considered as among the chief exciting causes of this extensively prevailing class of diseases. The diseases of the lungs may be conveniently divided into acute and chronic.

In inflammation of the lungs (*pneumonia peripneumonia*) the air-cells and parenchymatous structure of the organ are the seat of the disease. It is generally ushered in by rigors, and attended subsequently by great fever. There is much difficulty of breathing, and the respirations, which in the natural state are about twenty in a minute, increase in frequency to about forty or sixty. Sometimes there is little cough throughout the disease, but most commonly it increases as the disease advances, and the sputa become more deeply tinged with blood. The features subsequently assume a livid appearance; the breathing gets more oppressed; expectoration is effected with difficulty; the powers of life fail, and the patient dies from the lungs being no longer able to carry on their function.

In the early stage of pneumonia the inflamed part acquires an unnatural density and heaviness from the unusual accumulation of blood in it, but it still crepitates on being grasped. In a more advanced state, the lung is found still more dense, and does not crepitate when squeezed, showing that air is no longer admitted. As in this condition it somewhat resembles liver, it has been termed the stage of hepatization. When the disease has proceeded still further, suppuration may be found to have taken place. The sounds given by the stethoscope are crepitation in the first stage, and an absence of sound in the second. Percussion is dull in both stages.

The treatment of inflammation of the lungs must be conducted on the same general principles as inflammation occurring in any other part. The important nature of the organ renders it necessary to resort promptly to bleeding, sometimes to a very large amount, and on repeated occasions. Antimonials and mercury are highly useful in this affection.

Inflammation is sometimes confined to the bronchial tubes, and is called bronchitis; it may also co-exist with pneumonia. [BRONCHITIS.]

Mortification or gangrene of the lungs, though sometimes occurring as a result of pneumonia, most frequently takes place as an independent affection. Great fetor of the breath, with an expectoration of dark brown, greenish, and fetid sputa, excessive debility, and a cadaverous expression of countenance, are the symptoms by which it is indicated. After death portions of lung are found in a partially decomposed state, of a dark brown or dingy greenish appearance, with a putrid smell.

Hæmoptysis, or Spitting of Blood. Expectoration of blood may occur either by exhalation from the mucous membrane of the air-tubes or from the lesion of a bloodvessel. It generally occurs in early life, from the age of fifteen to thirty-five, and in the former instance may be dependent upon local congestion. This determination of blood to the lungs

may be occasioned by the sudden suppression of some natural or accidental discharge from other parts, as in suppressed or impaired menstruation, or the arrest of a hæmorrhoidal discharge, or by pressure of tuberculous matter. From the latter cause it is frequently a sign of approaching consumption. The expectoration of blood is attended with cough. Sometimes the quantity brought up is very considerable, and is expelled with violence; at other times the sputa are only streaked with it. The expectorated blood is generally of a vermilion colour, and when in small quantities, it is frothy and mixed with air. When the blood comes from the stomach, it is brought up by vomiting and without cough, without the frothy appearance, and is of a dark grumous character.

Pulmonary apoplexy occurs when blood is effused into the parenchymatous structure of the lungs.

Malignant Diseases.—The lungs are also subject to diseases of a specifically malignant nature, such as medullary sarcoma and melanosis; but these rarely occur as a primary affection. The medullary and melanoid matter is deposited in these organs as a secondary affection, in conjunction with its existence in other parts, and frequently in all or the majority of the organs of the body.

The most fatal of all the diseases of the lungs is treated of under **PHTHISIS PULMONATIS**. Inflammation of the Pleura is treated of under **PLEURISY**.

LUPERCI, the priests of the god Pan, and the most ancient order of the Roman priesthood. They were instituted in honour of Romulus and Remus, and so called from *lupus*, a wolf, because that animal was recorded to have suckled them. The place where the priests of Pan assembled was called *Lupercæ*, and his festivals took the name of *Lupercalia*. They continued till the year 496, when, on account of their licentiousness, they were abolished by Pope Gelasius.

LUPINE (*Lupinus*), a very extensive genus of hardy annual, perennial, and half-shrubby plants, commonly cultivated in gardens for the sake of their gaily coloured flowers. The species inhabit Europe, the basin of the Mediterranean, and the temperate parts of both North and South America, especially of the former, where they are extremely abundant; but they are unknown in a wild state throughout all the tropics, except on mountains, and in the principal part of Asia, New Holland, and South Africa.

LUPINITE, a peculiar bitter substance, extracted from the leaves of the *Lupinus albus*; it has a green colour, is translucent, and may be melted.

LUPULINE, a substance extracted from hops, and containing from 8 to 12 per cent. of the vegetable matter to which hops owe their power, and to which the name of *lupulite* has been given.

LUPULITE is nearly colourless, but sometimes of an orange colour: in the former case it is opaque, but in the latter transparent; it has no smell till it is heated, and then it has the odour of hops; its taste is bitter.

LUPUS (the Wolf), one of the old constellations, named in Aratus and Ptolemy simply *Θήριον*, 'the wild beast.' It was not a separate constellation, but was carried in the right hand of the Centaur towards the Altar. The same description is given by Hyginus. In modern maps it is represented as a wolf transfixed

by the spear of the Centaur. It is situated between Centaurus and Ara, directly under Scorpius.

LURCHER, the name of a dog which is a cross between the greyhound and the shepherd dog. It is marked by short ears, thick, wiry, and sandy-coloured hair. The lurcher is quick at scent, a fleet runner, and, when used by poachers, very destructive to game.

LURE. [*SAÔNE, HAUTE.*]

LURGAN. [*ARMAGH.*]

LUS. [*BELOOCHISTAN.*]

LUSATIA. [*LAUSITZ.*]

LUSIGNAN. [*CYPRUS; VIENNE.*]

LUSTRATION (*Lat. lustrum*, 'to purify'), among the ancients a mode of purification by sacrifices and other religious ceremonies. Thus the Romans were accustomed to purify their cities, armies, fields, or people, after any impurity or crime. There was scarce any action performed, at the beginning and end of which some lustral ceremony was not required, to purify themselves, and appease the gods.

LUSTRUM (Greek, *λῦσις*, 'I wash'), was the name applied to a period of five solar years among the Romans; and the termination of this period was generally marked by great religious solemnities. Varro derives the word from *luere*, because the farmers paid their taxes at that time; but others, with more probability, trace the etymology to the purifying sacrifice which was then offered.

It is well known that the most ancient Roman year consisted only of 10 months, or 304 days, and that this year continued to be used for religious purposes. Niebuhr, in his 'History of Rome,' has shown that the *lustrum* was the period after which the beginnings of the civil and religious years were made to coincide; since 5 solar or civil years of 365 days each, containing 1825 days, coincide with 6 religious years of 304 days each, containing 1824 days, with the difference of one day.

LUSUS NATURE. A term applied to a monster or to any thing unnatural in the physical world.

LUTE (*Ital. liuto*, from the Arabic, *el ud*), a musical stringed instrument with frets, one of the numerous varieties of the ancient *Cithara*. Till towards the end of the seventeenth century its practice formed an essential part of a good education, but it has since been partially superseded by the guitar. Mersenne, in his 'Harmonie Universelle' (1636), describes the lute as consisting of three parts: the table, made of fir; the body or belly, of the same wood or cedar, constructed of nine convex ribs joined; and the neck, on which was fixed the finger-board, of hard wood, having nine frets made of catgut. To these is to be added the head or cross, in which the pegs or screws were placed. The lute had at first six strings, or rather eleven, for the five largest were doubled; but the number was gradually increased till it reached twenty-four.

LUTES (*Lat. lutum*, 'clay'), in Chemistry, are substances employed in various operations for closing the joints of apparatus, and especially for connecting retorts and receivers so as to prevent the escape either of the vapour or gases generated during distillation or sublimation. The term lute is also applied to the external coating of clay and sand, or other substances applied to glass retorts, in order that they may support a high temperature without fusing or cracking. Common plastic clay answers sufficiently well in some

cases, but in some small distillations, as of nitric acid, the Fat Lute is used, which is prepared by mixing dried and powdered pipe-clay into a paste with linseed oil; and the joint is further secured, both where this lute is used and in many other cases, by tying it over with moistened bladder. In luting common stills, in which oils or water are merely distilled, linseed meal and water, made into a paste, form an effectual lute.

In luting, or rather coating, glass retorts, in order to enable them to sustain high temperatures, Stourbridge clay or Windsor loam mixed with tow have been used; but they require long drying, and are apt to crack. The simplest mode is that of brushing the retort over with a paste of pipe-clay and water, sifting sand upon it, drying it quickly in the ash-pit of the sand-heat, then covering it again with clay and sand, and repeating the alternate applications and drying till the coating is judged sufficiently thick.

Lutes composed of borax and slaked lime, borax and clay, and of lime, and the white of an egg, are also sometimes used, but caoutchouc is now, perhaps, more generally employed than anything else on account of its flexibility, and consequent non-liability to accident.

LUTHER, MARTIN, or LUDHER, LUTTER, or LÖTHER—for he signed his name in these various ways—was born at Eisleben, in Lower Saxony, on the 10th of November, 1483. When six years old he was sent to the free school at Eisenach, and to gain his daily bread was wont to solicit alms by singing before the houses of the rich and charitable, a custom both then and at a later time with the poor students of Germany. 'Let no one,' says the great Reformer in one of his works, 'speak contemptuously in my presence of the poor fellows who go from door to door, singing and begging bread *propter Deum*! You know the psalm says, *Princes and kings have sung*. I myself was once a poor mendicant, seeking my bread at people's houses, particularly at Eisenach, my own dear Eisenach!'

His father's circumstances improving—the elder Luther was a miner, and in possession now of two furnaces of his own—it was determined that the youthful Martin, already giving evidence of an active and powerful mind, should study the law, and he was entered in 1501 at the University of Erfurt, in Thuringia. For legal pursuits, however, he showed no appetite; his intellect swept away at once the cobwebs and trickeries of the law, and he devoted himself to the study of the *belles lettres* and music. Music throughout life was his favourite art; he taught it to his children, he ranked it next to theology, and was accustomed to say of it: 'Music is the art of the prophets; it is the only other art which, like theology, can calm the agitations of the soul, and put the devil to flight.'

Dividing his attention between the classics and the writings of the schoolmen, young Martin Luther strode forward in his career. At the age of twenty he was honoured with the title of Master of Arts, and then, by the advice of his kinsmen, he began to apply himself to jurisprudence. In the Augustine monastery at Erfurt, which he joined in July, 1505, he excited general admiration in the public exercises by the facility with which he extricated himself from the labyrinths of dialectics. He read assiduously

the prophets and the apostles, then the books of St. Augustine: his 'Explanations of the Psalms,' and his book on the 'Spirit and the Letter.' He studied with earnestness the writings of Occam, whose logic he preferred to that of Duns Scotus and Thomas Aquinas.

An accident, as the world would call it, determined his future career. He saw one of his friends killed by lightning at his side. He resolved thereupon to dedicate himself to God's service, and entered upon a life of the most rigid self-denial. 'If,' he says, 'Augustine went straight to heaven from the walls of a monastery, I ought to do so, as all my brethren would testify. I fasted, I watched, I practised all the austerities of a cenobite, until I absolutely fell very ill.' But as yet, like John Bunyan, he was wandering in the wrong path, and soon he was beset with doubts and fears which wrung his very soul. He lingered long in the valley of the shadow. Often might he be seen at the altar foot, with clasped hands and streaming eyes, declaring himself 'the chief of sinners.' He kept weary vigil throughout the night, wrestling with temptations which sprung from his diseased imagination. 'Jerome and other fathers,' he afterwards wrote, 'never endured such trials. Augustine and Ambrose, too, had their sorrows, and trembled before the sword; but what is this compared with the angel of Satan, "who strikes with the fists?" If I live I will write a book on Temptations, for without a knowledge of the subject no man can thoroughly comprehend the Holy Scriptures, or feel the due love and fear of the Lord.'

A weak mind gives way before these inward struggles; a strong mind, after much buffeting to and fro, rises out of them a conqueror; and Luther was reserved to accomplish a glorious mission—to open up to the intellect of Europe, like Columbus, a New World.

In his twenty-third year the business of his monastery called him into Italy. The journey opened up a new era, not only in Luther's life, but in the history of religion; for the shams and falsehoods and open vices of the Italian capital disgusted his clear moral sense and offended his vigorous intellect. He penetrated into all the mysteries of the papal court, and beneath its flowers and gilding recognized the abomination of iniquity that corrupted the church and society. So, with thoughts arising in his heart that were to prove the germs of a great revolution, he quitted the city of the popes, and shook the dust off his feet.

On his return to his convent solitude he devoted himself to the study of the Scriptures, reading them with the assistance of Erasmus, whose interpretation, however, did not always satisfy him. His renown as a scholar now obtained him the chair of professor of philosophy in the university which Frederick the Elector of Saxony had founded at Wittemberg (1508). Here he addressed himself to a full and lucid exposition of the divine word, and enunciated opinions which, though as old as the days of the apostles, fell upon his startled hearers with all the effect of novel truths. So long, however, as his doctrines were promulgated from the professorial chair, they exercised but little influence, because they were confined to a limited audience; but through the influence of Staupitz he passed from the chair to the pulpit, and

flung out his genius upon the multitude. Crowds flocked to hear this bold and original teacher, who spake as man had never spoken since the age of the primitive Fathers, and who put new life into the dry bones of an antiquated theology. He had not yet, however, stepped forward as the reformer. His foot was on the threshold, but custom and traditional influences still held him back. His mind required an external impulse to assist it in throwing off its fetters, and this impulse was afforded unwittingly by a Dominican monk named Tetzel. The resources of the Roman see proving inadequate to the accomplishment of the many ambitious projects which filled the teeming brain of Pope Leo X., he resolved to increase them by the sale of indulgences, and to draw fresh funds from the credulity and superstition of mankind. He commissioned Tetzel to hawk these indulgences, or licenses to sin, about Germany. The monk was fully equal to the task. There was no crime, however atrocious, which he would not remit for money. He was not content with pardoning known sins, but laboured to invent the foulest and most prurient enormities, and when he saw his hearers terrified by each loathsome idea, he would coolly add: 'Eh, well, all these are absolved as soon as your gold chinks in the pope's treasury!'

Luther was struck with amazement and horror at such open blasphemy. 'When I beheld,' he says, 'this unholy and detestable traffic taking place in open day, and thereby sanctioning the most villainous crimes, I could not, though I was then but a young doctor of divinity, refrain from protesting against it in the strongest manner.' He thundered resolutely against the monk and his mission; Tetzel retorted; Luther, growing bolder in the cause of truth, stepped into the arena, armed at all points. On the 31st of October, 1517, the eve of All Saints, he nailed to the church door ninety-five theses against the doctrine of indulgences, and announced his readiness to defend them. A copy found its way into the hands of Tetzel, and excited his alarm and indignation. He published a hundred and six counter-propositions, in which he asserted the pope's infallibility, and branded Luther and all who abetted him as heretics and heresiarchs. The discussion spread. The introduction of printing and the consequent diffusion of books had already awakened a spirit of inquiry, and the people threw themselves with eagerness on the religious pasture from which they had been so long excluded. Luther's theses were printed in thousands, devoured, and circulated in every direction, so that even their author was alarmed at his success. He was not yet prepared to throw off the authority of the pope, and at this juncture seemed disposed to abandon the whole matter. But his pacific resolve was shaken by Tetzel, who had burned the heretical theses in public, and, as it were, dared Luther to the conflict. The inhabitants of Wittenberg retaliated by consigning Tetzel's productions to the flames in the Great Square, and thus began the great religious revolution known as the Reformation. Numerous sleuth hounds joined in the chase which Tetzel had started; John Eck, Prierio, and Hoogenstraeten opened upon him in full cry. At first the commotion was viewed with indifference at Rome. 'Monkish jealousy,' cried Leo X.; 'this friar Martin is a man of fine genius!' And when Luther appealed

to him against the lawfulness of indulgences, he privately requested his friend Staupitz to persuade the reformer to rest in peace. But when at length the pope's master of the ceremonies wrote a defence of Tetzel, and Luther published a reply, in which he completely annihilated its pseudo-logic, the alarm and ire of the papal court were fully aroused. He was summoned to appear at Rome within sixty days, and Prierio, one of his most furious antagonists, was placed at the head of the tribunal appointed to try him. But the elector of Saxony, who was favourable to Luther, knew well that if he ventured to Rome he ventured into a lion's den from which there was no hope of return, and demanded of the pope that the German monk should be tried in his own country. His influence procured the concession that he should be examined by a legate in the free town of Augsburg, where the elector himself was then residing. With the courage born of faith Luther proceeded thither, journeying afoot, without a krentzer in his pocket, and in a worn-out gown. At the gates of Augsburg he was received by a crowd of priests and laymen, rich and poor, who welcomed him in God's name. Before the legate, Cardinal Cajetan, he preserved his wonted composure, and defended his convictions with earnest eloquence. The cardinal called upon him to retract, or threatened him with the vengeance of the church. A four days' dispute ensued, in which the reformer's arguments proved irresistible, and Cajetan broke up the examination in great disorder. The monk returned in safety to his cell and his pulpit. 'I leave the place,' he wrote to the cardinal, 'in the name of the Lord, and I appeal from Leo misinformed to Leo better informed.' Between Luther and the papal court reconciliation was henceforth impossible, and it was well for him that he had secured the protection of a patron so powerful and so sincere as Frederick of Saxony.

Day by day the breach widened. Luther still retained that feeling of deference towards the church which springs from tradition and prescriptive authority, and to sunder the thrall that bound him an external impulse was again necessary. It was at this time that John Eck put forth a public challenge to Luther to dispute with him at Leipzig. Thither proceeded the reformer, accompanied by Carlstadt, Melancthon, and a large body of students. A fierce debate ensued, in which logic was on Luther's side, and authority on that of Eck. But unhappily for the pope the course of the discussion led the Wittenberg professor to examine the papal claims to the primacy, and he soon found reason to assume a bolder tone and adopt a more vigorous course. Through the printing press he appealed to the people, and his voice stirred the heart of Germany like a trumpet. In October, 1520, he issued his indictment against the papacy in a work of great power and furious invective, entitled 'The Babylonian Captivity of the Church.' He set forth that the church was held in bonds, and that the Saviour, constantly profaned in the idolatry of the mass, and scornfully disregarded in the dogma of transubstantiation, was virtually the pope's prisoner. A bull of excommunication arriving from Rome stimulated him to further onslaughts. He immediately issued a pamphlet 'Against the Execrable Bull of Anti-Christ,' and on the 10th of December publicly burnt the papal anathema at

the gates of Wittenberg, with the canon law, the decretals, and the extravagances of the popes, exclaiming—'As thou hast afflicted the holy of the Lord, so mayest thou be consumed in everlasting fire.' In an address he added—'Hitherto I have merely jested with the pope; the serious struggle now begins.' And from that date Luther held no more communion with the Church of Rome.

The circumstances of the time, as we have said elsewhere, proved eminently favourable to the success of Luther's mission. The discovery of printing had aroused the intellectual faculties of men, while it provided the means of supplying them with the nutriment they so long had lacked. The printers, necessarily men of bold and quick intelligence, became Luther's most powerful and enthusiastic supporters. They frequently printed his books at their own cost, and always with a loving care. Vast numbers of copies were struck off, and rapidly distributed throughout Germany by those heretical monks who had thrown aside their cowls and returned to the world to promulgate the principles of a reformed creed. The fire was latent in the earth, and as the vivifying flame passed quickly from one point to another, it burst forth in all its brilliancy, lighting up the civilized world with the reflection of its radiance. The nobles and the peasantry, the castles and the free towns, feudalism and commerce, rivalled each other in enthusiasm for Luther. At Marienburg, at Strasburg, even at Mentz, there prevailed a constant struggle for his smallest pamphlets. The sheet, while yet wet from the press, passed from eager hand to hand. The literary guilds then flourishing in Germany, tinmen and shoemakers, braziers and tailors, greedily devoured the good tidings proclaimed by the reformer. Hans Sach, the shoemaker poet, celebrated in his most melodious strains the 'Nightingale of Wittenberg,' and the song, as it spread over all the German land, swelled into the trumpet-tones of a victorious pæan. The German nobles were foremost in this new communion of thought and sentiment. They supported the hero-reformer with money; they promised him active aid against all assailants. 'I see very clearly,' wrote Ulrich von Hutten, 'that we must come to swords, bows, armour, and cannon. Do thou, my father, fortify thy courage, and despise these wild beasts. I see each day the number of thy adherents augment; thou wilt be in no want of defenders.' The friends of Luther were even present in the Diet at Worms, and in one of the sittings a paper was produced which set forth that four hundred nobles had sworn to defend him, and he who read it cried aloud—'Buntschuh! Buntschuh!' the war cry of the insurgent peasantry.

Charles V., king of Spain, had been recently crowned as emperor of Germany at Aix-la-Chapelle, and his first Germanic Diet was summoned to assemble at Worms in 1521, with the avowed object of checking the progress of the new and dangerous opinions. The papal party, headed by Alexander, prevailed upon the young emperor to issue an edict for the destruction of Luther's writings. The States, however, refused to publish the decree unless the reformer were heard in his own defence, and a safe-conduct granted him under which he might repair to Worms. His friends would have had him dis-

regard the imperial mandate, but Luther was wiser and bolder, and seized the opportunity of proclaiming the truth before the great German council. His journey to Worms resembled a triumphal procession. When he came in sight of the city, on the 16th of April, he rose in his chariot and chanted the noble psalm—the 'Marseillaise of the Reformation'—*Ein feste Burg ist unser Gott* ('A safe stronghold our God is still'). Before the Imperial Diet he maintained the same sublime confidence in the help of heaven, and expounded his doctrines with all the eloquence of a vigorous and truth-fearing soul. Neither promises nor threats could induce him to retract. 'The word of God,' he said, 'is not my word, and I cannot abandon it. Here am I,' he exclaimed; 'I cannot do otherwise; so help me God. Amen!'

On the 26th of April he left Worms. An imperial edict was straightway issued against him, and all persons were prohibited from affording him any assistance or asylum, under penalty of high treason. As the only mode of saving his life, the friendly elector caused him to be arrested when on his way to Alterhausen, and provided for him a secure abode in his castle of Wartburg, where he was safe from the persecution of his sanguinary foes. He spent a year in this solitude, lamented by those of his friends who were not in the secret of his concealment, and occupied his time in a portion of his great work—the translation of the New Testament into German. The version was published in 1522. But his secluded and sedentary life filled him with morbidly nervous sensations. He imagined himself to be troubled with the frequent presence of the Evil One, in the form of a buzzing moth; and they still show the pilgrim to Wartburg the black mark on the wall which records the flight of an inkstand hurled at the intruder by the reformer's vigorous hand. He soon, however, shook off these wild delusions, and learning that Carlstadt and the more violent reformers were proceeding with such intemperance as to damage the cause of truth, he left the castle in March, 1522, and returned to Wittenberg. His influence and his energy speedily stilled the commotion that had arisen.

In the middle of the same year, Henry VIII. entered the lists of polemical controversy, and published a reply to Luther's 'Babylonish Captivity.' The reformer answered it with his wonted vehemence, and completely crushed the royal logician. In 1525 he still further asserted his independence of the Romish church by marrying a nun, Catherine von Bora, who had escaped from her convent about two years before. She was descended from a noble family, was twenty-two years old, and of a handsome person. Though tried by the miseries of extreme indigence, the union proved a happy one, and Luther found in his wife a helpmate and a consoler. Four children were born to him, and in his domestic relations the reformer showed himself endowed with a heart as true and tender as his intellect was bold and aggressive.

From this time forward the life of Martin Luther flowed on with the fullness and steadiness of a great river. His labours were incessant, for work was the necessary condition of his active spirit. The publication of his German version of the Scriptures was not only an epoch in the history of religion, but in the formation and development of the German tongue.

By the year 1533 seventeen editions of it were published at Wittenberg, thirteen at Augsburg, thirteen at Strasburg, with reprints at Erfurt and Leipzig. The bread was freely cast upon the waters, and was eagerly sought by exultant thousands. Many of the German States embraced the Lutheran creed, and its apostle found himself called upon to organize and superintend the new churches that sprang up around him. From 1517 to 1526 a book or tractate from his pen marked every year, and he wrote able and learned commentaries on nearly all the books of the Bible. In 1525 a council was held at Augsburg, which adjourned to Spire in 1526, and at it a general council was demanded. In 1529 a Diet was assembled at Spire, which determined on suppressing by force the further promulgation of the new doctrines. Against this intolerance several of the German princes, and the deputies of fourteen imperial towns, solemnly protested, and hence arose the glorious appellation of Protestants—Protestants against falsehood, bigotry, and the perversion of God's truth—which has ever since been borne by the members of the Reformed church.

At this period occurred the famous Sacramentarian controversy in reference to the supposed presence of the body and blood of Christ in the Eucharist. On this point Luther had not shaken himself free of Romish trammels. He still clung to the dogma of the Saviour's actual presence, and to all arguments replied, 'This is my body.' The discussion had no profitable result, but excited much ill feeling between Luther and the Swiss reformers, who stoutly opposed the doctrine of transubstantiation.

In 1530 was held the memorable Diet of Augsburg, at which the Confession of Faith prepared by Melancthon was formally accepted, and Protestantism, from the dream of a solitary monk, rose to the dignity and substance of a national creed. It was immediately followed by an assemblage of the Lutheran princes at Smalcald (December 31, 1530), where they entered into a mutual league of defence, and agreed, if necessary, to maintain their religious opinions by arms. The Smalcaldic League was the first movement of the Thirty Years' War, which, in the course of its desolating career, brought all Europe within its influence, until the Treaty of Westphalia secured the rights and liberties of the European States.

To the excesses of the Anabaptists it is unnecessary to allude, except in record of the sorrowful indignation with which they filled the soul of Luther. The reformer continued at his labours, earnest and resolute, till, in his sixty-second year, his health began to succumb. On the 23rd of January, 1546, he repaired to Eisleben to effect, if he could, a reconciliation between the Counts of Mansfeldt. In this labour of love he succeeded; a fitting conclusion to his great and glorious career. On the 17th of February he complained of severe ailments in the chest, and became so ill that a conviction of speedy death forced itself upon his mind. He passed an uneasy night, and on the following day gradually sank. 'Friends, I am dying,' he said to the anxious faces that thronged his chamber, 'I shall remain with you at Eisleben.' He repeated fervently the prayer, 'Into Thy hands I commit my soul; Thou hast redeemed me, O God of truth!' 'Reverend Father,' said his physician, 'do you die steadfast in the faith

that you have taught?' Not a doubt flung its shadow upon his soul in that supreme moment, and in a tone of indescribable earnestness, he answered, 'Yes.' He then fell asleep, and in a few minutes, breathing one deep sigh, surrendered his spirit to God. He is supposed to have died of angina pectoris, or, according to other authorities, of cancer in the stomach. His remains were conveyed in a leaden coffin to Wittenberg, and interred on the 22nd of February with the highest honours.

'Luther's face,' says Carlyle, 'is to me expressive of him; in Kranach's best portraits I find the true Luther. A rude plebeian face, with its huge crag-like brows and bones, the emblem of rugged energy; at first, almost a repulsive face. Yet in the eyes especially there is a wild, silent sorrow; an unnameable melancholy, the element of all fine and gentle affections; giving to the rest the true stamp of nobleness. Laughter was in this Luther; but tears also were there. Tears also were appointed him; tears and hard toil. The basis of his life was sadness, earnestness. In his latter days, after all triumphs and victories, he expresses himself heartily weary of living; he considers that God alone can and will regulate the course things are taking, and that perhaps the day of judgment is not far. As for him, he longs for one thing; that God would release him from his labour, and let him depart and be at rest. They understand little of the man who cite this in discredit of him! I will call this Luther a true, great man: great in intellect, in courage, affection, and integrity; one of the most lovable and precious men. Great, not as a hewn obelisk, but as an alpine mountain—so simple, honest, spontaneous, not setting up to be great at all; there for quite another purpose than being great! Oh, yes! unsubduable granite, piercing far and wide into the heavens; yet in the clefts of it fountains, green beautiful valleys, with flowers! A right spiritual hero and prophet; once more, a true son of nature and fact, for whom these centuries, and many that are to come yet, will be thankful to heaven!'

Luther's character had in it much of the heroic. He was not to be cowed by dangers, not to be daunted by obstacles; these to his ardent spirit were but incentives which stimulated him to greater efforts. He was fond of the clash and clang of battle. It was in moments of extreme peril that he felt all the depth and power of his great soul, and knew of what grand deeds he was capable. At the first sound of conflict his spirit rushed to arms, 'eager for the fray.' The blows he dealt were heavy, crushing, irresistible, for he was held back by no false sentiment; and when a sham was to be exposed, or a falsehood destroyed, his arm had a giant's might. Yet his was a heart of infinite tenderness, and in his family affections and his friendships he showed himself generous, forbearing, loyal. It is true the gold was not without alloy. There was a certain ruggedness about his nature which could not but offend the dilettante lovers of 'rosé-water revolutions;' but take him for all in all, and it may well be doubted whether the last nineteen centuries have seen a nobler man. Certainly never was man better fitted for the work he had to do, and which he did so successfully; work not unworthy of an apostle, and whose glorious results we at this day gratefully acknowledge.

(For authorities, consult Michelet, *Life of Luther*; Audin, *Histoire de Luther*; Blackwood's Magazine, December, 1835; Adams, *Scenes from European History*; D'Aubigné, *History of the Reformation in Germany*; Mosheim, *History of the Lutheran Churches*; Ranke, *History of the Reformation*; Coxe, *House of Austria*, &c.)

LUTHERANS, a name given to a sect of Protestants who profess to follow with the utmost strictness the doctrines expounded by the great German reformer. The German Protestants are all Lutherans. They have one or two places of worship in London.

LUTI, BENEDETTO, was born at Florence in 1666. He was the scholar of Gabbiani, and went about 1696 to Rome, where he died in 1724. Luti has been called by some the last of the Florentine masters. He painted in fresco, in oil, and in pastel. His masterpiece is the large picture of the Vision of San Ranieri, in the cathedral of Pisa.

LUTON. [BEDFORDSHIRE.]

LUTRA. [OTTER.]

LUTTERWORTH. [LEICESTERSHIRE.]

LÜTZELBURGHER, or LEUTZELBURGER, HANS, called also Hans Frank, a famous Swiss wood-engraver of Basle. He lived in the early part of the sixteenth century. There are many other celebrated old cuts, some from drawings by Holbein, attributed to Lützelburger.

LUTZEN, in Germany, a town in Prussian Saxony, in the government of Merseburg, nine miles S.E. of Merseburg, and on the Elster river canal. Population about 2500. It contains a church and a small castle, but no public buildings of importance, or any manufactures. Its interest is purely historical, and derived from the great battles of which the neighbouring plain has been the scene. A recent writer describes this plain as a rich and joyous looking expanse, studded with villages and tall ungainly church steeples; here and there, bedded in the soil, one of those problematical boulders of dark red granite which the glaciers transported hither, according to modern belief, from distant Scandinavia, and which now chiefly serve as landmarks; far in the south, the first blue outlines of the Erzgebirge faintly show themselves. This vast level has been the battlefield of Northern Germany from the earliest historic times. Here, or in the immediate neighbourhood, Henry the Fowler defeated the Huns in 934. Here were fought the two battles of Leipzig or Breitenfeld, in the Thirty Years' War. Here Gustavus Adolphus fought and died, on the 6th of November, 1632, for the great cause of civil and religious liberty. And here Napoleon was repulsed by the allied armies in 1813. Not an ear of corn is pure from the blood of men.

'Lutzen,' says Mr. Herman Merivale, 'is a thoroughly old-fashioned, forgotten looking town, with walls and fosse partially preserved, and the open country on all sides extending close up to them. It has now about 500 houses, and is traditionally reported to have been more considerable in olden times.' About three-quarters of a mile beyond the town, on the Leipzig road, stands a rough mass of porphyritic stone—the Schwedenstein, or Swede's stone. It commemorates the death of the great Protestant hero, Gustavus Adolphus, who fell close

to the spot where it stands. It bears the inscription 'G. A., 1632,' is surrounded with a little shrubbery and gravel walk, and surmounted by a Gothic arch of cast iron.

The battle in which the Swede king fell may be said to have secured the liberties of Protestant Germany, while it crushed the pretensions of Austria to the supremacy of Europe. The Swedish, or rather allied army, for it included English, Scotch, and Germans in its ranks, consisted of about 25,000 men; the Imperialists, under Wallenstein, duke of Friedland, numbered 20,000, while at Halle, sixteen miles to the north-west, lay Pappenheim with 16,000 men, the greater portion of whom he brought upon the field in the course of the struggle. The attack was delivered by the Swedes about eleven o'clock, and the fight continued with varying fortune until night closed over the conquerors and the conquered. Both sides fought desperately, but the superior discipline and religious enthusiasm of the Swedes prevailed, and the Austrian army was almost annihilated.

Gustavus was slain early in the battle. Wounded in the shoulder by an Austrian trooper, he fell from his horse with a groan, and his page, Lobeling, being unable to lift him again on his charger, he lay exposed to the enemy's cuirassiers. Some of these riding up fired a pistol through the hero's head, and terminated his bright and glorious career in the thirty-ninth year of his age. His memory is still so cherished in Germany, that his portrait adorns almost every cottage wall.

The second great battle of Lutzen was fought in 1813, between the French army, commanded by Napoleon in person, and the allies, under the Emperor Alexander, Blücher, Moreau, and Schwartzberg. Napoleon, after a desperate struggle, was compelled to retreat.

LUXEMBURG, formerly a grand duchy in the kingdom of the Netherlands, but now divided between Holland and Belgium, is bounded E. by Prussia, N. by Liège, W. by Namur, and S. by France. *Dutch Luxembourg*, the possession of which gives the king of Holland the title of Grand Duke, and a voice in the German Confederation, lies east of Belgian Luxembourg, and has an area of 979 square miles, with a population in 1863 of 202,313. *Belgian Luxembourg* is the largest and more western part of the former grand duchy; it has an area of 1690 square miles, with a population in 1861 of 203,597. The principal rivers of Luxembourg are the Moselle, the Sûre, and the Our, which form the boundary between Dutch Luxembourg and Prussia; the Elze or Alzette, a feeder of the Sûre; the Semois, which rises near Arlon, and flows west into the Maas; the Ourthe, which rises near Bastogne, and falls into the Maas near Liège; the Lesse, which rises near Neufchâteau, and falls into the Maas near Dinant.

Luxembourg is crossed from south-west to north-east by a range of high ground, part of the Ardennes, which separates the valley of the Maas from that of the Moselle. The soil of this elevated region is calcareous, and is principally occupied as pasture. The lower lands are very productive, and yield abundant harvests of wheat, rye, flax, hemp, mangelwurzel, &c. Such of the high lands as are tilled rarely yield anything but rye, oats, and potatoes. Large forests are found in many districts. Agric.—

ture is in rather a backward state. The vine is cultivated on the banks of the Moselle and the Sûre. The quality of the wine is inferior. In Dutch Luxemburg there is a great number of distilleries, and some iron works. Horses, horned cattle, swine, and sheep are numerous. The former are much prized for agricultural and military purposes. The latter are exported in large numbers. In the Belgian province there are iron works, slate quarries, potteries, tanneries, cloth, and paper mills. Iron and lead mines are worked; copper is also found.

The city of *Luxemburg*, the capital of Dutch Luxemburg, is a fortress of great strength, in 49° 37' N. lat., 6° 9' E. long., on the Elze, 76 miles S.S.E. from Liège, and has about 12,000 inhabitants. The city is surrounded by strong walls and deep ditches, and has a double line of outworks in the form of a heptagon. It stands partly on a rocky height, and partly in the plain below, communicating by flights of steps and zig-zag streets, impassable by carriages. Its works have been greatly strengthened of late years, and its Federal fortress is garrisoned by 6000 Prussian troops. It has an atheneum, public library, and a small museum; cannon foundry, and iron forges; and manufactures of linens, leather, and tobacco. It was taken by the French in 1795, and made the capital of the department des Forêts. *Echternach*, a walled town on the right bank of the Sûre, 17 miles N.E., has a population of 3726, who are occupied with the manufacture of damasks and paper.

In the Belgian province the chief town is *ARLON*. The only other towns worth notice are *Bastogne*, population 2265; and *Bouillon*, the capital of the ancient Duchy of Bouillon, which stands near the French frontier, on the left bank of the Semoy, and has 2703 inhabitants.

Dutch Luxemburg, united with Limburg, occupies the eleventh place in the Germanic Confederation, and furnishes a contingent of 2706 men to the Federal army.

LUXOR. [THEBES.]

LUXUEIL. [SAÔNE, HAUTE.]

LUZERN (*Lucerne*), a canton of Switzerland, bounded N. by Aargau, E. by Schwytz and Zug, S. by Unterwalden, and W. by Bern. Its greatest length from N. to S. is 33 miles, and its greatest breadth 27. Its area is 480 square miles; and the population in 1860 was 130,504, nearly all Roman Catholics. The constitution is democratic. The Great Council is composed of 100 deputies, presided over by a *schult-heiss*, or judge. The declivity of the valleys is towards the N.E. and N.W. The southern part of the canton belongs to the basin of the Reuss, which issues out of the Lake of Luzern or Waldstätter, at the town of Luzern, and flows N.E. into Aargau. Below Luzern the Reuss is joined by the Wald-Emme, which rises at the S.W. extremity of the canton. A succession of high grounds, running across the middle of the canton, divides the basin of the Reuss from that of the Aar, to which latter river the northern part of Luzern belongs. North-east of the Sempach Lake, which is in the centre of the canton, is another lake, called the Baldeg Lake. The only mountains in the canton are at its southern extremity, on the borders of the Unterwalden and the Bernese Oberland. None of them attain the limits of perpetual snow. The

highest is Mont Pilatus, south-west of the town of Luzern, and a conspicuous feature in its landscape. It is a mountain group nearly 30 miles in length, extending along the borders of Luzern and Unterwalden, and having seven peaks, of which the Tomlishorn (6858 feet) and the Esel (6678 feet) are the highest. The view from these summits is very extensive. The soil of Luzern is fertile; it is one of the very few cantons of Switzerland which produces more corn than it consumes. Fruit trees are also abundant; the vine is cultivated in some favourable situations. The rearing of cattle is the principal branch of industry in a great part of the canton. In some districts there are manufactories of linen and cotton goods. The trade between Switzerland and Italy by the St. Gothard employs a number of people, and all the goods pass through Luzern and the Waldstätter Lake. A steamer runs from end to end of Lake Luzern twice a day in the summer.

German is the language spoken. Luzern is in the diocese of the bishop of Basle, who resides at Soleure; and it is the chief of the Roman Catholic cantons.

LUZERN, the capital of the canton, is situated at the western extremity of the Waldstätter Lake, and is divided into two unequal parts by the Reuss, which issues out of the lake. The larger part, which is on the right bank, is built on the slope of a hill; the whole is surrounded by old walls flanked by watch towers. The interior of the town presents streets narrow, uneven, and ill paved. The remarkable buildings are—the cathedral, several other churches, convents, the town-house, the college of the Jesuits, the arsenal, with ancient armour, and the three covered wooden bridges, which are the chief curiosities of Luzern, being adorned with ancient paintings. The parochial church and cemetery are outside of the town, and are well worth visiting. Luzern contains 11,522 inhabitants. It has two hospitals, a savings' bank, a friendly society, and other benevolent institutions. It has also a collection of minerals, and very good elementary and secondary schools. Luzern is one of the three seats of the Swiss Diet. It has manufactures of silk and cotton fabrics, and carriages, and a large weekly corn market. The forces of the Sonderbund were defeated near Luzern by the Federal army of the Swiss Diet, under General Dufour, on the 24th November, 1847. [SWITZERLAND.]

LUZERN, or LUCERNE, LAKE OF, also called the 'Lake of the Four Forest Cantons' (*Vierwaldstättersee*), from its being surrounded by the cantons of Luzern, Schwytz, Uri, and Unterwalden, is the largest and finest basin of water in central Switzerland. Elevation above the sea-level, 1406 feet; length from N. to S. about 25 miles; breadth from N.E. to S.W. about 9 miles; depth, near Luzern, 300 feet, and towards the E. and S.E., 600 to 900 feet. The scenery which borders upon it presents every variety of landscape, from spots as wild and savage as the Scottish Highlands, to others as rich and beautiful as the fairest parts of Italy. It is navigated by several steamboats. Chief towns, Luzern, Alpnach, Küssnacht, and Flüchen.

LUZON. [PHILIPPINES.]

LU'ZULA, a genus of plants belonging to the natural order *Juncaceæ*. *L. sylvatica*, the great Woodrush, is found in shady places in Great Britain.

L. campestris is common in the pastures of this country, and seven species are natives of the British Islands.

LYCANTHROPY (*lykos*, 'a wolf,' and *anthropos*, 'a man'), a medical term for a species of insanity produced by the bite of a rabid dog, which causes the sufferer to make a noise resembling the howling of a wolf.

LYCAONIA, a district of Asia Minor, is first mentioned by Xenophon, who describes it as extending eastward from Iconium in Phrygia to the borders of Cappadocia, a distance of about 110 English miles. ('Anab.,' i. 2, s. 19.) But in the time of Strabo the name of Lycaonia was applied to the south-eastern part of Phrygia.

Lycaonia is described by Strabo as high table-land, deficient in water. Iconium, the principal town of Lycaonia, and at present Konieh (Strabo, xii. 6; Cic., 'Fam.,' xv. 4; Plin., 'Nat. Hist.,' v. 25), was situated in a fertile plain at the foot of Mount Taurus. Isauria is mentioned by Strabo as part of Lycaonia; it contained the cities of Larauda, Lystra, and Derbe; the two last of which were visited by St. Paul. (Acts xiv. 6.)

LYCEUM, in Greek antiquity, a famous academia or school situated upon the bank of the Ilissus at Athens. It consisted of several porticoes, and numerous open and covered walks, where Aristotle instructed his scholars in the principles of philosophy and logic. As he and his admiring retinue walked there daily until the hour of anointing, they received the name of *Peripatetics*. In modern usage the term signifies generally an educational establishment, and is sometimes applied to literary institutions. The French word is *Lycée*.

LYCHNIS, a genus of plants belonging to the natural order *Caryophylleæ*, and to the sub-order *Sileneæ*. *L. Chalcidonica*, the Scarlet Lychnis, produces scarlet, rose-coloured, or white flowers, and is a great favourite in our gardens; it is a native of Siberia and Japan. Several varieties of this plant have been named. *L. grandiflora* has large beautiful scarlet flowers, and is a native of China and Japan. *L. flos cuculi*, Ragged Robin, has rose-coloured petals, and is an abundant plant in the moist meadows and pastures of Great Britain, as well as the whole of Europe. *L. vespertina*, White Campion, is a common plant in the hedge-banks of Europe. This and *L. diurna*, Red Campion, are frequently regarded as varieties, and then named *L. dioica*.

LYCIA, a province of Asia Minor, was bounded on the N. by Phrygia, on the E. by Pamphylia, on the W. by Caria, and on the S. by the Mediterranean Sea. The interior of this country was entirely unknown till the recent discoveries of Sir C. Fellows, which have corrected the erroneous representations of the maps. The coast is bordered by lofty mountains, but there are no high mountains in the interior. The Xanthus, which has been represented as a small stream, is a river of considerable length, flowing from the mountains in the north of Lycia; and the whole of the interior is a fertile plain, surrounded by mountains, and drained by the Xanthus.

That Lycia was early colonized by the Greek nation is evident, not only from the account of Herodotus,

but also from many other Lycian traditions, as well as from the worship of Apollo, which was spread over the country. Xanthus was a Cretan settlement. The chief temple of Apollo was at Pátara.

In the time of Strabo the Lycians had a kind of federation consisting of twenty-three cities, which sent deputies to an assembly, in which a governor was chosen for the whole of Lycia, as well as judges and inferior magistrates. All matters relating to the government of the country were discussed in this assembly. The six principal cities, Xanthus, Pátara, Píñara, Olympus, Myra, and Tlos, had three votes each; other cities two votes each; and the remainder only one each. In consequence of dissensions between the different cities, this constitution was abolished by the Emperor Claudius; and the country was united to the province of Pamphylia.

The country is now well inhabited, chiefly by Turks, many of whom lead a life half settled and half nomadic; they are distinguished by their excellent character. Most of them are farmers or herdsmen; trade is chiefly carried on by Armenians and Greeks, who live in the sea towns, and form the greater portion of the population of the inland town of Almali, which is the largest in Lycia, the population being about 25,000. The Turkish population is exceedingly careless about money, and when they have enough to eat and to drink—and they are moderate in their habits—they are satisfied, and care for nothing more. The breeding of horses is carried on to a great extent, and herds of many hundreds are often seen grazing together in the valleys. The only kind is that of which such spirited representations are seen in the ancient marbles; the head is of Arabic cast, the chest is very large, the feet are remarkably fine and thin, and the ears are small, as in the antique. They are not shod. No part of Asia Minor contains such splendid valleys as those of the Xanthus and the Dolomon Chái. Myrtle, oleander, and pomegranates cover the banks of the rivers; the plains along the rivers are well cultivated, and in many places the fields are inclosed by fences of myrtle and the small prickly oak, mixed with the orange, the wild olive, the pomegranate, the elegant green storax, which are most beautifully matted together by vine, clematis, and many other climbers. The hills are covered with large oaks and planes, which supply excellent timber. The high plain round Almali, which is 4000 feet above the sea, is one of the largest and best cultivated corn tracts in Asia Minor; its chief produce is barley, which is the common food for horses. Maize is chiefly raised in the valleys and on the coast.

(Fellows, *An Account of Discoveries in Lycia; a Journal written during an Excursion in Asia Minor*.)

LYCIUM. Many ancient authors, and among others Dioscorides, describe under the above name a substance as used in medicine, which is stated to be of two kinds; one obtained from Lycia and Cappadocia, and the other from India. The former is said to be the produce of a thorny shrub called *Pyzanthus*. The latter is stated to be more valuable and efficacious as a medicine, and to be produced also by a thorny shrub, which is called *Lonchitis*. This, however, appears not to be the case, and Dr. Royle has stated his reasons for believing that this sub-

stance is the produce of various species of the genus *Berberis*.

LYCODON, a genus of innocuous snakes, of which we may give the *Lycodon Capensis*, Smith (*Lycodon Horstokii*, Schlegel), as an example.

LYCOPERDON (Gr. *lukos*, and *perdomai*), a genus of fungi, emitting when burst, either by violence or natural dehiscence, a quantity of dust-like seeds or spores, whence the species are commonly called Puff-balls. When the common Puff-ball, *Lycoperdon gemmatum*, first appears, it forms a whitish ball, looking like a common eatable mushroom, but by degrees it changes colour, becomes brown, and, tearing irregularly at the apex, discharges a cloud of brownish dust, consisting entirely of its spores. The Geasters, or Starry Puff-balls, are much less common; instead of bursting irregularly at the apex when ripe, their outer rind separates into a definite number of lobes, which spread open, curve backwards, and at last elevate upon their centre a bag containing the spores. No use has ever been made of any of the Lycoperdons, except in the case of *L. giganteum*, a very large indehiscent species, often many feet in circumference, and filled with a loathsome pulpy mass, which has been employed as a styptic, and for tinder.

LYCOPHRON, a native of Chalcis in Eubœa, was a poet and grammarian at the court of Ptolemæus Philadelphus, from B.C. 280 to B.C. 250, where he formed one of the seven poets known by the name of Pleias. He is said by Ovid to have been killed by an arrow.

Lycophron wrote a great number of tragedies, only one of which has come down to us, entitled 'Cassandra, or Alexandra.' This poem, however, cannot have any claims to be called a drama; Cassandra is the only person introduced as speaking. The work is written in iambic verse, and has no pretensions to any poetical merit; the style is very obscure, and the meaning of most passages is very doubtful.

LYCOPODIA/CEÆ, a natural order of vascular Acrogens, chiefly consisting of moss-like plants, inhabiting moors, boggy heaths, and woods in many parts of the world. They never exceed the height or length of two or three feet, and usually grow prostrate. Some of them, especially *Lycopodium catharticum*, are violent purgatives, and it has been proposed to use others as dyes; but in general they are of little importance to any except the botanical systematist. Their name has, however, of late been brought frequently before the public in popular works, in consequence of an opinion that certain large fossils common in the coal measures, and called *Lepidodendra*, are the relics of an extinct gigantic race of these now pigmy species. [COAL PLANTS.]

LYCOPODITES. The affinity of many fossil plants to some of the various genera composing the Lycopodiaceæ is very distinctly pointed out by M. Brongniart, both in the 'Prodrome' and in the 'Histoire des Végétaux Fossiles.'

LYCOPIDIUM, a fine yellow dust, the seed of the *Lycopodium clavatum*, or club moss. It is used for producing theatrical lightning, as it burns with a bright glare when ignited by a candle on spirits of wine. It is also sprinkled upon pills to prevent their adhesion. A decoction of the plant is used by the Poles as a remedy in the *plica Polonia*.

LYCOPUS EUROPEUS, a wild plant inhabiting wet ditches and sides of ponds, belonging to the natural order *Labiata*, and known popularly under the name of Gipsy-wort, because gipsies are said to stain their skins with its juice.

LYCURGUS. [SPARTA.]

LYCURGUS, the Athenian orator, the son of Lycophron, was one of the warmest supporters of the democratical party in the contest with Philip of Macedon. The time of his birth is uncertain, but he was older than Demosthenes. He is said to have received instruction from Plato and Isocrates. He took an active part in the management of public affairs, and was one of the Athenian ambassadors who succeeded (B.C. 343) in counteracting the designs of Philip against Ambracia and Peloponnesus. He filled the office of treasurer of the public revenue for three periods of five years, and was noted for the integrity and ability with which he discharged the duties of his office.

After the battle of Chæronea (B.C. 338) Lycurgus conducted the accusation against the Athenian general Lysicles. He was one of the orators demanded by Alexander after the destruction of Thebes, B.C. 335. He died about the year B.C. 323, and was buried in the Academia.

Only one of his orations has been preserved, an accusation of Leocrates, an Athenian citizen, delivered B.C. 330, for abandoning Athens after the battle of Chæronea, and settling in another Grecian state.

LYDD. [KENT.]

LYDGATE, JOHN, was a monk of the Benedictine Abbey of Bury St. Edmund in Suffolk. It has been conjectured that he was born about 1375. Warton says he seems to have arrived at his greatest eminence about the year 1430. He was eminently skilled in French and Italian, and wrote in English with great perspicuity. Ritson, in his 'Bibliographia Poetica,' has given a list of no fewer than two hundred and fifty-one pieces by Lydgate. His MS. of the 'Life of St. Edmund,' which he presented to Henry VI., is in the British Museum. It is conjectured that he died about 1461.

LYDIA, a country of Asia Minor, whose boundaries varied at different times. Under the Roman empire it was bounded on the S. by Caria, from which it was separated by the river Mæander; on the N. by a range of mountains named Sardene, which divided it from Mysia; on the E. by Phrygia; and on the W. by the Ægean, though the tract of country along the coast was more commonly called Ionia. Lydia was intersected by mountain ranges, running from east to west, of which the principal, called Més-sogis by Strabo, forms the northern boundary of the valley of the Mæander. Another chain of mountains, named Tmolus, runs parallel to the Més-sogis, and terminates on the west coast opposite the Island of Chios. A branch of Tmolus, called Sipylus, stretches more to the north-west, towards the towns of Cuma and Phocæa. Lydia is thus divided into two principal valleys; the southern, between Més-sogis and Tmolus, through which the Caystrus flows, is of moderate extent; but the northern, between Tmolus and Sardene, watered by the Hermus, and its tributaries the Hyllus, Pactólus, and Coganus, forms a considerable plain. The fertility of Lydia and the salubrity of the climate are frequently mentioned by

ancient writers. Chishull speaks of the country between Tmolus and Mésogis as a 'region inexpressibly delicious.'

According to Herodotus, the Lydians were of a common origin with the Carians and Mysians (i. 171).

The early history of Lydia is told by Herodotus (i. 6, &c.), who says that three dynasties ruled in Lydia: the Attyadæ, the Heraclidæ, and the Merminadæ, from B.C. 716 to 556. The proper history of Lydia begins with the last of these dynasties. The first king of this dynasty was Gyges, and the last was Croesus. The Lydian kingdom had its greatest extent during the reign of Croesus, who subdued all the people of Asia Minor west of the river Halys (Kizil-Ermak), with the exception of the Cilicians and Lycians. (Herodot., i. 28.) But this empire was overthrown by Cyrus (B.C. 556); and the country became a Persian province. After Alexander's conquests, Lydia, with the rest of Western Asia, formed part of the empire of the Seleucidæ; and on the conquest of Antiochus by the Romans, B.C. 189, it was given to Eumenes, king of Pergamus. On the death of Attalus III., B.C. 133, it came, with the other dominions of the kings of Pergamus, into the power of the Romans.

The Lydians carried on a large trade, and had abundance of the precious metals. The Lydians are said by the Greeks to have been the first people who put a stamp upon gold and silver.

The most extraordinary work of art in ancient Lydia was the enormous sepulchral mound of Alyattes, the father of Croesus. It was 1300 feet in width. [ALYATTES.]

The Grecian towns on the coast of Lydia belong to IONIA. The most important of those towns which properly belonged to Lydia were Sardis, Philadelphia, and Thyatira.

Sardis, called at present Sart, is situated on the Pactólus, a tributary of the Hermus, in an extensive plain. The citadel was situated on a hill, which was a perpendicular precipice on the back part, which looked towards Tmolus. Sardis was the capital of the Lydian kingdom, and the residence of the Persian satraps of the country. It was nearly destroyed by an earthquake in the time of Tiberius (Tacitus, 'Ann.,' ii. 47); but it was rebuilt. Sart is at present a miserable village; but there are large ruins of the ancient Sardis.

Philadelphia, called at present Allah Shehr (that is, 'City of God'), 28 miles south-east of Sardis, stands on a part of Mount Tmolus, by the river Coganus. To the east of Philadelphia Strabo places the district of Katakekaúmene, or 'Entirely burnt,' 500 stadia in length and 400 stadia in breadth. He describes the surface of the plain as covered with ashes, and the mountain rocks as of a black colour, as if they had been subject to the action of fire.

Thyatira, called at present Akhissar, was built by Seleucus Nicátor. It was famous for the art of dyeing purple. (Acts xvi. 14.) Thyatira, Philadelphia, and Sardis are three of the Seven Churches which are addressed in the Book of Revelations.

LYDIAN (from *Lydia*, a country of Asia Minor), an epithet applied by the Greeks to music which was of a tender and flowing character,

'Softly sweet, in Lydian measure,
Soon he soothed the soul to pleasure.'—DREYDEN.

The character of this poetry is said to have been striking and animated yet capable of pathos and melting softness; and it was on this account that Plato banished it from the republic. Some attribute its invention to Amphion; but Pindar states that it was first used at the marriage of Niobe.

LYDIAN STONE, the name of a silicious rock, of a grayish-black colour, a splintery or conchoidal fracture, and keen edge. It is sometimes named black jasper.

LYDUS, JOANNES LAURENTIUS, was born at Philadelphia in Lydia (whence he derived his surname), about 490. He died about the latter end of Justinian's reign. Lydus appears to have been well acquainted with Greek and Roman antiquities; and his works contain much curious information on the mythology and history of several of the nations of antiquity.

LYGODYSODEA'CEÆ, a natural order of plants closely allied to *Cinchonaceæ*. The only genus of this order is *Lygodysodea*, of which two species, *L. fetida* and *L. ciliata*, have been described. They are both natives of Peru and Mexico.

LYING-TO. A nautical term denoting the state of a ship when the sails are so disposed as to counteract each other, and thereby retard or destroy the progressive motion of the vessel.

LYLY, WILLIAM. [LILY.]

LYME REGIS. [DORSETSHIRE.]

LYMINGTON. [HAMPSHIRE.]

LYMPH, LYMPHATICS. The Lymphatics are the system of vessels which, from the part that they take in the process of absorption, are not unfrequently called absorbents. They consist of minute branched tubes of extremely delicate membranes, whose extremities are arranged in a more or less dense network in every part of the body. From this network they gradually converge into a succession of branches of increasing size, and terminate in two main trunks, called the right and left great lymphatic veins, through which the lymph is poured with the chyle from the thoracic duct [LACTEALS] into the right and left subclavian veins. The lymphatics also communicate with the veins at some other parts of their course, chiefly near their minute extremities, and more rarely by larger branches. They have in their interior numerous delicate valves formed of crescentic folds of the lining membrane, exactly like those of the veins, and, like them, preventing the retrograde force of the contained fluid.

The Lymph is a thin opaline whitish fluid of a somewhat saline taste, which a short time after it is removed from the body separates into a clear fluid and a soft white or pinkish coagulum.

The name of Lymph is rather vaguely applied to many different morbid secretions which have a thin watery appearance. Coagulating or coagulable lymph is the fibrinous matter effused in the adhesive inflammation.

LYNCH LAW, the rough species of justice sometimes administered in parts of the United States by the 'sovereign people,' and so called, it is said, from a Virginian farmer named Lynch, who, having caught a thief, bound him to a tree, and summarily flogged him.

LYNCHBURG. [VIRGINIA.]

LYNDHURST. A village in the centre of the

New Forest, Hampshire, 8 miles W.S.W. of Southampton, has only 1522 inhabitants, but contains the King's House, or official residence of the Lord Warden of the forest. All the forest courts are held here. In the vicinity is the spot where William Rufus is supposed to have been slain by Tyrrel's arrow.

LYNEDOCH, GENERAL, LORD, was born in 1750, and was the third son of Thomas Graham of Balgowan, in Perthshire. By the death of his two elder brothers he succeeded to the family estates. But on the loss of his wife, to whom he was devotedly attached, he was induced to take up the profession of arms; and in 1793 he accompanied Lord Hood, as a volunteer, with British troops to Toulon. He afterwards raised two battalions; and in a very few months the first battalion, the 90th, formed a part of the earl of Moira's army. Colonel Graham was afterwards attached to the Austrian army of Italy, and was beleaguered in Mantua with General Wurmser during the investment of that city. As yet he had had but few opportunities of distinguishing himself; but in 1808 he was allowed to accompany his friend Sir John Moore to Sweden, and afterwards to Spain; where in 1809 the sanguinary battle of Corunna was fought, in which Colonel Graham so distinguished himself, that he was immediately placed on the list of major-generals. He accompanied the British expedition to Walcheren and Flushing; but was compelled by the fever there prevalent to return to England. He was next ordered to Cadiz; and in 1811 a British force of 3000 men, commanded by him, and a body of 7000 Spaniards, were embarked in Cadiz Bay, in order to form a junction with the Spanish General St. Roche. The united forces, under General La Pena, took their position near Barossa, where a sanguinary battle was fought with the French troops under Marshal Victor. Such was the consummate skill and promptitude of General Graham in his attack, that in less than one hour and a half from the commencement of the action, the enemy were in full retreat, with a loss, in killed, wounded, and prisoners, of 3000 men. In the summer of the same year General Graham joined the army under Lord Wellington, and took an energetic part in the siege of Ciudad Rodrigo. Owing to a complaint in his eyes at this period, he was obliged to return to England to seek advice; but early in 1813 he again quitted England for the Peninsula; and in June of the same year was engaged in the battle of Vittoria, at which he commanded the left wing of the army under the marquis of Wellington, and not only defeated the enemy, but cut off their retreat by the highway to France. In the subsequent military affairs of the Peninsula, the name of Sir Thomas Graham was everywhere to be found, at San Sebastian, the Bidassoa, &c., until he succeeded in triumphantly entering on French ground. On his return to England he was appointed commander of the forces in Holland. After receiving the thanks of Parliament for his conduct in the Peninsula, he was raised to the peerage by the title of Baron Lynedoch, of Balgowan, co. Perth. In 1821 the governorship of Dumbarton Castle was conferred upon him. He died in 1844, aged ninety-four.

LYNN. [NORFOLK.]

LYNX. The name of *Lynx* is applied by zoologists to a subdivision of the feline group, regarded

by Dr. Gray in the light of a genus, to which he has applied the term *Lyncus*. [FELIDÆ.]

Cuvier observes that there are known in commerce, under the name of *Loups Cerviers* (*Lupus cervarius*), four or five sorts of Lynxes, which had long been confounded by naturalists, and whose specific limits were not perhaps well fixed when he wrote. We shall proceed to notice the arrangement of M. Temminck, and then return to observe what part of it is adopted by Cuvier.

M. Temminck gives the following as species:—

1. *Felis cervaria*, described as nearly equalling a wolf in size, and possibly the *Kattlo* of Linnæus and the Swedes; but it has been remarked that no skins of it are contained in the cargoes that arrive from the Baltic. In commerce the skins of *F. cervaria* are said to be only obtained from the markets of Moscow, to which they are brought from the provinces of Asia. It is considered as probable that this species may have been confounded, under the name of the *Canadian Lynx*, with

2. *F. borealis*, which is intermediate in size between the fox and the wolf. This comprehends the *Canadian* but not the *Mississippi Lynx* of Cuvier, and is said to inhabit the north of both the old and the new continents: its fur, less valuable than that of *F. cervaria*, is stated to be received equally from Sweden and from Hudson's Bay.

3. *F. Lynx* (true Lynx), different from, but nearly allied to, *F. cervaria*, *F. borealis*, *F. rufa*, and

4. *F. pardina*. Size of a badger, but the legs longer, resembling *F. rufa* in form and size; tail short, but longer in proportion than that of *F. Lynx*. *F. pardina* is the *Loup Cervier* of Perrault, and is found only in the south of Europe, the centre being the locality of the true Lynx.

5. *F. Caracal*, *Nubian Caracal*, and *Cat of the Desert of Bruce*, *Persian Cat* (*Lynx*) of Pennant.

6. *F. aurata*. Rather less than the Caracal. Country unknown. Skin purchased from a London dealer.

7. *F. Chaus* (Güldenstedt), figured by Schreber. The other animals described under this name are considered to be referrible to

8. *F. Caligata*; *Booted Lynx* of Bruce; *F. Libycus* (Olivier); *Libyan Caracal* of Buffon.

Of these, Baron Cuvier notices *Felis cervaria* as the finest and largest; *Felis borealis*; *Felis Lynx*, which has almost entirely disappeared from populous countries, but is still to be found in the Pyrenees, the mountains of the kingdom of Naples, and even, it is said, in Africa; *Felis pardina*, Oken, from the south of Europe; *Felis rufa*, Gülden.; and *Felis Chaus*, or *Lynx of the Marshes of Caucasus*, Persia, and Egypt. Cuvier further observes, that it is believed at present that the *Booted Lynx*, *Felis caligata*, Temm., may be distinguished from *Felis Chaus*; but he remarks that *F. caligata* is at least very nearly approximated to it, and that it has the same habits.

Felis Caracal (Persia, Turkey, &c.), which he considers to be the true Lynx of the ancients, closes Cuvier's list of species; but he alludes in a note to *Lynx faciatius*, *L. floridanus*, and *L. montanus* of Rafinesque, and to *Felis aurata* of Temminck, as belonging to this tribe.

M. Lesson gives the following species:—1. *F. Lynx*, the *Loup Cervier* of the Furriers. He states

that the whole of Europe is its habitat, where it has become very rare. 2. *F. pardina*, Temm., *Loup cervier* of the French Academicians; to this Portugal, Sardinia, Sicily, and Turkey are assigned as localities. Next follows *Felis Serval*, which cannot be considered a Lynx. 3. *F. cervaria*, Temm. 4. *Felis Borealis*, to which the northern countries of America and Asia are given as its distribution. 5. *Felis Caracal*, the Lynx of the ancients (Africa, Persia, and Arabia). 6. *F. chrysothrix* and *F. aurata*, Temm.; country unknown. 7 *F. Chaus*, Gülden. (Egypt, Nubia, and Caucasus). 8 *Booted*



Caracal (*Felis caracal*).

Lynx (*F. caligata*, Bruce, Temm.) To this a range is given from Egypt to the Cape of Good Hope in Africa, and the south of Asia. M. Lesson also notices as specifically different the *Felis Manul* of Pallas and Desmarest, a species not admitted by Temminck, but which has, according to Pallas, the appearance of the *Lynx*. (Mongolian Tartary.)

Sir William Jardine, who adopts the genus *Lynxus* or *Lynchus* of Mr. Gray, as the fifth genus of the *Feline*, enumerates the following species: *Lynchus Caracal*; *L. aurata*; *L. chelidogaster*, inhabits Chili (Temm., Mus. Leyd.); *L. caligata*, Bruce; *L. nigripes*, Burchell, inhabits South Africa; *L. Chaus* (Gülden., Rüpp.); *L. Canadensis*; *L. rufa*, Bay Lynx, inhabits banks of Columbia river, United States, not Canada (Temm.); *L. fasciata*, Banded Lynx (Richardson), inhabits N. America, woody countries in the neighbourhood of the Pacific (Lewis and Clark); and *L. Lynx*.

Sir William Jardine remarks, that there is yet considerable confusion among the Lynxes of America, and that, except the Canada Lynx, the species are perhaps not well determined. He observes that M. Vigors and Dr. Horsfield describe one under the title of *F. maculata* from Mexico.

Sir William further states that another Asiatic Lynx may be perhaps added in the *Felis affinis* of Mr. Gray, figured in his 'Illustr. of Indian Zoology.'

It may be necessary also to call the reader's attention to two species of *Felis*, *F. servalina*, figured as *F. ornata*, which Sir W. Jardine at first considered as identical with Mr. Gray's species with the last-mentioned name, but which Mr. Gray considered to be distinct. The figures of both *F. ornata*, Gray ('Illustr. Ind. Zool.'), and *F. servalina*, Jardine, have small tufts on the tips of their ears, and are otherwise inclined to be lynx-like, as if they formed

the passage between some of the smaller Spotted Cats and the Lynxes.

LYNX, a constellation of Hevelius, situated directly in front of Ursa Major, the head of the animal being halfway between a Ursæ Majoris and Capella.

LYON KING-AT-ARMS. This officer, who by the law of Scotland has sole power and jurisdiction in heraldic affairs, is said to derive his name from the lion rampant, the old armorial bearings of the Scottish kings, which he carries upon his robes. His jurisdiction is defined by various ancient statutes. He has power to visit the arms and ensigns-armorial of all noblemen and gentlemen throughout the kingdom, to give grants of arms to deserving persons, to matriculate them in his register, and to fine to the extent of 100*l.* Scots (8*l.* 6*s.* 8*d.* sterling) all persons who use arms without being matriculated. He further appoints all heralds, pursuivants, and messengers-at-arms. Much of his duties in former times was ministerial, and he still with his heralds makes proclamations of war and peace throughout the kingdom. There is an appeal from the decisions of the Lord Lyon to the Court of Session.

LYONS (the ancient *Lugdunum*), the capital of the department of Rhône, in France, is situated at the confluence of the Rhône and the Saône, in 45° 45' 45" N. lat., 4° 49' 10" E. long., 288 miles S.E. of Paris, and has 318,803 inhabitants. Lugdunum is said to have been founded by L. Munatius Plancus, who settled here a portion of the inhabitants of Vienna (Vienne), when driven from their homes by a revolt of the Allobroges, about 42 B.C. Strabo describes it as the most populous city of Gaul, except Narbonne (iv. 192, Casaub.) It was the great mart of the Romans, who had a mint here for coining gold and silver money; and it gave name to one of the four great divisions of Gaul. Lugdunum was utterly destroyed in a single night by fire, about A.D. 59, and was rebuilt chiefly by a grant from the Emperor Nero, to whom the citizens manifested their affection and fidelity in his downfall. In the beginning of the fifth century, the Burgundians possessed themselves of this town and of the south-eastern part of Gaul. On their overthrow it came into the power of the Franks. Lugdunum, during the Roman period, occupies a considerable place in ecclesiastical as well as in civil history. The Gospel had been early introduced into this part of Gaul, and here a severe persecution raged in the reign of Marcus Aurelius Antoninus, in 172 or 177. The churches at Vienna (Vienne) and Lugdunum sent a relation of their sufferings to those of Asia and Phrygia. Pothinus, bishop of Lyons, was one of the martyrs in this persecution. His successor was Irenæus, one of the most eminent of the early Fathers.

In the division of the Frankish kingdom under the Merovingian princes, Lyons, as we may now call it, was included in the kingdom of Bourgogne (561-613). In the division of the Frankish empire among the grandchildren of Charlemagne in 843, Lyons, with the district of Lyonnais, fell to the lot of the Emperor Lothaire; and in the subsequent division of his states in 855 it fell to Charles, king of Provence, who made it his usual residence. On his death in 863 it was seized by Charles the Bald, king of France. On the re-establishment of the kingdom

of Bourgogne by Boso in 879, Lyons was included in his dominions. In the troubled period of the later Carolingian kings, Lyons was subject alternately to them and to the kingdom of Bourgogne Transjurane. It was in these troubled times that the counts or governors of Lyons succeeded in establishing a hereditary sway over the districts of Lyonnais, Forez, and Beaujolais, but not over the city of Lyons, the lordship of which was obtained by Bouchard, archbishop of Lyons, and after his time remained annexed to the see. The archbishops, whose temporal power over the city was confirmed by the emperor in 1157, received the title of exarch: they were allowed free and independent jurisdiction, except so far as they were subject to the supreme authority of the emperor and the general laws of the empire.

About the middle of the thirteenth century, the citizens of Lyons became dissatisfied with the government of their ecclesiastical rulers; they elected a municipal body, between whom and the archbishop dissensions broke out, which led to the annexation of the city by Louis IX., the judicial administration remaining partly in the hands of the archbishop, partly in the municipality or consulate, as the civic council of Lyons was called. The citizens had the right to elect their own magistrates, and to control the receipts and outlay of the municipal officers; they were also exempt from the jurisdiction of any courts but those established in the city. Under this government the town increased in population, wealth, and commerce, till the sixteenth century, when it suffered much at the hands of the Huguenots, but recovered its prosperity in the seventeenth and eighteenth centuries. In the year 1793, during the government of the Convention, the people of Lyons rose against the tyranny of the revolutionary club which had been established in the city, and seizing the town-hall, put Challier, president of the club, to death. To avenge this affront, the Convention sent an army of 60,000 men with a hundred pieces of cannon. The town was bombarded, and obliged, after a siege of sixty-six days, to yield to famine and force; and during the cruelties that followed in the next five months nearly 6000 victims perished, including those who fell in the defence; the principal buildings were demolished, and a new name—*Commune Affranchie*—was given to the city. This dreadful blow, together with the long war which followed the French revolution, caused the commerce and manufactures of Lyons to languish. On the return of Napoleon from Elba, in 1815, his cause was espoused by the Lyonnese. In 1831 and 1834 Lyons was the scene of great disturbances, which originated in the disputes of the trades unions with the master manufacturers respecting wages, but had also connection with the republican party, who headed the insurrection, and were ready to make it subserve their own purposes. In the last-mentioned year, the insurgents by barricading the suburbs contested the possession of the town for two days with the military, but at the end of that time they laid down their arms. Numerous famous historical personages have been natives of this city: among them the Roman emperors, Claudius, Caracalla, and Marcus Aurelius; St. Ambrose, St. Irenæus, and Pope Clement VI.

The city of Lyons is very advantageously situated on the railway from Paris to Marseilles, and the

navigable rivers, the Rhône and the Saône, in the fork between which the greater part of the town is built. This part of Lyons consists mostly of narrow, crooked, dirty streets, formed by solidly built houses of seven or eight stories high. To afford room for the extension of the town southwards, the two rivers have been made to meet about a mile below their original junction, thus forming the peninsula of Perrache, on which the streets are built with more regularity and elegance, and some beautiful promenades are laid out. The old fortifications between the city and the hill and suburb of Croix-Rousse prevented the extension of the town northwards, but by a decree of the French republic, dated March, 1848, these fortifications were ordered to be demolished, and a wider enceinte to be constructed, so as to include this suburb, which was thence to be considered as an integral part of Lyons. A considerable part of the town lies on the right bank of the Saône, both shores of which are lined with quays. Here also is the steep hill and suburb of Fourvières on the south-west; and the suburbs of Serin and Vaize on the west. On the left bank of the Rhône are the suburbs of Brotteaux and Guillotière; its right bank is lined with quays throughout the whole length of the city, some of them being planted with trees and forming delightful promenades.

The suburbs of Fourvières and Croix-Rousse are chiefly inhabited by silk weavers. The hill of Fourvières is said to derive its name from *Forum-Vetus*, an ancient Roman structure which stood on its summit, and on the site of which the church of Notre-Dame is now built. The remains of an aqueduct and amphitheatre have been found on this hill. From the terrace close by this church, or from a tower erected near it, the view over the city of Lyons, its two noble rivers, its squares, chief structures, quays, avenues, and bridges, the hills and plains in the vicinity, of the snowy peak of Mont Blanc and the Alps of Dauphiné in the far distance, presents one of the most varied and most beautiful panoramas in Europe.

The Rhône, which runs along the eastern side of the town, flows with a rapid current 656 feet wide, and is spanned by four bridges, that unite the city to the populous suburbs of Guillotière and Brotteaux, which are protected from the inundations of the river by high embankments. The Saône flows in a gentle current with a breadth of 492 feet along the base of the hill Fourvières, a projecting crag of which formerly blocked up the passage along the right bank, but was cut through by the Romans, and hence it got the name of *Petra Excisa*, still remaining in the modern name *Pierre-Scise*. The Saône is crossed by nine bridges.

Of the fifty squares or open spaces in the city, the finest are—the Place-Bellecour, which is planted with lime-trees, and is one of the largest squares in Europe; and the Place-des-Terreaux, of which the town-hall and the Palais-des-Arts form two sides.

The public structures of Lyons are numerous, and with some exceptions more remarkable for solidity than elegance. These the space allowed for this article will permit merely to mention. Among the chief religious edifices are—the splendid cathedral of St.-Jean, on the right bank of the Saône, the churches of St.-Pierre, d'Ainai, de l'Observance, Notre-Dame-de-Fourvières before mentioned, St.-Nizier, St.-

Bonaventure, St.-Polycarpe, des-Chartreux, St.-Georges, St.-Irénée, and St.-Just. These, together with the palace of the archbishop, form a series of buildings interesting from their architecture, extent, decorations, and antiquity. Among the civic structures are the prefect's residence, once a Jacobin convent; the town-hall, the finest building of the kind in France; the court-house, on the Quai-de-la-Saône; the public library; the Palais-des-Arts, in which are an exchange, galleries of paintings and sculptures, cabinets of medals, collections of minerals and of natural history, specimens of silk manufactures, &c.; the Loge-du-Change, formerly an exchange, now a Calvinist temple; the college, situated on the Quai-du-Rhône; the mint; the general hospital, or Hotel-Dieu; the Maison-de-la-Charité, or asylum for the poor; the hospital de l'Antiquaille, built on the site of the Roman palace in which Claudius, Caligula, and Germanicus were born; the Mont-de-piété; the prisons; the two theatres; and the numerous barracks.

The fortifications of Lyons have been enlarged and strengthened under the imperial régime. Its environs are dotted with numerous country seats, gardens, and vineyards.

Lyons is an important manufacturing town. The staple articles of industrial produce are silk stuffs of all descriptions, which for solidity of texture, richness and permanence of dye, and beauty of design, are not equalled elsewhere. In this manufacture about 100,000 of the population are directly or indirectly concerned. Cashmere and silk shawls, ribands, cotton cloth, hosiery, hats, printed calico, jewellery, liqueurs, chemical products, gold and silver lace, crapes, tulle, glue, sheet lead, musical strings, ornamental paper, &c., are also made. There are, besides, numerous printing establishments, dye-houses, metal foundries, glass-works, potteries, tan-yards, breweries, boat-building yards, &c.

Lyons is also, from its advantageous position, a place of great commerce. The products imported into the town for its own consumption, or for re-exportation, are wine, brandy, oil, hemp, flax, soap, rice, chestnuts, salt, raw cotton, coffee, indigo, sulphur, lead, teazles, madder and other dye-stuffs, &c. Timber, firewood, building stone, and asphalt are the chief articles brought down the Rhône to this city. Down the Saône are brought timber of all kinds, oak staves, firewood, charcoal, tanning bark, iron and iron ore, gypsum, hay, straw, corn, building stone, bricks, tiles, &c. Steamers ply on the Saône to Châlon-sur-Saône, and on the Rhône to Avignon and Arles. The town has communication with the Rhine by the Canal-du-Rhône-au-Rhin; and with Paris by the Saône and the canals that join it to the Seine. A railroad, 35 miles in length, unites Lyons to the great manufacturing town of St.-Etienne and the extensive coal-fields of the department of Loire.

Lyons gives title to an archbishop, whose see includes the departments of Rhône and Loire. It is the seat of a high court (Cour Royale) and of a university academy, which have jurisdiction over the departments of Aine, Loire, and Rhône. Connected with the university there are in Lyons faculties of theology and the sciences, a secondary school of medicine, and a college; and within the jurisdiction six colleges, sixty-two boarding-schools, three primary normal schools, and 1470 day-schools. The city

has also a tribunal of first instance, a tribunal and chamber of commerce, a council of Prud'hommes, an academy of sciences and arts, a theological college, a school of the fine arts, a mint, an establishment for deaf-mutes, a school of arts and trades, besides various other literary, scientific, and benevolent institutions.

LYONNAIS, a former province of France, which now forms the departments of RHÔNE and LOIRE. Lyons was its capital.

LYONS, VICE-ADMIRAL LORD, was born at Barton, co. Hants, in 1790. He was educated at Westminster School; and in 1801 entered the royal navy. In 1804 he accompanied Admiral Duckworth's expedition to the Dardanelles; and proceeded to the East Indies in 1807. His various exploits stamped him as a true British sailor, and at the age of twenty he was appointed flag-lieutenant on board the *Minden* 74. While lying off the coast of Java he displayed consummate bravery by the capture of Fort Marrach; and in 1814 received post-rank. During the peace that followed he was employed in a variety of ways. In 1828 he commanded the *Blonde*, and entered the Black Sea, which was the first occasion on which a British man-of-war had ever done so. In 1835 he was knighted, and in 1840 made a baronet. His nomination, as second in command, of the Mediterranean fleet, in 1853, brought him from his embassy at Stockholm to commence that brilliant career which has rendered his name illustrious as a British seaman. In 1855, during the contest with Russia, he assumed the chief command of the Mediterranean fleet, on board the *Agamemnon*; when a series of victories, which are more matters of history than of biography, crowned his distinguished career. Kinburn fell, the fortress of Kertch was captured, and the attacks on the fortifications of Sebastopol were skilfully conducted. In 1856 he was created a British peer; and in 1857 he became vice-admiral of the White. He died at Arundel Castle, Sussex, the seat of his son-in-law, the duke of Norfolk, in November, 1858.

LYRA (the Harp), one of the forty-eight constellations of Pompey, representing the lyre of Mercury (Aratus), of Mercury or of Orpheus (Hyginus). It is surrounded by Cygnus, Aquila, Hercules, and the head of Draco. Its brightest star, α Lyre, also called Vega, is a conspicuous object. If a line be drawn through the middle of Cassiopeia, the pole-star, and the middle of Ursa Major, this star may be seen nearly in the perpendicular to that line drawn through the pole-star. When Aquila is known, a line drawn through its four neighbouring stars, δ , θ , β , α , and γ , will pass through α Lyre.

LYRE (*λύρα*), a musical instrument of the stringed kind, known under various names from the earliest historical period. Some of the Greeks ascribe its invention to Hermes, some to Hyperion; but it is possible that they may have had it from the Egyptians, and the Egyptians from Asia. Of many instruments figured or described in early writings, it is difficult to decide whether they should be termed lyres, lutes, harps, or guitars. The most ancient Grecian lyre had only three strings. That of Terpander had seven. Timotheus increased the number to eleven; and others were gradually added, till they reached sixteen, fifteen of which rendered the principal sounds in the Greek scale, and the sixteenth was

the *Proslambanomenos*, an additional or supernumerary sound.

LYRE BIRD. [MÆNURA.]

LYRIC POETRY is commonly understood to be that kind of poetry which is composed in order to musical recitation; but the epithet has been transferred to all kinds of verse partaking in any degree of the same nature as that to which it was first applied. Thus we hear of lyrical ballads, the greater part of which might with as great propriety be called epical, and of lyric measures in Horace where there is no ground to suppose that they were sung, and no fitness for the purpose of musical rehearsal. In a former article [EPIC POETRY] a distinction has been made between epic and lyric poetry more satisfactory than common language allows. There is no impropriety in giving a decided meaning to words which have usually been understood in a confused sense, particularly when, as in the present case, the same senses have been applied to each, so as not only to confuse, but to confound them. Lyric poetry may, then, be defined as that class of poetry which has reference to and is engaged in delineating the composer's own thoughts and feelings, in distinction from epic poetry, which details external circumstances and events. The former is therefore called *subjective*, and the latter *objective*.

LYS. [BELGIUM; SCHELDT.]

LYSANDER, a Spartan, who rose to eminence towards the end of the Peloponnesian war, and was placed in command of the Lacedæmonian troops on the coast of Asia Minor, B.C. 407. Unlike most of his countrymen he had great flexibility of character, and gained the regard and confidence of his Persian allies. During his year's command he defeated the Athenian fleet, commanded by Antiochus, as lieutenant of Alcibiades, at Notium. In September, 406, he was superseded by Callicratidas, who was defeated and slain in the memorable battle of Arginusæ. The allies petitioned that Lysander might be reappointed; and having resumed the command, he gained the decisive victory of Ægospótami, in the Hellespont, where 170 Athenian ships were taken. This in effect terminated the Peloponnesian war.

He accompanied Agesilaus during his first campaign in Asia, where his popularity and renown threw his superior into the shade; and an estrangement resulted, in which Lysander behaved with temper and wisdom. About B.C. 396 he returned to Sparta. In the following year, on occasion of a quarrel with Thebes, he was sent into Phocis to collect contingents from the northern allies. Having done this, and being on his way to join the Lacedæmonian army, he was taken by surprise, and slain by the Thebans, at Haliartus in Bœotia.

LYSIAS, one of the ten Athenian orators, was born at Athens, B.C. 458. At the age of fifteen he went to Thurii, in Italy, where he remained for thirty-two years. He returned to Athens, B.C. 411, and carried on, in partnership with his brother Polemarchus, an extensive manufactory of shields. Their wealth excited the cupidity of the Thirty Tyrants; their property was seized, and Polemarchus was taken to prison, where he was shortly after executed. Lysias escaped to Mégara, and died about B.C. 378. Thirty-four extant orations are attributed to Lysias.

LYSIMACHIA, a genus of plants belonging to

the natural order *Primulaceæ*. *L. thyrsoflora* is found in marshes in the north of England. *L. vulgaris* is the *L. punctata* of some botanists.

LYSIMACHUS, one of the officers of Alexander the Great, was born of an illustrious Macedonian family. In the distribution of the provinces to the chief Macedonian officers after the death of Alexander, Lysimachus received Thrace and the neighbouring countries. In B.C. 314 he joined Cassander, Ptolemæus, and Seleucus, in opposing Antigonus. [ANTIGONUS.] The peace, which was made between the contending parties, B.C. 311, lasted only for a short time. The conquests of Demetrius, the son of Antigonus, in Greece, roused the confederates to more vigorous exertions; and Lysimachus was sent into Asia Minor, B.C. 302, where he took several places, and acquired immense plunder. In the following year Lysimachus, having joined Seleucus, defeated and killed Antigonus at Ipsus in Phrygia.

Lysimachus obtained the north-western part of Asia Minor as his share of the captured country. He shortly afterwards married Arsinoe, the sister of Ptolemæus, king of Egypt, although his eldest son Agathocles had already married Lysandra, the half-sister of Arsinoe. In B.C. 286 he obtained possession of the throne of Macedon. The latter part of his life was embittered by family dissensions. Arsinoe, fearful lest her children should be exposed after the death of her husband to the violence of Agathocles, persuaded Lysimachus to put him to death. Lysandra, his widow, fled to Babylon, and entreated Seleucus to make war against Lysimachus, who, anticipating his intentions, marched into Asia, and fell in a battle with the forces of Seleucus, in his seventieth year.

LYTHRACEÆ, a natural order of polypetalous Exogens. They are most near *Melastomaceæ* and *Onagraceæ*. The order contains few plants of any interest.

LYTHRUM, a genus of plants belonging to the natural order *Lythroriaceæ*. *L. Salicaria*, Purple Loosestrife, is a native of Europe, in ditches and watery places, especially about the margins of ponds and rivers, and is found in Britain very plentifully. The colour of the flowers varies from crimson to purple. The herbage is generally almost smooth, and of a dark green, but in dry situations it becomes hoary and downy, or in some degree hairy, as well as more dwarfed in stature. This species is the *Lysimachia* of Pliny, lib. xxv. cap. 7; lib. xxvi. cap. 12, 14. *L. hyssopifolia* is found in damp places in Great Britain. *L. Hunteri*, Hunter's Purple Loosestrife, is a native of the East Indies, where it is used in dyeing.

LYTTELTON, GEORGE, LORD, born in January, 1708–9, the eldest son of Sir Thomas Lyttelton, Bart. He entered Parliament in 1730, and connected himself with the leaders of the opposition to Sir Robert Walpole. After Walpole's retirement Lyttelton was made a lord of the treasury, in 1744. He was raised in 1756 to be chancellor of the exchequer. He went out of office altogether in 1759, when he was raised to the peerage by the title of Baron Lyttelton of Frankley. The rest of his life was chiefly devoted to literature. He died in 1773.

Lord Lyttelton's literary talents are well known. His most important works are a 'History of Henry II.' and 'Observations on the Conversion and Apostleship of St. Paul.'

M.

M is the labial letter of the liquid series.

1. *M* is interchanged with *n*. Thus *m*, at the end of Latin cases and tenses, is generally represented by an *n* in Greek. Similarly the German dative *ihm* and accusative *ihn* have been confounded in the English *him*, which is at once dative and accusative. The German *boden*, *busen*, *besen*, *faden*, are in English, *bottom*, *bosom*, *besom* or *broom*, *fathom*.

2. *M* with *b*. Thus in Latin *hiemps* coexists with *hibernus*, *tumeo* with *tuber*, *glomus* with *globus*, *fama* with *fabula*. In our own language *husband* is a corruption of *house-man*, the correlative of *housewife*.

3. *M* with *p*. Hence the Greek forms *ορμα*, *τιτυμμα*, &c., for *ορμα*, *τιτυμμα*, &c. The Greek *μολυβδος* is in Latin *plumbum*.

4. *M* with *v*. This is particularly the case in the Welsh language. The Latin *amnis* is believed to be identical with the Welsh *Afon*, pronounced *Avon*. The Latin language has *promulgare*, apparently for *proulgare*. Compare also *himmel*, *heaven*; *immer*, *ever*.

5. *M* with *w* probably. This interchange follows easily from the last, and is a natural step towards the next. The German *mit* seems to be identical with our own *with*, and their longer preposition *wider* is to *mit* or *with* precisely as the Latin *contra* to *con*. The difference of meaning is only apparent, for the notion of hostility is secondary, and belongs to the shorter as well as to the longer forms. Thus in Latin we say *pugnare tecum*, and in English to *withstand*.

6. *M* disappearing. This appears to have been the case even at the beginning of words. Compare the Greek *μυρις* with *αχρ*, *μολυβδος* with *ολυβ*, the Latin *manus* with the Teutonic *hand*, the Latin *mere-re* with the English *earn*. At the end of words at least, the loss of an *m* is very common, particularly after *o*. Thus the Greek and Latin verb often has the first person ending in *o*, where analogy would lead to *om*; *scribo*, *τιπτω*. Compare the words *sum*, *inquam*, besides the other tenses *scribebam*, *scribam*. In Latin all the adverbs ending in *o*, signifying *motion to*, appear to have lost an *m*, viz., *quo*, *eo*, &c. Hence *adeo*, *quoad*, occur in conjunction with a preposition which elsewhere requires an accusative. Again, an *m* has been lost in *postea*, *antea*, *postillā*, &c.; compare *postquam*, *antequam*, &c.

7. *M*, like the other liquids, but not so frequently, is liable to change its position with regard to the vowel of a root. Thus in Greek the root *τιμ*, 'cut,' may take the form *την*.

MAAS. [BELGIUM; HOLLAND.]

MAASTRICHT. [LIMBURG.]

MABILLON, JEAN, born in 1632, became a Benedictine of the congregation of St. Maur in 1654, and died in 1707. His 'Museum Italicum,' 1689,

MACACUS.

and 'Iter Germanicum,' are full of learned matter: his controversial works, such as his 'Traité des Études Monastiques,' 1691, directed against De Rancé and the monks of La Trappe, were highly popular; and his 'Veterum Scripturarum varia Specimina,' &c., is still much esteemed. He was employed by Louis XIV. to collect books, and is described as one of the most learned and liberal men of his age.

MABLY, ABBÉ DE, born at Grenoble in 1709, died in 1785. His political works, which are numerous, are esteemed more for the facts they contain than for their arguments. The principal of them are—'De la Manière d'écrire l'Histoire,' 'De l'Étude de l'Histoire,' 'Observations sur l'Histoire de France,' 2 vols. 12mo, 1765, with a posthumous continuation in two more volumes, published in 1790.

MABUSE, or MAUBEUGE, JOHN. This eminent painter, whose proper name was John Gossaert, was born at Maubeuge in Hainault, in 1470, according to some authorities; in 1499, according to others. The finest specimen of this painter, perhaps, is the Wise Men's Offering, now at Castle Howard, the seat of the earl of Carlisle. He painted chiefly scriptural subjects, but was employed by Henry VII. to paint portraits of his children. The picture is at Hampton Court, and contains Prince Arthur, Prince Henry (Henry VIII.), and Princess Margaret. He died, it is said, in 1562, but it is not known where.

MAC or M', the Gaelic word for son. It is often used as a prefix to Scotch names, but in many cases it has of late years become incorporated with the name itself, as in Mackenzie, Macintosh, and Macpherson. It is probably allied to the Gothic word *magus*, 'a son,' 'a boy,' and its root is generally believed to be the Sanscrit *mah*, 'to grow.'

MACA'CUS (French, *Macaque*), a barbarous word adopted as the title of a genus of *Simiade* (Monkeys) peculiar to India and the Indian Islands.

In the *Macaci* or *Macaques* the body is stouter than in the *Guenons* [*GUENONS*], the head larger in proportion, the limbs more muscular, and the tail shorter. The muzzle is heavy; the superiliary is boldly prominent, and the forehead is flattened; the callosities are large, and mostly surrounded by a space of naked skin. There are ample cheek-pouches, and Cuvier states that a laryngeal sac is always present. The last molar of the lower jaw has a fifth tubercle, and the molars are broad. The tail is variable; in some species it is of considerable length, and these, in general form, approximate towards the *Guenons* (*Cercopithec*). In others the tail is short and slender; the ears are angular. The *Macaci*, like the *Guenons* of Africa, which they seem to represent, inhabit the forests, living in troops, and are remarkable for boldness and activity. Emboldened by tolerance, they become very audacious, pillaging

the gardens and the fields of grain; and their rapacity is seconded by address and cunning.

Cuvier says, relative to the Magot or Barbary Ape (genus *Inuus*), that it is simply a Macaque with a small tubercle in place of a tail. We regard the Magot as a form intervening between the Macaques and the Cynocephali, but still as a sub-genus of the latter group.



Wanderoo (*Macacus silenus*).

As examples of the genus *Macacus*, we may adduce the Toque or radiated Macaque (*Macacus radiatus*), the *Bonnet Chinois* of Buffon; the Rhesus (*Macacus Rhesus*); and the Wanderoo (*M. Silenus*), a native of Malabar and Ceylon.

MACAO, a Portuguese possession in China, situated at the southern extremity of the estuary of the Choo Kiang, or Canton River, $22^{\circ} 24' N.$ lat., $113^{\circ} 30' E.$ long, about 80 miles from Canton by the river. The population is estimated at 35,000, of whom about 30,000 are Chinese; the others are Portuguese, Hestizos or mongrels, English, Americans, &c. The town is built on a peninsula of the island of Heong-shan, which is $2\frac{1}{2}$ miles in length, by less than a mile in breadth, and is connected with the island by a narrow, low, and sandy isthmus, forming a land-locked inner harbour 12 miles in circuit.

Macao itself stands on several declivities, the shore being lined on the outer side by an embanked parade and a terrace of white houses, above which Chinese and European residences are curiously intermingled; but the mass of buildings, chiefly Chinese, are on an inner slope. Both harbours are within the vortex of typhoons, and suffer greatly from them. The climate is, however, very salubrious, and during the monopoly of the East India Company it was a favourite place of resort for Englishmen from India. The principal edifices are—the collegiate church of St. Joseph, eleven other churches, a convent, hospital, barracks, and the senate house, besides some Chinese temples. Six forts defend the harbour north and west of the town, which is fit only for small vessels. Large ships anchor in a roadstead east of the island. The trade of Macao was formerly restricted to the Portuguese and Spanish shipping, but now it is chiefly English and American, and that limited to twelve or fifteen ships annually, of from 4000 to

5000 tons, laden with tea and silk brought from the interior. The settlement has no export product itself, and its customs revenue rarely exceeds 20,000*l.* per annum, half of which is raised from the duty on opium; while the expenditure exceeds 32,000*l.*, so that it is a burden on the parent state. After the rise of Hong Kong, the commerce of Macao almost entirely disappeared, but it has since been made a free port, and great efforts have been made to restore its former prosperity. The educational wants of the inhabitants are provided for by the college of St. Joseph, a royal grammar-school, and female orphan asylum. The Portuguese authorities and others form a senate, a governor, and council, but the government of the native population is substantially vested in a Chinese mandarin.

Macao was granted to the Portuguese, subject to an annual rent, by the Chinese emperor in 1586, in return for assistance against pirates. In 1863 the payment of this tribute was rescinded, and the land conceded by treaty to Portugal; but jurisdiction over the Chinese inhabitants was retained.

MACARONI, a food product made of wheat flour in the shape of pipes. The manufacture is carried on chiefly in Italy (it was formerly peculiar to Genoa alone), but also at Marseilles and one or two other places in the south of France. *Vermicelli* is made of the same material, but in smaller rolls. Only the hard sorts of wheat, which contain a large proportion of gluten, are applicable to the manufacture. It is first ground into a coarse meal, and the bran being removed, it is called *Semola*. The flour is then worked up into dough with water, and forced through gauges, as in pipe-drawing, according to the size required. For the *Italian pastes* which are now so much used for soups, the dough is simply rolled out into thin sheets and cut into various shapes by means of stamps. Macaroni is now much used in England for puddings (if it is made of the best wheat it should swell considerably, and become quite soft, but not break or burst in boiling), and also for making a favourite dish of macaroni and cheese. The total quantity imported in 1864 was 7896 cwt., valued at 17,763*l.*, or rather over 2*l.* per cwt. The customs duty is the same as on flour, $4\frac{1}{2}d.$ per cwt.

MACARTNEY COCK. [PHEASANT.]

MACARTNEY, GEORGE MACARTNEY, EARL OF, was born near Belfast, May 14, 1787. He was educated at Trinity College, Dublin, and in 1759 entered himself at the Middle Temple, London. In 1764, through the interest of Lord Holland, he was despatched as envoy extraordinary to the empress of Russia, for the purpose of effecting a commercial treaty with that country, which he brought to a satisfactory conclusion, and returned to England in June, 1767.

In 1768 he was returned to Parliament, first for Cockermonth, in the English House of Commons, and afterwards for Armagh, in the Irish, and was appointed to the office of chief secretary for Ireland, January 1, 1769. As a debater, Macartney distinguished himself in the House against Flood, Dr. Lucas, and other leaders of the opposition. He held his office till June, 1772. In 1775 he was created an Irish baron, and made governor of Granada, where in 1779 he was compelled to surrender to Count d'Estaing, and was sent prisoner to France, but very

soon exchanged. In 1780 he was appointed governor of Madras, returning to England in January, 1786. In 1792 he was selected to undertake the embassy to Peking, in which service he gave so much satisfaction that he was elevated to an Irish earldom. In 1796 he was created Baron Macartney in the British peerage, and sent as governor of the newly-acquired territory of the Cape of Good Hope. He returned to England in 1798, and died on the 31st of March, 1806.

MACASSAR. [CELEBES.]

MACAULAY, CATHARINE, was born in 1733, and died in 1791. She was a most voluminous writer in defence of republican principles, and is chiefly known by her 'History of England from the Accession of James I. to the Elevation of the House of Hanover,' of which the first volume appeared in 1763, and the fifth in 1771, which, however, only came down to the Restoration. A sixth volume carried it on to the termination of Walpole's administration in 1742. Though the work went through more than one edition, it has now sunk into oblivion.

MACAULAY, THOMAS BABINGTON, LORD MACAULAY. It has often been remarked that the life of a man of letters presents few romantic or stirring incidents; is unmarked by those great events which illuminate the biographic page dedicated to the memory of successful statesmen or eminent warriors. The career of Thomas Babington Macaulay presents no exception to this general rule. Blessed with ample competence, with troops of friends, with an honourable position, he pursued the even tenor of his way undisturbed by external influences or an 'o'erleaping ambition,' and devoted his vast intellectual powers to the acquisition and diffusion of that knowledge in which his soul delighted. From his youth he was distinguished by an extraordinary capacity, a retentive memory, an insatiable greed of information, and brilliant conversational powers; and there were not wanting many eminent authorities and competent judges to predict his future fame from his youthful promise. His mind was early matured. The same exquisite polish, the same pictorial power, the same felicity in grouping illustrative facts about a particular topic, the same moderate liberalism of thought, the same qualities of trenchant sarcasm and well-weighed criticism, are visible in the productions of his student days as in the compositions of his more matured manhood, and the dazzling historical essayist of the *Edinburgh Review* is plainly conspicuous in the contributor to *Knight's Quarterly Magazine*. Macaulay was not one of those writers who attain completeness by slow degrees, by years of painful labour; his lucid intellect was ripe and perfect at the very outset of his career, and he sprang into fame and influence almost at a bound.

Macaulay was born in 1800 at Rothley Temple, in Leicestershire. He was the son of Zachary Macaulay, a wealthy merchant, whose indefatigable devotion to the cause of the emancipation of the negro was rewarded after his death by a tomb in Westminster Abbey. After the usual course of instruction under a private tutor, he was sent to Trinity College, Cambridge, where his remarkable mental powers immediately attracted notice, and he carried off all the honours open to the laborious student. Destined for the law, he was next entered

at Lincoln's Inn. He relieved the aridity of his legal studies by cultivating the muse, and contributed to a new periodical of great talent, *Knight's Quarterly Magazine*, some poetical compositions of peculiar merit, among which we may specially notice the 'Spanish Armada' and the 'Battle of Ivry.' These are distinguished by a curious felicity of language and a rare energy and fire. In 1826 he was called to the bar, but he thenceforth virtually abandoned the legal profession.

In the preceding year (1825) his essay on Milton had appeared in the *Edinburgh Review*. Its brilliant style, solid criticism, and extensive information produced an instantaneous impression that a new and superior luminary had risen upon the literary horizon. This essay was the first of a series, the most remarkable, perhaps, in our language, which was continued for fifteen years with constantly increasing excellence. In 1848 an incorrect edition having been published at Philadelphia without his authority, he decided on issuing a selection under his immediate auspices, and published it in three volumes, under the title of 'Critical and Historical Essays.' They attained a permanent popularity in this form, and find a place in every student's library. The most able and interesting are the essays on Milton, Addison, Hallam, Pitt, Bacon, Byron, Chatham, Frederick the Great, Johnson, and Gladstone. Apart from their dazzling style and extensive erudition, they were remarkable from the light they threw upon historical events and illustrious men, for their originality of view and independence of thought.

A warm partizan of pure Whig principles, which colour all his writings and influence his estimates of the men and deeds of the past, he was called at a comparatively early age to play an important part in the political world. He entered Parliament in 1830 as member for Calne, and participated in the violent debates which attended the introduction of the celebrated Reform Bill. His speeches were characterized by forcible reasoning and felicitous illustration, and he defended Earl Grey's measures with so much vigour and effect, that he was offered the secretaryship of the Board of Control. In 1832 he was returned to the reformed House of Commons for the important borough of Leeds. Two years later he resigned his seat to proceed on a mission to Calcutta, where, as member of the Council and President of the Legislative Council (1834), he carried out numerous reforms in the Indian laws. In the face of a bitter and unscrupulous opposition, he passed an Act which submitted to the jurisdiction of the local courts the civil affairs of the English scattered throughout India, and consolidated various heterogeneous statutes into a harmonious whole, which is still known as the Macaulay Code.

While in India he collected the materials for his two fine contributions to Anglo-Indian history, the lives of Lord Clive and Warren Hastings. These display in an eminent degree all the peculiar merits of his style, and the power which he possessed of placing before the reader a picture equally distinguished by accuracy of detail, force of outline, and depth of colouring. Some passages seem to us superior to the most elaborate episodes in his English History.

Soon after his return to England (1839) Lord

Melbourne conferred upon him the post of secretary at war, which he held until the downfall of the Whig ministry in 1841. In 1840 he had been returned to Parliament by the electors of Edinburgh. He continued to represent the Scottish capital until 1847, when he was unseated on account of the liberal vote which he had given in favour of the Maynooth College Endowment. Scotch Presbyterianism could not pardon this exercise of independent thought, even in a man who had rendered such distinguished services to the great cause of civil and religious freedom. Macaulay was keenly sensible of the injustice done him, and retired from a parliamentary career to devote himself to his favourite studies. But at the instance of Lord John Russell he returned to public life, and from 1846 to 1848 held the office of quartermaster-general, with a seat in the Privy Council. In the latter year he was unanimously elected Lord Rector of the Glasgow University.

Notwithstanding his parliamentary and official labours, Macaulay had found time to prepare the great work which has made his name European, and placed him, *longo intervallo*, at the head of British historians. Our readers will remember the furore produced in 1848 by the appearance of the first volumes of his 'History of England from the Accession of James II. ;' how they were sought for at the circulating libraries as eagerly as a sensation novel; how ladies pronounced them to be more interesting than the most interesting romance; and how critics stood astonished by their originality of view, elaborateness of treatment, pictorial effect, and amazing erudition. They could not but recognize, with unwonted unanimity, the historian's profound knowledge of the most recondite authorities; his singular photographic power of sketching characters, manners, and historical events; his faculty of comprehending the tone and spirit of the age he delineated; and his vivid yet dignified style. Blending in his narrative traits, pictures, allusions, biographical sketches, and even classical quotations, he troubled himself but little, as he said in his preface, about what is called the dignity of history, so long as he succeeded in conveying to his readers an exact knowledge of the public and private life of their ancestors. Nor did he pretend to absolute impartiality. He could not but profess for the heroes of liberty, for the patriots who had bled and suffered that England's freedom might be established on an eternal basis, that earnest admiration which he felt, and he lauded their achievements as warmly as he denounced the tyranny or bigotry of their oppressors. His History, therefore, has not escaped the attacks of political critics, and Tory writers have laboured to impugn many of his conclusions. It cannot be said, however, that he has been convicted of misrepresentation except in two instances; and even his warmest admirers must admit that he has failed to do justice to the memory and fame of William Penn and John duke of Marlborough.

We may here enumerate the various honours which showed the public appreciation of the historian's genius. He was Lord Rector, as already stated, of the University of Glasgow in 1848; Trustee of the British Museum, 1847; Fellow of the Royal Society, November, 1849; Foreign Member of the French Academy, May, 1857, and of the Prussian Order of

Merit in the same year; High Steward of Cambridge, 1857. In the latter year he was raised to the peerage, a tribute, it has been said, to his high and blameless character and transcendent literary distinction, and an act of royal favour quite unexpected, but highly approved by all whose approbation was of real value. It may be added that though he took his seat in the House of Peers, he never spoke in that 'august assembly.'

The gradual decline of his health, and the immense research necessitated by an historical work conducted on such novel principles and laid out on so elaborate a scale, prevented Macaulay from continuing his enterprise with any great rapidity. It was not until 1855 that the third and fourth volumes of his History appeared, and these only carried the reader down to the peace of Ryswick in 1697.

His last literary labour was the composition of some biographies for a new edition of the 'Encyclopædia Britannica.' These include Atterbury, Johnson, and William Pitt, and are distinguished by all his peculiar merits.

Lord Macaulay was never married. Yet was he a man of strong domestic affections, and he lavished a wealth of love on the children of his sister, Lady Trevelyan. He was a warm friend and a generous opponent, and it may be truthfully said of him that in all his political life he excited no lasting enmity.

His last years were harassed by the distressing symptoms of pulmonary disease, and his friends and admirers saw with deep regret that there was little chance of his living to complete the colossal work on which, as on a monument more enduring than brass—*monumentum ære perennius*—he had hoped to establish the superstructure of an enduring fame. Yet his end, when it came, came suddenly and unexpectedly. He fell asleep, as tranquilly as he had lived, on the 28th of December, 1859, in the sixtieth year of his age; and English literature was prematurely deprived of one of its greatest glories. On the 9th of the following January his remains were honoured with interment in Westminster Abbey, where they lie, in Poet's Corner, at the foot of Addison's statue, near to Johnson, and among many others of our most famous statesmen, poets, and men of letters.

Something must now be said of Macaulay as a conversationalist, and we shall avail ourselves of the opinions of the dean of St. Paul's, no incompetent judge. There is a common impression that in society he was engrossing and overpowering. Every one has heard the witty saying of his old friend, Sydney Smith (no two men could appreciate each other more highly or more justly), about 'flashes of silence.' But in the quiet intercourse with a single friend, no great talker was more free, easy, and genial than Macaulay. There was the most equable interchange of thought; he listened with as much courtesy as he spoke with gentle and pleasant persuasiveness. In a larger circle, such as he delighted to meet and assemble around him to the close of his life, a few chosen intimates, some accomplished ladies, foreigners of the highest distinction, who were eager to make his acquaintance, his manners were frank and open. In conversation in such a circle, a commanding voice, high animal spirits, unrivalled quickness of apprehension, a flow of language as rapid as inexhaustible,

gave him perhaps a larger share, but a share which few were not delighted to yield up to him. His thoughts were like lightning, and clothed themselves at once in words. While other men were thinking what they should say, and how they should say it, Macaulay had said it all, and a great deal more. And the stores upon which his memory could draw seemed inexhaustible. A wide range of Greek and Latin history and literature, English, French, Italian, Spanish; of German he had not so full a stock, but he knew the best works of the best authors; Dutch he learned for the purpose of his History. With these came anecdote, touches of character, drollery, fun, excellent stories excellently told. The hearer often longed for Macaulay's memory to carry off what he heard in a single morning, in an after-dinner colloquy, or in a few hours in a country house.

With respect to Macaulay as an essayist a few observations may be permissible. His style was eminently individual, and its leading features were vigour and animation, copiousness, clearness, and above all, English, 'pure and undefiled'—the English of Addison, Steele, and Burke, enriched by his own copious imagination, and enlivened by a vivid poetic faculty. He was so strong, and so conscious of his strength, that sometimes he underrated the force of his own expressions. No ornament, however, is introduced for the sake of ornament; Macaulay's is the style of a Homeric hero, not of an Oriental potentate. Its lucidness is wonderful; no sentence need be read twice before you can apprehend its meaning. And not less wonderful is its pictorial power; it flashes upon the mind a series of brilliant pictures, each complete in detail and vivid in colouring, so that one feels as if walking through a picture gallery crowded with the masterpieces of a great artist.

As a poet, Macaulay's fame will rest on his 'Days of Ancient Rome,' his 'Armada,' 'Ivry,' 'Naseby,' and 'Moncontour.' In other departments of poetry he would probably have failed through his very affluence and prodigality; his prize poems and some of his early writings show that, like Tarpeia, the weight of his golden spoils would have crushed him. But the essence of the ballad, as an accomplished critic remarks, is simplicity—simplicity not inconsistent with the richest word-painting. The *vivida vis*—the life, force, movement—conspicuous in all Macaulay's writings, are displayed in his ballads with singular success, so that in English literature, and in their own peculiar line, they are unrivalled. They have called forth a host of imitations, but none have even approached their excellence. It must not, however, be supposed that Macaulay was a poet in the higher sense of the word; but he possessed the *poetic faculty*, and it is this which enhances the rare and surpassing merits of his prose.

No complete biography of this illustrious man of letters has yet appeared, but a brief sketch is prefixed to the eighth volume of the octavo edition of his History. See also Mr. Arnold's *Public Life of Lord Macaulay*; the preface, by Mr. Adam Black, to the biographies of Pitt, Atterbury, and Johnson; the *Imperial Dictionary of Biography*; the *Annual Register*; and the notices in *Blackwood*, *Fraser*, and other magazines, in January and February, 1860.

MACAW. [PSITTACIDÆ.]

MACAW-PALM, a genus of palms, the *Acrocomia sclerocarpa* of the West Indies. It comprehends a portion of those majestic species of palms which soar to the height of forty or fifty feet; and from their gigantic foliage and towering stems impart features of grandeur to the surrounding country. The fruit yields an oil of a golden yellow colour, of the consistence of butter, which has a sweetish taste, and emits an odour like violets. The nuts are sometimes fancifully carved by the natives, and highly polished.

MACBETH, or MACBEATHAD MAC FIN-LEGH, as the chroniclers call him, whose stormy career and terrible crimes have been immortalized by Shakspeare in a tragedy which is, perhaps, only second to 'Hamlet' as a work of the highest genius, was *maormor*, or ruler, of the province of Moray, and succeeded the 'gracious Duncan' as king of Scotland, on Duncan's defeat and death in battle, near Elgin, in 1039. In his administration he displayed great energy, no ordinary ability, and a fervent love of justice; but the partizans of the Duncan dynasty rose against him, and, assisted by Siward, the Danish earl of Northumbria, and Macduff, the *maormor* of Fife, defeated him at Dunsinane Hill in Perthshire, in 1054. It was not on this occasion, however, nor by the hand of Macduff, the man 'not of woman born,' that Macbeth fell. He was defeated and slain in fair fight, at Lumphanan in Aberdeenshire, in 1056, after a reign of seventeen years.

MACCABEES, a Jewish family celebrated for their heroic resistance to the oppression of the Greek kings of Syria in the second century before the Christian era. Their history is given in the apocryphal Books of the Maccabees, and in the 'Antiquities of the Jews' by Josephus. [ANTIOCHUS; ASMONEANS; JEWS; JUDAS MACCABÆUS.]

MACCABEES, THE BOOKS OF THE. Five books have come down to us under this title:—

1. *The First Book of the Maccabees* contains the history of the Jews during forty years, from the accession of Antiochus Epiphanes to the death of Simon Matthes, B.C. 135. The author is unknown. It is generally supposed to be a Greek translation from some Hebrew source, the work, probably, of a Palestinian Jew.

2. *The Second Book of the Maccabees* is abridged from an earlier work in five books, by one Jason of Cyrene, which was compiled from various sources, (2 Macc. ii. 23-32). The author is unknown, but from the style he is supposed to have been a Greek of Alexandria.

3. *The Third Book of the Maccabees* is prior in time to the first and second, and in fact has nothing to do with the history of the Maccabees. It contains the history of the Jews at Alexandria during eight or nine years, from the battle of Raphia in B.C. 217. The author is unknown.

4. *The Fourth Book of the Maccabees* contains an account of the martyrdom of Eleazar and the Seven Brethren (2 Macc. vi. vii.), and of the attempt of Heliodorus to plunder the temple (2 Macc. iii.)

5. *The Fifth Book of the Maccabees* only exists in Arabic and Syriac. It extends from the attempt of Heliodorus to plunder the temple to within a few years of the birth of Christ. The first two books are received by the Church of Rome; the last three

by no Christian church. (Dr. Cotton's *Five Books of the Maccabees*.)

MACCLESFIELD, a municipal and parliamentary borough, in the county of Cheshire, 168 miles N.N.W. from London, and 15 miles S.S.E. from Manchester, is situated on the west side and at the base of a range of high land which is on the borders of Cheshire and Derbyshire, and is a part of the mountain region of the latter county. The Bollin, an affluent of the Mersey, runs through the town. A canal, which unites the Grand Trunk and Peak Forest canals, passes close to Macclesfield, and thus opens a water communication with most parts of England, and a railway extends from Manchester through Stockport to Macclesfield. The town contains four principal streets, diverging from the market-place in various directions; and there are four chief entrances from London, Chester, Manchester, and Buxton. The guild hall is a modern Greek edifice, of graceful design, and the public room is well adapted for concerts and meetings. A subscription library contains about 20,000 volumes. The court-house and gaol are situated in the market-place. The town is lighted with gas, and supplied with water conducted in pipes from the adjoining hills. The various factories are situated on the Bollin. One of the cotton factories cost 30,000*l.*, and some of the silk factories 14,000*l.*; but the value of the latter has been much depressed by the deterioration of the silk-trade. The town contains a dispensary, a savings bank, a free grammar-school, endowed in 1502, and many trusts for charitable purposes.

St. Michael's church was founded by Eleanor, queen of Edward I., in 1278. There are six other churches in the town, besides one in each of the suburbs, Sutton and Hurdfield. There are also various places of worship belonging to different classes of dissenters.

Macclesfield is one of the chief seats of the silk-throwing trade, which progressively advanced from 1808 to 1825, when it attained its greatest prosperity. It has since been much prosperous, but is still large, employing upwards of seventy mills. Every variety of silk article is produced here, from the narrowest riband to the different kinds of sarsonets, plain and figured gros de Naples, satin, silk, vestings, and velvets. It is likewise the chief place for the manufacture of silk handkerchiefs of every description. It has two weekly markets, and five annual fairs.

The municipal borough is divided into six wards, and is governed by twelve aldermen and thirty-six councillors. The population of the borough, which returns two members, in 1861, was 36,101. The parliamentary and municipal limits are co-extensive. The number of voters on the borough register in 1866 was 949.

M'CRIE, THOMAS, was born at Dunse in Berwickshire, November, 1772. He entered at the University of Edinburgh in 1788, and was licensed as a clergyman, in 1795, in that branch of the secession from the Church of Scotland termed Anti-Burghers. He was immediately afterwards chosen pastor of a congregation in Edinburgh, where he continued to reside during his whole life. In 1812 he published 'The Life of John Knox;' and this was followed by 'The Life of Andrew Melville.' Both

of them are works of great research and much merit, though written with strong feelings in favour of the subjects of his biographies. Their author led a blameless, simple life, and died August 5, 1835.

MACDONALD, ETIENNE JACQUES JOSEPH ALEXANDRE, Duke of Tarentum and Marshal of France, was born November 17, 1765, at Sancerre, in the department of Cher, though some authorities make Sedan the place of his birth. He became one of Napoleon's most distinguished generals. His rise in the French army was extremely rapid. He first served on the staff of General Dumouriez during the Revolution. Under Pichegru he distinguished himself by the passage of the Waal, and was made general of division. Subsequently he was made governor of Rome; he commanded at Versailles during the 18th Brumaire, and in 1800, as commander-in-chief of the reserve army of Switzerland, effected his celebrated passage of the Splügen, which was more difficult than that of Napoleon over the Great St. Bernard.

His brilliant exploits under Napoleon belong to history. Napoleon himself presented him with the marshal's baton on the field of Wagram. In April, 1810, he was created Duke of Tarentum. He was with Napoleon in his Russian and German campaigns, adhered to him faithfully in his decline, and endeavoured to procure favourable terms for him from the allies.

On the first restoration of the Bourbons, Macdonald was called to the Chamber of Peers. He steadily refused to join Napoleon on his return from Elba, and on the second restoration of the Bourbons was named chancellor of the Legion of Honour, which office he retained till 1831. He died at Paris, September 24, 1840.

MACDUFF. [BANFFSHIRE.]

MACE. [MYRISTICAL.]

MACEDO'NIA. The boundaries of this country varied at different times. In the days of Strabo it included a considerable part of Illyricum and Thrace; but Macedonia Proper was separated from Thessaly on the south by the Cambunian mountains; from Illyricum on the west by the great mountain chain called Scardus and Bernus, and which under the name of Pindus also separates Thessaly from Epirus; from Mæsia on the north by the mountains called Orbélus and Scomius, which run at right angles to Scardus; and from Thrace on the east by the river Strymon. The Macedonia of Herodotus was still more limited. Macedonia Proper, as defined above, is watered by three large rivers, the Axios (*Vardar*), the Lydias, and the Haliacmon, which flow into the Thermaic Gulf (the modern Gulf of Saloniki). The whole of the district on the sea-coast, and to a considerable distance in the interior, between the Axios and the Haliacmon, is low and marshy. The only other rivers of any importance were the Strymon and the Angites, whose valleys were separated from that of the Axios by a range of mountains which run from Orbélus on the north towards the peninsula of Chalcidice. The Strymon (*Struma*) rises in Mount Scomius, and flows into the Strymonic Gulf (*Gulf of Orphano*). Not far from the sea it forms a lake, called Cercinitis (*Kerkine*) into which the Angites flows from the eastward.

The Macedonians were probably an Illyrian people, though it appears that their princes were an Hellenic

race, and parts of the country were inhabited by Hellenic tribes from an early period. Perdiccas is usually regarded as the founder of the kingdom, the limits of which were confined to the country in the neighbourhood of Edessa, between the Lydias and the Haliacmon. Very little is known of its history till the reign of Amyntas I., who was king at the time of the expulsion of the Pisistratidae from Athens, B.C. 560. Amyntas was succeeded by his son Alexander I., who was obliged to accompany the Persian army into Greece, but was able to render important services to the Grecian cause. The time of Alexander's death is uncertain, but he lived at least to B.C. 463. He was succeeded by Perdiccas II., who took an active part in the Peloponnesian war, and alternately assisted Athens and Sparta. His successor Archelaus (B.C. 413) was the wisest king that had yet sat upon the throne of Macedonia. [ARCHELAUS.]

On the assassination of Archelaus, B.C. 399, confusion prevailed for many years; and it was not till the accession of Amyntas II. (B.C. 393), that order was restored. Amyntas was succeeded by his eldest son Alexander II., who was assassinated at the end of the first year of his reign by Ptolemæus Alorites, who was regent for three years during the minority of Perdiccas; but in consequence of abusing his trust he was cut off by Perdiccas, B.C. 364. Perdiccas, after a reign of five years, fell in battle against the Illyrians, B.C. 359, and was succeeded by his younger brother, the celebrated Philip. [PHILIP.] Philip was succeeded by Alexander the Great. [ALEXANDER.] In the disturbances which followed the death of Alexander the royal family was destroyed, and Cassander obtained at first the power, and eventually the title, of king of Macedon. Cassander was succeeded by his son Philip, B.C. 296, who reigned two years; and on his death, in B.C. 294, his two younger brothers, Antipater and Alexander, having quarrelled respecting the succession, the throne was seized by Demetrius, the son of Antigonus, who reigned seven years. He was driven from his kingdom, B.C. 287, by Pyrrhus, king of Epirus, who was deposed, after a reign of seven months, by Lysimachus, king of Thrace. [LYSIMACHUS.]

On the death of Lysimachus, B.C. 281, the country remained in a state of anarchy for many years, during the invasion of the Gauls from B.C. 280 to B.C. 278, and the contests between the numerous pretenders to the throne. Eventually Antigonus (surnamed Gonatas), the son of Demetrius, was proclaimed king, but was dethroned by Pyrrhus, who again obtained the kingdom on his return from Italy. After the death of Pyrrhus, Antigonus regained possession of the throne, which he retained till his death, B.C. 239. The two following kings, Demetrius II. (B.C. 239-229) and Antigonus II. (B.C. 229-220), were principally occupied in the Grecian wars which followed the formation of the Achæan league. [ANTIGONUS.]

Philip V., who succeeded Amyntas, alarmed at the increasing power of the Romans, entered into an alliance with Hannibal. On the conclusion of the war with Carthage he was unable to cope with the Roman power, and after continuing the contest for a few years, was obliged to sue for peace. Philip was succeeded by Perseus, B.C. 178, who carried on war against the Romans, and was finally conquered,

B.C. 168. Macedonia was divided into four districts, which were considered independent, and governed by their own laws, and of which the capitals were respectively—Amphipolis, Thessalonica, Pella, and Pelagonia. Macedonia was reduced to the form of a Roman province, B.C. 142.

It is very difficult to determine its boundaries at this date. According to the 'Epitomizer' of Strabo (vii.), it was bounded by the Adriatic on the west; on the north by the mountains of Scardus, Orbelus, Rhodope, and Hæmus; on the south by the Via Egnatia; and on the east it extended as far as Cypselæ and the mouth of the Hebrus.

MACER, EMILIUS, a Roman jurist, who lived under the Emperor Alexander Severus, or shortly after his time. He was either a contemporary of Ulpianus, or wrote after Ulpianus, for he cites him several times. There are 275 excerpts from Macer in the 'Digest.'

MACERATA, a province of central Italy, having a fertile soil, an area of 1056 square miles, and in 1863, 239,411 inhabitants. The principal rivers are the Esina, Potaiza, Chienti, and Musone, which rise in the Apennines and flow into the Adriatic.

The chief towns are the following:—*Macerata*, on a hill in a fine country watered by the Chienti, a well-built town, inclosed by walls, with 19,283 inhabitants, several churches and convents with good paintings, a cathedral, theatre, college, and a university with a library containing 20,000 volumes, a handsome town-house, and several fine private palaces, amongst which the palace Compagnoni is the most remarkable. *Macerata* is a bishop's see. It carries on a considerable trade in corn, silk, and cattle. *Loretto*, famous for its sanctuary of the Madonna, called the Santa Casa or holy house, which is said to be the house in which the Virgin Mary lived at Nazareth, and to have been miraculously carried, first to a hill near Fiume in Dalmatia, and finally, in 1294, to its present site, about 15 miles S.E. of Ancona, near the Adriatic coast. The ground on which the house was deposited belonged to a woman called Lauretta, whence the name of Loretto. The town which has grown up around the sanctuary is well built, and in 1862 contained 8000 inhabitants. The celebrated Holy House stands within a magnificent church. It is a small brick house, with one door and one window, originally of rude material and construction, but now, from the devotion of pilgrims for many generations, a marvel of art and costliness. It is entirely cased with white marble exquisitely sculptured. *Recanati*, near the Adriatic, with 3000 inhabitants, is now a small fishing town, but it has a cathedral, a town-hall rich in works of art, a communal and other palaces, and an aqueduct by which water is conveyed to Loretto. Near it are the ruins of *Potentia*. It was an important military post in the middle ages. *Tolentino*, farther inland, near the foot of the Apennines, has a cathedral, and manufactures of dressed skins. Here, in February, 1797, the pope ceded by treaty the Romagna to the French republic; and in May, 1815, Murat retired with his troops before the Austrians. *Camerino*, the ancient Camerinum, an old town among the Apennines, and a bishop's see, with several churches and convents, and some silk factories. *Fabriano*, farther north, a bishop's see, with a cathedral, manufactories of paper

and parchment, and a considerable trade in wool. *San Severino* is 15 miles W.S.W. of Macerata, on the Potaiza, and has 4334 inhabitants. It is a bishop's see, has two cathedrals, and several churches, with many interesting paintings. *Matelica* is 6 miles farther in the same direction, on the eastern side of the Apennines, with a population of 7355, who carry on some manufactures of coarse woollen cloths. It is inclosed by walls, and has several churches and convents.

MACERATION is the steeping of substances in cold liquids, either merely to soften the parts of the substance operated on, or to dissolve the aromatic parts of a substance when *digestion* would not merely dissolve, but dissipate them.

MACERS, in Scotch law, are officers attached to the Courts of Session, Justiciary, Teinds, and Exchequer. Their duties are to preserve silence in court, to call the rolls of court, and to execute such warrants for the apprehension of delinquents as are addressed to them. (*Bell's Law Dict.*, art. *Macer*.)

MACGILLIVRAY, WILLIAM, LL.D., Professor of Civil and Natural History in Marischal College, Aberdeen, was born in the Isle of Harris. Having in early life taken up his residence at Edinburgh, and devoted himself to the pursuit of natural history, he became assistant to Professor Jameson in the Natural History and Geological Museum of the Edinburgh University. He afterwards received the appointment of Curator of the College of Surgeons in Edinburgh. He pursued the study of natural history in all its branches with great ardour. After having been appointed to the professorship of natural history in Marischal College, Aberdeen, he produced several valuable works, which have largely contributed to the interests of science. In 1839 he brought out a 'Manual of Geology, with a Glossary and Index,' and afterwards a 'History of British Birds,' a 'History of British Quadrupeds,' a 'History of the Molluscous Animals of the Counties of Aberdeen, Kincardine, and Banff,' 'Conchologist's Text-book,' the last of which has been very successful. He died in 1852.

MACGILLYCUDDY REEKS. [*KERRY.*]

MACHAIRODUS, a genus of extinct animals established by Professor Kaup upon those canine teeth with serrated or denticulated edges which have been attributed to bears (*Ursus cultridens*, &c.) by Cuvier and others, and to great cats (*Felis*) by Bravard.

Professor Owen has no doubt that the teeth belonged to a mammiferous animal; and the proof is afforded by the specimen examined, which shows that the tooth was originally locked in a socket, and not anchored to the substance of the jaw, and that the fang is contracted and solidified by the progressive diminution of a temporary formative pulp, and does not terminate in an open conical cavity, like the teeth of all known Saurians, which are lodged in sockets. Careful comparison will show that the canine teeth of *Machairodus* are very far from those of the bears, and sufficiently removed from those of the tiger, though those of the latter present serrated edges. On looking at the catalogue of the extinct species found at Epplesheim, we do not find any large fossil ruminant noticed, though we find large cats, some as large as a lion, and another carnivorous animal (*Agnotherium*), allied to the dog and also as large

as a lion; and we are not without existing ruminants with very long canine teeth in the upper jaw with serrations on their edges, though not so broad in proportion as those of *Machairodus*.

MACHECOUL. [*LOIRE-INFÉRIEURE.*]

MACHIAVELLI, NICCOLO' DI BERNARDO DEL, was born at Florence in 1469, of an old though not wealthy family of that republic. When twenty-nine years of age, he was made secretary of the 'Ten,' a board which had the management of foreign affairs. His abilities and penetration being soon perceived by his superiors, he was successively employed on many and some very important missions. In the year 1500 he was sent as a commissioner to the Florentine camp before Pisa, and subsequently to Paris to conciliate the king towards the Florentines. On both occasions his labours were crowned with success.

In 1502 he was despatched as ambassador to Duke of Valentino, the formidable Cæsar Borgia, who was then at Imola in Romagna, to make professions of friendship on the part of the Florentines. His account of this mission is extremely curious. Borgia's object was to obtain the command of the Florentine forces; that of Machiavelli to refuse it without offending the tyrant. In August, 1503, Alexander VI. died, and his successor, Pius III., died a few days after. A new conclave being assembled in October, the Florentines sent Machiavelli to Rome, where he was present at the election of Julius II., and soon after witnessed the fall of Cæsar Borgia. After visiting France, Rome, and some other places, on various missions, Machiavelli was sent in 1507 to the Emperor Maximilian in Germany. On his return he wrote several reports on the affairs of Germany: 'Rapporto sulle Cose di Lamagna;' 'Discorso sopra le Cose dell' Alemagna;' 'Ritratti di Lamagna.'

In February, 1509, he was sent to the camp before Pisa, which was besieged by the Florentines, and in July, 1510, to France a third time. The object of this mission was to encourage the French court to maintain the alliance with the pope and the emperor against the Venetians (the league of Cambrai), and to induce Louis to prevent the Swiss from enlisting in the service of the pope. Machiavelli returned to Florence in September, 1510, having consolidated the alliance of Florence with France.

When in 1512 the Medici possessed themselves of Florence, Machiavelli, with others of the popular government, was banished, and subsequently imprisoned and put to the torture on suspicion of being implicated in a conspiracy against the Medici. He persisted in declaring himself innocent, and was released by the intervention of Leo X. He then withdrew from public life, and wrote his discourses upon Livy, his books on the art of war, and his 'Principe.' In this work he treats of what he terms mixed principalities, as distinct from republics and hereditary monarchies. The 'Principe' was first published, after Machiavelli's death, at Rome in 1532. The 'Legazioni,' or letters of the political missions of Machiavelli, which are the key to his 'Principe,' were not made public till the middle of the last century.

The chief works of Machiavelli, not mentioned above, are:—'Storie Fiorentine,' which he presented to Clement VII. in 1525, and which come down to the death of Lorenzo the Magnificent, in 1492; and

he has left fragments which bring down the history of Florence to 1499; 'La Mandragora,' and 'La Clizia,' two comedies; 'Sette Libri dell' Arte della Guerra;' 'Discorso si la Lingua di Dante, Boccaccio, e Petrarca, debba chiamarsi Italiana, Toscana, o Fiorentina;' besides minor productions and a multitude of letters. The best editions of his works collectively are those of Florence, 1783, 6 vols. 4to; 1796, 8 vols. 8vo; and 1818, 10 vols. 8vo.

MACHICOLATION, a term applied to those openings in the parapet of a fortified building through which ignited combustibles, melted lead, stones, &c., were poured and hurled down upon the besiegers. The apertures were formed in the soffit or under surface of the projecting parapet, which was supported upon corbel stones, the perforations themselves being in the soffit, between those stones. By this contrivance the besieged were enabled to harass their assailants, while they themselves were protected by the parapet and its battlements. Machicolations were frequently confined to particular situations, such as over an entrance-gateway and the towers flanking it, or other parts most likely to be assaulted.

MACHINE, an object by the intervention of which a motive power is made to act upon any body, and overcome the force by which the latter resists the effort to change its state of rest or motion. The advantage which any machine affords for overcoming resistance consists in the reaction by which it supports a certain portion of the weight producing that resistance, so that the motive power has only to counteract the remainder. This may be immediately observed in those simple machines called the mechanical powers. For example, in the lever, the wheel and axle, and the pulley, any convenient portion of the resistance may be made to rest on the point of support, or the point of suspension. Again, in the inclined plane, the wedge, and the screw, the motive power, the resistance, and the reaction of the support being, in the case of equilibrium, represented by the three sides of a triangle, the ratio of the first to either of the others may be varied at pleasure by the construction of the machine.

The powers employed to give motion through machinery to any object, are produced by the muscular strength of men or animals; the actions of weights, springs, wind, water, heat, and electricity; and these powers may generally be considered as pressures exerted during certain portions of time. Even that power which is produced by a sudden impulse, as when a rammer descending by its weight falls on the head of a pile, is only a pressure existing during an indefinitely short interval of time. The point in any machine to which the moving power is applied is called the impelled or driving point, and that against which the resistance acts is called the working point.

In estimating the power of a machine, it is usual to make the measure of the power depend on the condition that the impelled and working points shall be in a state of uniform motion. For then, agreeably to the law of the conservation of energy, the velocities of those extreme points are inversely proportional to the forces which would be in equilibrio at the same points; the same principle in other words being that in every machine, simple or complex, the pressure at the impelled point, multiplied by the velocity of that

point, is equal to the product of the resistance at the working point by the velocity of the same point; or work done is equal to energy excited. When there are several working points, the whole work done is the sum of the quantities of work done at those points; and the energy exerted is equal to that sum.

The whole work done by a machine is distinguished into useful work and wasteful work, according as it is done in overcoming useful and wasteful resistance. For example, in a pumping engine, the work done in raising the water is useful, and that done in overcoming friction wasteful. The ratio of the useful work to the whole work is called the *efficiency* of the machine, and is always a fraction less than unity.

MACHINE, CALCULATING. [**CALCULATING MACHINE.**]

MACHINES OF WAR. Among the ancients there was a great variety of destructive implements in use, which are frequently mentioned in the history of ancient warfare. Thus the Greeks had the Battering Ram; the Chelone, or tortoise; the Scaling ladders (Climaces); the Helepolis, the Chroma, or Agger, which was raised higher than the wall; the Catapulta, from which they threw arrows; Purgi, towers of wood; and Lithoboli, from which stones were thrown with great velocity and force. Among the Romans, the principal machines of war were:—the Aries, or Ram; the Testudo, or tortoise; the Ballista; the Catapulta; the Scorpion; the Bel-fragium; the Pluteus, &c. The Roman machines were adopted under various names in the middle age. Besides the above, Grose enumerates the Mangona, the Trebuchet, the Petiary, the Mafafunda, the Warwolf, &c., for throwing stones; the Bricolle, the Espringall, &c., for throwing darts; and the Cat for sieges.

MACINTOSH CLOTH (so called from the inventor) is a singular but very useful manufacture, consisting of two layers of fine cotton, cemented with a solution of caoutchouc in coal naphtha, or liquid india-rubber, and so completely conjoined as to appear one material. The cotton pieces, thus coated with the liquid, are passed between two smooth wooden rollers, and so thoroughly pressed as to be made to unite permanently and durably. Cloth thus prepared, when perfectly dried, may be cut and made into garments which will bear the roughest wear, and be impervious to the most soaking rains. For travelling overcoats they are of great service.

MACKENZIE, the name of a large river in British North America, rises in the Great Slave Lake, and running in a north-westerly direction enters the Atlantic by several mouths, about lat. 68°-50' N. Forts Simpson, Norman, and Good Hope are on its banks. The Mackenzie is estimated to be 870 miles long, though from the source of the Slave River, the principal feeder of the Slave Lake, to the ocean is over 1770 miles. An extensive deposit of lignite accompanies its course and its estuary westward. It takes its name from its discoverer, Alexander Mackenzie, by whom it was first navigated in 1789.

MACKENZIE, SIR ALEXANDER, emigrated from Scotland to Canada when a young man. He rendered important services to geographical knowledge by his intrepid expeditions from Fort Chipewyan down the Mackenzie River to the Northern Ocean, in

lat. 68° 50, in 1789; and from Montreal through the continent to the Frozen and Pacific Oceans, in 1792. Of this last expedition he has left a full account, published in London, 1801.

MACKENZIE, SIR GEORGE, of Rosehaugh, was born at Dundee in 1636. He was by profession a lawyer, and held for many years the important situation of justice-depute. He represented Ross in the Scottish Parliament. He is known chiefly by his 'Institutions of the Laws of Scotland,' 1684, a concise and excellent compendium of the law; and his 'Moral Essay upon Solitude.' He wrote, however, many other works, and was among the first Scotchmen who wrote the English language in a style approaching to purity. He died May 2, 1692.

MACKENZIE, HENRY, was born at Edinburgh in August, 1745. He was the son of Dr. Joshua Mackenzie, a physician. Educated at the high school and university of his native city, he afterwards became one of the attorneys in the Scottish Court of Exchequer. While in London, in 1765, studying the English practice in Exchequer, he had begun to write his earliest and best novel, 'The Man of Feeling,' which was published anonymously in 1771. In 1783 he published his second novel, 'The Man of the World;' and next came 'Julia de Rouigné,' his last considerable work of this class. Meantime he had edited two well-known periodicals: 'The Mirror,' which continued to appear weekly for seventeen months from January, 1779; and 'The Lounger,' which, begun in February, 1785, came to a close about two years afterwards. Besides minor productions he wrote several plays, of which the principal are, 'The White Hypocrite,' 'The Spanish Father,' and 'The Prince of Tunis.' He was likewise a political writer in the Tory interest. In 1808 he edited a complete collection of his literary works, in eight octavo volumes; and this was almost his last contribution to literature. He died in Edinburgh, January 14, 1831.

MACKEREL. [SCOMBRIDÆ.]

MACKINTOSH, SIR JAMES, the historian, was born at Aldourie, on the banks of Loch Ness, October 24, 1765. He received his education at the universities of Aberdeen and Edinburgh, came to London, and was called to the bar in 1795. In 1804 he went to India as recorder of Bombay. He returned to England in 1812; in 1818 he was appointed to the professorship of law and general politics in the college instituted for the education of the civil servants of the East India Company at Haileybury. In 1830, when the Whigs came into office, Sir James was appointed a commissioner for the affairs of India. He died May 30, 1832.

Sir James' principal works are his 'Vindiciæ Gallicæ,' his 'History of England' (which he left unfinished at his death); his 'Dissertation' prefixed to the 'Encyclopædia Britannica;' and his 'Life of Sir Thomas More.'

MACKLIN, CHARLES, actor and dramatist, according to the account of a female relative, 'was two months old at the battle of the Boyne' (July 1, 1690). He began life as a saddler's apprentice, but in his twenty-first year joined a strolling company as harlequin, and pursued the vocation of an actor thenceforward with various fortune till 1789. He died in London, July 11, 1797. He was a clever

actor, and celebrated for his performance of Shylock. He also wrote several dramatic pieces, of which 'Love à la Mode,' a farce, and the 'Man of the World,' a comedy, are occasionally performed.

MACKNIGHT, JAMES, D.D., born 1721, died 1800, was a clergyman of the Church of Scotland, and of considerable eminence among the theological writers of the last century. He wrote 'A Harmony of the Gospels, with copious illustrations, being in fact a life of our Saviour, embracing everything which the Evangelists have related concerning him;' and 'A new Translation of the Epistles.' Both these works were favourably received, and are by many persons highly esteemed.

MACLAURIN, COLIN, was born at Kilmoran, in Argyleshire, in February, 1698. The care of his education devolved upon an uncle, who sent him to the University of Glasgow at the age of eleven. It is said that in the following year, meeting accidentally with a copy of Euclid, he made himself master of the first six books in a few days, a story utterly incredible upon the mere statement. It is said also, and with much more likelihood, that at the age of sixteen he had invented many of the propositions afterwards published in his 'Geometria Organica.' However this may be, he took the degree of Master of Arts with distinction in the fifteenth year of his age (1713), and afterwards lived in studious retirement till the autumn of 1717, when, after a severe competition and ten days' examination, he obtained the professorship of mathematics at the Marischal College, Aberdeen. In 1719 and in 1721 he visited London, and formed the acquaintance of many eminent men, particularly of Newton.

In 1725 he was appointed to assist James Gregory, whose strength was declining, in the duties of his chair at Edinburgh. The want of funds to pay an assistant placed difficulties in the way of this arrangement, which were removed, but how is not clearly stated. We mention them here to record, in honour of Maclaurin, that Newton, on hearing of the obstacles, offered to pay twenty pounds a year, till Gregory's death, towards the assistant's salary, if Maclaurin were to be appointed. At Edinburgh he remained almost all the remainder of his life. When the rebellion broke out in 1745, he exerted himself vigorously for the existing government, and the hasty works which were thrown up for the defence of Edinburgh were planned and superintended by him: fatigue and exposure laid the foundation of a mortal disorder. When the Pretender entered Edinburgh, Maclaurin withdrew, to avoid making the submission which was demanded: but he had previously managed to introduce a good telescope into the castle, and to contrive a method of supplying the garrison with provisions. He accepted the invitation of Dr. Herring, archbishop of York, with whom he remained till it was safe to return to Edinburgh. Shortly after his return, he died of dropsy, June 14, 1746, aged forty-eight years.

The writings of Maclaurin are not numerous, but they have exercised considerable influence upon the mathematical studies of this country; more however, we think, in what has been taken from them, or on their model, by others, than in the extensiveness of their own circulation.

MACLE (*Chiastolite*) is a right rhombic crystal,

composed of two substances; one of a yellowish white, sometimes translucent, and of a glassy fracture; the other bluish black, opaque and dull. It is, in fact, a silicate of alumina, and contains a small portion of oxide of iron and magnesia.

MACLUREITE (*Condrodite*, *Brucite*) occurs imbedded in rounded masses, the larger of which present occasional crystalline appearances of rhombic prisms with dehdral terminations. It consists principally of silica and magnesia.

MACON, the *Matisco* of Julius Cæsar, the capital of the French department of Saône-et-Loire, is situated on the right bank of the Saône, in 46° 18' N. lat., 4° 50' E. long., 40 miles N. from Lyons, on the Paris-Lyons Railroad, and has 18,006 inhabitants. The town stands on the slope and at the foot of a hill above the Saône, along the bank of which is a noble quay, from which the distant Alps may be seen. The chief public buildings are—the cathedral, old episcopal palace, Hotel de Ville; national college, and normal school; the town-hall, which contains a theatre and public library; the general hospital, on the parade; the church of St. Vincent; and the prison. Among the Roman antiquities are a triumphal arch and the ruins of a temple of Janus. The inhabitants carry on a considerable trade in the wines of the district, corn, cattle, &c. There are manufactures of blankets, leather, earthenware, watches, and jewellery. It was the birthplace of Lamartine.

MACON. [GEORGIA.]

MACPHERSON, JAMES, was born in 1738 at the village of Ruthven, in Inverness-shire. He studied at King's College, Aberdeen, and on leaving college he was appointed schoolmaster of his native village; and it was while holding this situation that he gave to the world what appears to have been his first publication, a poem entitled 'The Highlander,' in 1758. He afterwards became known for his enthusiastic love of the ancient poetry of Scotland, which he translated from the Gaelic, and published at different times between 1759 and 1763. He attributed these poems to Ossian, which occasioned a lively controversy among the learned of the day as to their genuineness. From a recent investigation, conducted by competent authorities, it has been conclusively established that the Ossianic poems are not authentic, though undoubtedly embodying many Gaelic ballads and traditions. In 1771 he published a disquisition on the antiquities of the Scottish Celtic race, under the title of 'An Introduction to the History of Great Britain and Ireland;' in 1773 a prose translation of the 'Iliad' of Homer; in 1775 a 'History of Great Britain from the Restoration to the Accession of the House of Hanover,' in 2 vols. 4to, together with two volumes of 'Original Papers,' which last work he sold to the booksellers for 3000*l*. At last his appointment to the lucrative office of agent to the nabob of Arcot turned his attention and pen to Indian affairs; and he was brought into Parliament in 1780, as member for Camelford, for which he sat till 1790. He died February 17, 1796.

MACQUARIE, a river of New South Wales called by the natives *Wambool*, is formed by the junction of the Fish and Campbell rivers, in the counties of Bathurst and Westmoreland, and flows N.W. to lat., 36° 45' S., long. 145° 20' E. where it loses itself in the Macquarie marshes, from whence issue tribu-

taries of the river Darling. In some places it is deep, broad, and navigable, in others rapid, and obstructed by falls; its total course is about 230 miles.

MACRA'SPIS (*MacLeay*), a genus of Coleopterous insects of the section *Lamellicornes*, and, according to Latreille's classification, belonging to the third division of that group, the *Xylophili*. The genera *Macraspis* and *Chasmodia* constitute two closely allied groups of the family *Rutelidæ*, the species of which inhabit the warmer parts of South America, and are remarkable for the large size of their scutellum.

The insects of these two genera fly by day about trees, emitting a humming noise, and feed upon flowers. Collections formed in Brazil usually contain many of these insects.

Dejean, in his 'Catalogue des Coléoptères,' enumerates twenty-six species of *Macraspis* and five of *Chasmodia*.

MACRAUCHENIA, Professor Owen's name for a large extinct mammiferous animal, referable to the order *Pachydermata*, but with affinities to the *Ruminantia*, and especially to the *Camelidæ*.

The remains on which the professor founded this genus included two cervical vertebræ, seven lumbar vertebræ, all more or less fractured; a portion of the sacrum and ossa innominata; fragments of the left scapula, of the right radius and ulna, and right fore-foot; the right femur nearly entire, the proximal and distal extremities of the right tibia and fibula; and a metatarsal bone of the right hind-foot. These portions of the skeleton were discovered by Mr. Darwin in an irregular bed of sandy soil, overlying a horizontal accumulation of gravel on the south side of Port St. Julian, on the east coast of Patagonia, and belonged to the same individual.

MACROBIUS, AMBROSIUS AURELIUS THEODOSIUS, probably lived about the middle of the fifth century of the Christian era. The place of his birth is uncertain; but he says, in his preface to the 'Saturnalia,' that the Latin language was not his mother-tongue.

Three works of Macrobius have come down to us: a commentary on the 'Somnium Scipionis' in the sixth book of Cicero's 'Republic;' 'Dialogues' which were supposed to have taken place during the Saturnalia at the house of Vettius; and a 'Treatise on the Latin and Greek Verb,' which, however, is imperfect. The 'Saturnalia' is the most important and interesting. Although written in indifferent Latin, and full of trifling absurdities, it contains much valuable information. It is divided into seven books.

MACRODACTYLES, Cuvier's name for a family of Wading Birds (*Echassiers*) [GRALLATOIRES], which have very long feet, formed for running over marshy or water plants, or even for swimming, especially in those numerous species which have the feet fringed or bordered. There is not, however, any membrane between the bases of their toes, not even between those of the external ones.

The following genera are arranged by Cuvier under this family, which terminates his order *Echassiers*:—*Parra*, *Palamedea* (including *Charina*), *Megapodius*, *Rallus*, *Fulica*, (including *Gallinula*, and *Porphyrio*), *Chionis*, Forst. (*Vaginalis*, Lath.), *Glaucola*, Gm., *Phenicopterus*. Cuvier's sixth order, *Palmipedes*, immediately succeeds this family, which is somewhat heterogeneous, and composed of birds

whose habits are not similar. *Phanicopterus* cannot be said to be without any membrane 'between the bases of the toes,' &c., for its anterior toes are united to the nails by a lunated membrane. [FLAMINGO.]

MACROOM. [CORK.]

MACROPO'DIANS, a tribe of brachyurous decapod Crustaceans, being the first of the family of *Oxyrhynchi* (Milne-Edwards), and nearly corresponding with the genus *Macropus* of Latreille, remarkable for the enormous length of their feet, which has obtained for them the name of *Sea-spiders*.

Habits, Food, &c.—The localities of the Macro-podians are considerable depths in the sea, where they lie hid among the sea-weeds; they are also found on oyster banks. They walk slowly and unsteadily. The weakness of their claws must render them not formidable to other marine animals, and the probability is that they live principally on *Annelids*, *Planarie*, and small molluscs. (Milne-Edwards.) The genera are numerous.

MACRO'PUS, the scientific name for the Kangaroos. [MARSUPIALIA.]

MACROURA, or MACRU'RA, the scientific name for that section of Crustaceans which have the abdomen, usually called the tail, long, in contradistinction from that section (*Brachyura*) which have the tail short. The common lobster is an example of a macrurous crustacean, and the common crab of a brachyurous crustacean. [CRUSTACEA.]

MACTRA, a genus of conchiferous mollusca, under which above sixty species are ranged, forming the family *Mactridae*, or kneading trough shells, of which Mactra is the type. There are between thirty and forty fossil species, belonging chiefly to the *Lias*. The *Mactridae* are found in all seas, though they occur in greatest abundance in those of the tropics, to a depth of above thirty fathoms. The shell is nearly equilateral. The animal has its mantle partially open, its margins fringed, with foot large, linguiform, and heeled. The *Mactridae* are favourite food of the star fishes.

MACULÆ (Lat. 'spots'), dark spots, supposed to be openings in the atmosphere or vapour, but apparently looking like blemishes on the surface of the sun and moon, and on some of the planets. The solar spots vary greatly in size and duration. They were first observed by Galileo in Italy, and Harriot in England.

MC'ULLAGH, JAMES, F.R.S., Professor of Natural Philosophy in the University of Dublin, was born at Lough-lindhuussey, co. Tyrone, in Ireland, in 1809. He was educated at the school of the Rev. J. Graham, at Lifford; and in 1824 entered Trinity College, Dublin, as a pensioner. Throughout his undergraduate course he gained every honour both in science and classics. In 1835 he was appointed Professor of Mathematics; and in 1843 was selected to fill the chair of Natural Philosophy. In 1830 he read his first paper on refracted light before the Irish Academy; and in 1838 received the Conyngham gold medal for a valuable paper 'On the Laws of Crystalline Reflexion and Refraction.' In 1842 he received the Copley medal of the Royal Society for his investigations on the theory of Light; and in 1843 he was elected a Fellow of that learned body. He died in 1848.

MADAGASCAR (called by the natives Made-

casse), a large island in the Indian Sea, about 240 miles (across the Mozambique Channel) from the coast of Mozambique on the eastern shores of Africa, extends from 12° S. lat. to 25° 45' S. lat., and between 43° and 51° E. long. Its length is 1030 miles; its greatest breadth 360 miles. The population is variously estimated at from 1,600,000 to 4,000,000. A mountain range traverses the island in its whole length, and some of the summits rise to an elevation of 10,000 or 12,000 feet. Its offsets cover the greater part of the interior, and in some places approach to the very shores of the sea. In the interior the country in many places contains extensive plains, which are excellent pasture ground, and frequently possess a soil adapted to all kinds of tropical plants.

Bambatooka Bay, on the western coast, is the estuary of several rivers. It is 17 miles in length, and three and a half wide at the entrance; but inside it is nearly eight miles wide. Bambatooka itself is an inconsiderable village, but Majunga, on the north side of the bay, is a large town and the harbour of Thanaan-arive, the capital of the Ovahs, the most powerful, industrious, and civilized nation of the island. Thanaan-arive is situated in 18° 56' S. lat., and about 47° E. long., at an elevation of about 4000 feet above the sea-level. It contains some well-built houses, and a few in the European fashion have been erected in modern times.

The climate of Madagascar, everywhere unfavourable to Europeans, is not so hot as might be expected from its geographical position. The elevated range in the interior, and the wind constantly blowing from the sea, render the heat supportable. Madagascar contains a very large proportion of fertile soil, and will produce nearly every kind of grain. Rice is the principal object of agriculture; but grain and fruits are cultivated in abundance, as are likewise sugar, pepper, tobacco, and coffee. Cattle, sheep, fowls, ducks, and geese are kept. Wild swine are numerous. Among the minerals are iron, tin, silver, copper, plumbago, and potter's clay.

The inhabitants seem to belong to different races, which have mixed together, and speak only one language, which contains a great number of Malay words. The Ovahs and the inhabitants of the coast differ in stature, hair, and features; but both nations have made much progress in arts and agriculture. Their language is written in the Arabic character. Their religion is idolatry, not founded on any sacred writings; and missionary enterprise had made some progress among them, when it was checked by violent means in 1835.

Madagascar is divided into twenty-eight states, governed by chiefs; but in the present century most of them were subjected to the sway of the Ovahs, by King Radama, who died in 1828. This extraordinary man, who in energy of character resembled Peter the Great, introduced into his country the arts and civilization of Europe. He established a communication with the English in the island of Mauritius. He received and protected the missionaries, and promoted the establishment of schools, the number of which at the time of his death had increased to more than 100, in which nearly 5000 children were instructed. Several young people were sent to the Mauritius, and even to England, to

receive instruction. European mechanics were well received and employed by Radáma. He introduced into his army the discipline and arms of the English. He was succeeded by his queen, who governed on entirely opposite principles. She died in 1861, and was succeeded by her son Radáma II., who was strangled in 1863, and the government, now constitutional, devolved on his queen. Since 1862 European consuls have been established at Antanarivo, the capital, nearly in the centre of the island, and the distinguished missionary, Mr. Ellis, has a Christian congregation of about 1000 there, besides six others of nearly equal size.

The French alone have tried to establish colonies on this island. The first attempt was made in 1665, and several others were made afterwards. These settlements never prospered, partly on account of the unhealthiness of the low western coast, where they were formed, and partly on account of the warlike character of the inhabitants. The French have again made some attempts in two or three places, which, however, have had but little success. The French and English trade a little with Madagascar; and some districts keep up a commercial intercourse with the southern coasts of Arabia.

MADDALONI. [LAVORO, TERRA DI.]

MADDER. [RUBIA.]

MADEIRA, an island situated in the Atlantic Ocean, between $32^{\circ} 30'$ and $32^{\circ} 53'$ N. lat., and $16^{\circ} 40'$ and $17^{\circ} 20'$ W. long., and about 400 miles from the north-western coast of Africa. It is 31 miles long, and its breadth 12 miles. The area is 360 square miles.

This island is one mass of basalt, rising with a rather steep ascent from the south and from the north towards the interior, where Pico Ruivo, the highest summit, attains to 6100 feet above the sea-level. Both declivities of the mountain pass are furrowed by deep and generally narrow valleys and depressions, traversed by streams of clear water. These valleys contain the gardens and vineyards. The climate of Madeira is very mild; and many persons in England who are suffering from or in danger of consumption withdraw to it for the purpose of diminishing their sufferings and prolonging their life.

In the lowest region of the island, to about 750 feet above the sea-level, many tropical plants are cultivated. Above this region, to a height of from 750 to 2500 or 2800 feet, the fruits and grain of Europe, especially wheat and maize, are raised; and in this region are also the extensive vineyards, which till recently furnished the most important article of exportation. Then follows a tract covered with high trees, which rises to 3200 feet and higher, where many plants and trees are found which do not occur in Europe; and above this level is a region of grass, fern, and heath. Few horses are kept, and most of them are imported. Cattle are more numerous, and of a large size. Asses are the most common domestic animals, and best adapted to the roads of the country as beasts of burden. Hogs are rather numerous, as well as fowls. In the interior there are many wild swine and rabbits. Birds are not numerous, and fish is rare, on account of the great depth of the sea which surrounds the island. Salted cod constitutes one of the principal articles of import.

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Funchal, the capital, and the only town of the island, is on the southern coast. The town consists of a pretty wide street along the sea-shore, where there are several good buildings, and numerous small lanes, which extend to a considerable distance up the slope of the hill. The number of inhabitants is 29,775. The town is defended by four forts, and has eight churches and several convents. In the midst of the town is an open square, planted with trees.

The number of inhabitants in the Madeiras in 1863 was 104,420, of whom 300 were English. The population of the island are descendants of the Portuguese, but with a considerable mixture of African blood. The number of negro slaves is still considerable, and was formerly much greater. The inhabitants are a very industrious and enterprising people.

The commerce of Madeira is considerable. The exports consist chiefly of Madeira and Malvasia de Madera wines. Minor articles of export are, fruits, dragon's-blood, honey, wax, orchil, and tobacco, besides provisions for the vessels bound to more remote places. The imports consist of manufactured goods, corn, fish (herrings and cod), oil, salt-beef, salt, and some tropical productions. The exports from Madeira to England have decreased of late years. In 1860 they were valued at 45,431*l.*, and in 1864 at only 17,261*l.* This is in consequence of the falling off in the supply of wine, which is the principal article sent to this country. The imports from England, consisting chiefly of coals and cotton goods, were valued at 71,500*l.* in 1864.

Madeira is said to have been visited by Robert Machin, an Englishman, during the reign of Edward III. It was rediscovered in 1419 or 1420 by Gonzalves Zarco. It derived its name from the timber (*madéra*) with which it was covered. Soon afterwards it was settled by the Portuguese, and the culture of sugar and wine was introduced. Sugar was grown to a considerable extent before the islands in the West Indies were settled; but upon that event the culture decreased, and was replaced by that of wine, which now seems to be giving way to coffee.

About 40 miles north-east of Madeira lies the small island of *Porto Santo*. It is a basalt rock, which does not exceed 500 feet in height. To the south-east are three small basalt rocks, lying in a row from north to south. They are called *Ilhas Desertas*, and are only inhabited by sea-fowl, but they are visited from Madeira for the purpose of collecting the orchil, with which the greatest part of their surface is covered.

MADIA, the name of a genus of dicotyledonous plants belonging to the natural order *Compositæ*. Of the two known species *M. sativa* is most prized. It is a native of Chili, where it is cultivated for the sake of the oil which it yields. It is either put under a press, or boiled under a low gentle heat, when the oil is to be taken from it. The oil is used for lubricating fine machinery.

MADISON, JAMES, was born March 16, 1751, at King George, near Port Royal, on the Rappahannock River in Virginia. He was educated at the college of Princeton in New Jersey, where, in 1772, he took the degree of B.A. In the spring of 1776 his political career commenced by his being chosen a member of the Virginia convention, which formed the first

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constitution of Virginia. He was appointed a member of Congress in March, 1780. He was one of the three commissioners from Virginia who assembled at Annapolis, where he met Alexander Hamilton, with whom he was afterwards so closely united in forming the new constitution, and from whom he was so widely separated in carrying it into execution. His services to the United States cannot be too highly estimated. After the American constitution was formed, he was its zealous expounder to the people. He carried it triumphantly through the legislature of Virginia in spite of a strenuous opposition. He was chosen a member of the first Congress in 1789, and continued a member until 1797. He took an active part in the affairs of his country; and though he often appeared politically in opposition to General Washington, so great was the esteem of the latter for Madison that he intrusted him with the composition of his farewell address on his retirement from public life. In the struggle which succeeded the retirement of the general, Madison took an honourable and influential part, and when Mr. Jefferson was elected president, he was appointed his secretary of state. He succeeded Mr. Jefferson as president in 1809. Under his administration war was declared against Great Britain, to which he was urged by Mr. Clay and some ardent spirits whose patience was exhausted.

After serving two terms, Mr. Madison retired to private life, in March, 1817. In 1829, when the constitution of Virginia was submitted to revision, he consented to serve as a member of the convention. He also acted as a visitor of the University of Virginia, and succeeded Mr. Jefferson as its rector. Although Mr. Madison lived to the age of eighty-five, he had a very delicate constitution, and never enjoyed good health. He died January 28, 1836.

MADNESS. [INSANITY; LUNACY.]

MADONNA (*Ital.* 'my lady'), a word much used in the Roman Catholic Church in reference to the Virgin Mary. The Madonna and Child have been the subject of innumerable paintings by the great masters; but the grandest success has undoubtedly been achieved by Raphael, who has represented the Madonna now as the loving mother, then as the ideal of female beauty, and last of all as the Queen of Heaven. In Mrs. Jameson's 'Legends of the Madonna' (London, 1852), a complete history of the subject will be found, accompanied with numerous explanatory engravings. It would appear that no attempt was made to represent the features of the mother of Christ till the fifth century, when she was declared to be the 'Mother of God.' At first her face was made full, oval, and of a mild expression, and the lineaments of her countenance copied from the older pictures of Christ, according to the tradition which declared that he resembled his mother. As Mariolatry developed in the Roman Catholic Church, the representations of the Virgin became more and more sublime, until they may be said to have culminated in Raphael's 'Queen of Heaven' before referred to. She was, however, never represented without a child until comparatively recent times.

MADOX, THOMAS. Of the personal history of Madox little is known. His first work appeared in 1702, entitled 'Formulare Anglicanum; or a Collection of ancient Charters and Instruments of divers

kinds, taken from the originals, from the Norman Conquest to Henry VIII.' In 1711 he published his great work, entitled, 'The History and Antiquities of the Exchequer of the Kings of England, in two periods; from the Norman Conquest to the end of the reign of King John; and from the end of the reign of King John to the end of the reign of Edward II., taken from Records.' In 1726 Mr. Madox published his 'Firma Burgi, or an Historical Essay concerning the cities, towns, and boroughs of England, taken from Records.' A posthumous work from the pen of Mr. Madox, entitled 'Baronia Anglica,' a history of the land-honors and baronies, and tenure in capite, verified by records, in which he corrects the errors into which Lord Coke and others have fallen in the use of these terms, appeared in 1736. The date of his death is not known. Mr. Madox held the office of historiographer royal.

MADRAS, one of the three great presidencies into which British India is divided for administrative purposes, occupies an extensive portion of the south of the Indian peninsula. Area, 355,846 square miles; population, 43,528,265. It contains the following six divisions:—

1. The **NORTHERN**, comprising the provinces of Gangani, Vishákpattanam, Rájámatendri, and Maclákpattanam.
2. The **SOUTHERN**, comprising the provinces of Salem, Trinchinapalli, Tanjúr, Madura, Koimbatúr, Tuinevellí, and the territory of the Rájáh of Travancore.
3. The **CENTRAL**, comprising the provinces of Nellúr, Guntur, Chengalpatt, North and South Arkatt.
4. The **MYSORE**, comprising the provinces of Mysore, (or Maisur), Malabar, and Kanara.
5. The **CEDED DISTRICTS**, comprising the provinces of Kadagra, Karmél, and Bellari; and
6. The **PROTECTED STATES**, including Nagpúr and the Nizam's territory.

The soil of the presidency varies greatly. Along the coast it is generally light and sandy; inland, a decomposed syenite is so strongly impregnated with salt that in dry weather the ground glitters with a granular efflorescence; while on the banks of the Coleroon the mould is rich and genial, producing crops of extraordinary luxuriance. A like diversity of climate exists, from the tropical heat of the maritime districts to the grateful coolness of the country at the base of the Neilgherries. The principal products are—date sugar, sugar cane, rice, wheat, barley, maize, and other grains; tamarisk, areca, yam, plantain, mango, melon, and cocoa-nut; ginger, turmeric, tobacco, coffee, indigo, hemp, and cotton. Wild animals are still numerous, notwithstanding the rewards offered by the British government for their extirpation, and include the elephant, tiger, wolf, bear, among the carnivora, as well as the elk, the antelope, the jackal, and the wild hog.

The general aspect of the presidency is that of an elevated table-land, which on either side slopes gradually towards the sea, but on the E. and W. is shut in by the Eastern and Western Ghauts, on the S. by the mountain range of the Neilgherries. The latter shoots across the peninsula from N.E. to S.W. with an average elevation of 5000 feet, and so links together the two great lines of the Ghauts. The main rivers are the Godavery and the Kistna; the

minor streams, the Palaur, Pennaar, Coleroon, Cavery, and Vighey.

The administration of the presidency is in the hands of a governor, who is subordinate to the governor-general of India, and assisted by a council of three members (one being the commander-in-chief), and three secretaries for the financial, political, and military departments. The presidency, for revenue purposes, is divided into twenty-one collectorates. The Anglican church is represented by a bishop and archdeacon, and nineteen chaplains, each with his separate district. The languages spoken are Hindustani, Mahrathi, Telooogo, Tamil, Malayim, and Canarese.

The trade between the United Kingdom and Madras, although considerable and yearly increasing, is by no means so important as that with either of the other presidencies. The following tables show the imports and exports of the principal articles and their values for 1864 :—

IMPORTS INTO GREAT BRITAIN FROM MADRAS.

	Quantity.	Value.
Coffee, . . .	13,864,486 lbs., ...	£439,298
Cotton, raw, .	421,833 cwts., ...	3,695,819
Indigo, . . .	14,450 " ...	295,437
Oil (cocoa-nut),	148,575 " ...	293,128
Rice, . . .	124,993 " ...	64,033
Seed (for express- ing oil therefrom,)	16,722 qrs., ...	42,688
Sugar, unrefined,	228,223 cwts., ...	259,873
Skins (goat), .	1,620,790 num., ...	133,318
Other articles, .		370,539

Total, ... £5,594,133

EXPORTS FROM GREAT BRITAIN TO MADRAS.

	Quantity.	Value.
Beer and ale, .	27,082 barrels, ...	£88,060
Copper, . . .	12,134 cwts., ...	55,132
Cotton yarn, .	2,090,351 lbs., ...	329,752
" entered by } the yard, }	14,269,475 ...	406,714
Iron, ...	801,260 cwts., ...	351,999
Foreign and colonial merchandise, .		46,709
All other articles, .		360,249

Total, ... £1,638,615

MADRAS, a maritime city of British India, capital of the presidency of Madras, is situated in a district of the same name on the Coromandel coast, and in lat. 13° 4' 6" N.; long. 80° 14' E. The natives call it Cheunapatanam, or city of Cheunapgoa, an apocryphal Indian prince. Though the seat of an extensive commerce, its position is most unfavourable for commercial purposes. The roadstead is swept by every wind except the west; the shore is sandy and exposed, without harbour or landing-place, and when a gale breaks out the only chance of safety for ships is to make for the open sea. In calm weather the surf breaks 300 feet from the beach, and gathers in a wave 3 feet in height. When storms prevail it breaks 1000 feet off, with a wave 14 feet high, and the native boats cannot pass it then without imminent risk of life. These boats are built of thin planks, with coir caulking, and are large and light. The fishermen make use, however, of a catamaran, which is formed of two or three logs of wood 8 to

10 feet in length, firmly lashed together, and capable of holding two men. Madras has two seasons, marked by the two monsoons; the north-east, lasting from October to February, a period of violent storms, and the south-west, from May to October. Ships are not allowed to anchor from the 15th October till the 15th December.

The city, with its suburbs, which are nine in number, extends along the coast for nine miles, and occupies a level and ill-drained area of twenty-seven square miles. In the centre, and on the shore, stands Fort St. George, built in 1639, a formidable stronghold, generally garrisoned by an European regiment and two companies of native artillery. Within its precincts are the council house and the civil and military offices. West of the fort is placed an equestrian statue of Sir Thomas Munro, by Chantrey. To the north lies the Black Town, inhabited by few European families, and closely as well as irregularly built. Here are the Seven Wells, affording a plentiful supply of wholesome water. The Government house, St. George's church, the Presbyterian church, and Roman Catholic cathedral, are handsome structures. There are also an university, military orphan asylums, a polytechnic institution, a mint, a medical school, a high school, an observatory, and various charitable associations. St. George's cathedral contains Chantrey's statue of Bishop Heber. The university has a valuable museum and library. North of the fort stands an elegant lighthouse 126 feet high, with a singularly brilliant light.

The commerce of Madras is extensive. Its imports include cotton goods, wines, spirits, metals, sugar, stationery, jewellery, silk, horses, and hardware; its exports, cotton, grains, rice, indigo, coffee, sugar, saltpetre, ginger, and pepper.

Madras was founded by the English in 1639, their first settlement on the coast having been at Armagon, sixty miles to the north. In 1702 it successfully resisted a besieging force under Daoud Khan. In 1744 it was captured by the French, but restored to England in 1749. It was again besieged by the French in 1758, under the celebrated Lally Tollandal, but after an investment of two months he was compelled to retire. It is now the chief seat of the government and judicial administration of the presidency. Nine newspapers are published here, and nearly 13,000 foreign and native vessels annually enter its port. In 1829 its population was computed at 462,951; in 1851, at 720,000; but a more accurate as well as recent enumeration reduces the number to 450,000, of whom not more than 16,000 are Europeans.

MADREPHYLLIÆA (*Cœlenterata*), the first section of the *Stony Zoantharia* of Blainville, who styles the other section of this family *Zoantharia Madreporæa*. The Linnaean genus *Madrepore* included nearly all the species, and obviously required analysis, the more so that geological naturalists referred to the same genus a vast number of previously unknown forms, and thus encumbered recent and impeded fossil zoology, and prevented any right notion of the successive forms of zoophytic life on the globe.

Solander proposed some useful divisions of this unmanageable genus, derived from the growth of the coral; Lamarck established many important genera,

especially characterizing some fossil groups; Lamarck also laboured to improve the classification. Of late years Goldfuss has described additional fossil groups; and M. de Blainville has reorganized the labours of his predecessors, with a special regard to the soft animal parts figured and described by Lesueur, Quoi, Gaimard, and other voyagers.

The *Madrephyllæa* of this writer seldom acquire that highly ramose figure which belongs to the Lamarckian genera *Madrepora*, *Pocillopora*, &c.; they are furnished with cells of various figures, always, however, radiated by lamellæ, which are frequently numerous. There is no general distinctive character of the soft parts or 'polypi,' as they have usually been termed.

MADREPORÆA (*Cæliterata*), the second section of the *Stony Zoantharia* of De Blainville, and placed by him after *Madrephyllæa*.

The Corals of this section are generally arborescent, with small partially lamelliferous cells, and constantly porous in the interstices and walls of the cells. This last is the most important character. The Lamarckian genus *Madrepora* included many of the genera of De Blainville.

MADREPORITE, *Anthracomite*, *Columnar*, *Carbonate of Lime*, is a grayish black translucent mineral, which occurs in roundish masses, and consists chiefly of carbonate of lime and carbonate of magnesia.

MADRID, Department. [CASTILLA-LA-NUOVA.]

MADRID, the capital of New Castile and of Spain, and now also of the province of Madrid, is situated on a bare and exposed plateau, 2060 feet above the sea-level, in the middle of the extensive plain of New Castile, which is bounded on the north by the mountains of Guadarrama, and on the south by those of Toledo, in 40° 24' 18" N. lat., and 3° 42' W. long. Madrid is supposed to occupy the site of the Mantua Carpetanorum of the Romans. It was a frontier town in the time of the Moors, and was constituted the capital of Spain by Philip II. Occupying an area about five miles in circumference, and with a population at the last census of 475,785, it stands on the left or eastern bank of the Manzanares, a small river, which is crossed by two majestic bridges, called Puente de Toledo and Puente de Segovia. The city is surrounded by a brick wall twenty feet high, which contains fifteen gates, mostly built of coarse gray granite.

The general aspect of Madrid from all the approaches is anything but inviting. The numerous fantastic spires of churches and convents, the tiled roofs of the houses, the sterility of the neighbourhood, and the total absence of good houses, pleasure-gardens, or other buildings which indicate the approach to a great city, give to the capital of Spain the most gloomy and forbidding appearance.

The interior, however, is not devoid of beauty. There are wide and well-paved streets, extensive and well-planted public promenades, fountains in many of the squares, gorgeous churches, and handsome public buildings. The houses are large and well constructed. There are forty-two squares, of which the principal are—that of the Royal Palace; that of Santa Catalina, where a beautiful bronze statue of Cervantes has been placed; the Puerta del Sol, where the five principal streets of Madrid meet; the

Plaza de la Cevada, where criminals were formerly executed; and lastly, the Plaza Mayor, which is the finest of all.

The royal palace (*Palacio Real*) though unfinished, is one of the finest royal residences of Europe. The interior is decorated in a style of costly magnificence. It has four fronts, 470 feet in length, and 100 feet high. The custom house; the Casa de Correos (post office) in the Puerta del Sol; the palace called de Buena Vista, formerly belonging to the dukes of Alba, now converted into an artillery museum; the royal printing office in the street of Carretas; and the palace of the duke of Berwick—are among the public and private buildings which adorn the capital. Among the numerous churches and convents which fill the streets of Madrid, scarcely one can be mentioned as a specimen of a pure style of architecture. The public promenades are many; the chief are the Prado, the Retiro, and the Delicias.

Madrid contains a university, nine academies, four public libraries, three museums, three theatres, an amphitheatre for bull fights, and thirty-three public fountains.

The Museo, or Picture Gallery, is open to the public on Sundays and Mondays, and to foreigners on other days on producing their passports. In 1865 it contained 1833 pictures, among which were sixty-two by Velasquez, forty-six by Murillo, ten by Raphael, and a proportionate number by other great masters.

Charitable and benevolent institutions are numerous, and some are amply provided with funds; but the management having always been in the hands of the clergy, the funds have been spent in building monasteries and churches rather than applied to the charitable purposes intended by the donors.

Madrid has little manufacturing industry. A manufacture of porcelain and another of tapestry are both the property of the Crown.

MADRIDEJOS. [CASTILLA-LA-NUOVA.]

MADRIGAL, in Music, is an unaccompanied vocal composition, sometimes in three parts, but commonly in more. The Flemings invented the madrigal about the middle of the sixteenth century, and the Italians took it up shortly after. Palestrina, Marenzio, Mazocchi, and Scarla, in Italy, and Morley, Weekes, Wilbye, Bennet, John Ward, Orlando Gibbons, Dowland, and Ford, in England, were the chief madrigal writers of that century. It is not too much to say that the English madrigalists have no superiors. The art was long indebted to the Madrigal Society, a club which consisted chiefly of amateurs, founded in London in 1741, and which, by zeal and perseverance, succeeded in diffusing throughout the British Isles a taste for a species of music as delightful as it is scientific, and exactly suited to the choral societies already existing or springing up in all our great manufacturing and commercial towns.

MADURA, an island in the Eastern seas, separated by a narrow strait from the north-east coast of Java, with which it is connected under the Netherlands government. Lat. 7° S., long. 113° E. Its extreme length from east to west is 90 miles, and its mean breadth 17 miles. The inhabitants, who reside chiefly in villages, amount to about 522,000. The religion of the Madurese is Mohammedan, although the remains of Hindoo temples attest the prevalence

of that faith in former times. The natives are active, honest, brave, and skilful.

The island is inferior in fertility to Java, and barely supports its population.

MADURA, a littoral district in the presidency of Madras, Hindustan, separated from Ceylon by a channel of varying width, has an area of 10,500 square miles, and a population of 1,775,000. Its natural products are sugar, tobacco, cotton, and betel-nut.

MÆANDER. [ANATOLIA.]

MÆCENAS, CAIUS CILNIUS, belonged to the equestrian order, and was descended from an ancient Etruscan family at Arretium. We are ignorant of the place and time of his birth. He received a good education, and was well acquainted with the Greek language. He early became acquainted with Octavianus (Augustus Cæsar), and continued through his life an intimate friend and chief adviser of that emperor. While Augustus was engaged in opposing Sextus Pompeius, and also during many of his other wars, Mæcenas was intrusted with the charge of the city. Mæcenas is said to have dissuaded Augustus from his purpose of restoring the ancient Roman constitution, which Augustus, however, probably never seriously intended. He died B.C. 8.

Mæcenas was a great patron of literature; and it was principally owing to his assistance and support that Virgil and Horace were raised from indigence, and enabled to devote themselves to poetry. They were both admitted to his friendship, and Horace in particular lived on terms of intimacy with him. He was a man of luxurious habits, and lived in a magnificent house on the Esquiline Hill. He wrote several works, such as poems, tragedies, and a 'History of the Wars of Augustus.'

MAELAR, an extensive lake of Sweden, running inland for about 80 miles from the Baltic, with a breadth varying from 2 to 23 miles. It contains no less than 1300 islands, and its total area is 520 square miles. It has deep and clear water, and is connected with the Baltic by a strait, on both sides of which Stockholm is built.

MAELSTROM, or MALSTROM (Danish, *malström*, 'a whirlpool'), a celebrated whirlpool, off the N.W. coast of Norway, and immediately to the S.W. of Moskenesoe, the most southern of the Loffoden Isles, lat. 67° 48' N. and long. 12° E. It is in reality a violent current, which runs in opposite directions alternately, for six hours at a time, and with a peculiar rotatory motion. Notwithstanding the fables told of its dangerous character, it may be traversed with safety by ordinary sailing boats, except when a N.W. wind beats up against the reflux of the waves. Its depth does not exceed twenty fathoms.

MÆRA, Dr. Leach's name for a genus of amphipodous crustaceans. Example, *Mæra grossimana*, Leach (*Cancer Gammarus grossimanus*, Montagu). Very common on the English coasts, where it is found under stones and rocks at low water.

MAFFE'I, SCIPIONE, MARQUIS, was born at Verona in 1675. He was educated in the college of Parma, and served in the Bavarian army during the war of the Spanish succession. His principal works are—'La Merope,' a tragedy, the first written in Italian which deserves the name; 'Verona Illustrata,' a very valuable work; 'Trattato dei Teatri

antichi e moderni,' a defence of the stage; and 'Gallia Antiquitates.' In union with Vallisnieri and Zeno, Maffei also originated the first literary journal which appeared in Italy, *Giornale dei Letterati*, begun in 1710, and which was continued till 1730. Maffei died at Verona in the year 1755.

MAGADOXO, a town on the eastern shores of Africa, on the Somali coast, is situated in 2° 30' N. lat. and 45° E. long. The harbour is formed by a long coral reef, and the town is divided into two parts—Umarween and Chamgany; but the latter consists entirely of tombs. Umarween contains about 150 stone houses, built in the Spanish style. It carries on some commerce with Arabia. Its exports are ivory, gum, and a particular kind of cloth; it imports sugar, dates, salt fish, arms, and slaves. The town, which is very unhealthy, is inclosed by stone walls, has about 5000 inhabitants, and is governed by the imaum of Muscat.

MAGALHAENS, FERNANDO, incorrectly called *Magellan*, was born about 1470, in some place in Alentejo. He is celebrated for his intrepid expedition, under the patronage of the Spanish crown, to America, when he was the first to discover, in 1520, the strait which bears his name, and the Ladrões and Philippine Islands. At the latter group he died in a skirmish with the natives in 1521. An account of the voyage was written by Pigafetta, who had accompanied him, but except some extracts, it remained unpublished till 1729, when it was given to the public in Italian and in French by M. Amoretti.

MAGALHAENS, STRAIT OF, commonly called the *Strait of Magellan*, is the most extensive known strait on the surface of the globe. Its length in a straight line is above 200 miles; but if the three great bends are taken into the account, it is rather more than 300 miles. It divides the continent of South America from Tierra del Fuego. The eastern entrance is formed by Cape de las Virgines on the continent and by Cape del Espiritu Santo, or Queen Catherine's Foreland, which is on King Charles' Southland, the largest of the islands composing Tierra del Fuego. At its western entrance are Cape Pillar to the south, on the island of South Desolation, and Cape Victory to the north, on a small island belonging to Queen Adelaide's Archipelago. The most northern bend of the strait approaches 53° 10' S. lat., and the most southern inlet, called Admiralty Sound, 55° S. lat. The eastern extremity of the strait is situated in about 68° 20' W. long., and the western in about 74° 40'.

The Strait of Magalhaens was discovered by Fernando Magalhaens in 1520. It was formerly much navigated by vessels bound for the harbours on the western coast of America; but the navigation was always dangerous and tedious, in consequence of the all but continuous western gales, the great strength and irregularity of the currents, the numerous rocks and cliffs in the western part of the strait, and the great humidity of the climate, which engenders scurvy and other diseases. At present a vessel rarely enters the strait unless despatched by some government for a special purpose.

MAGAZINE (Arabic, *Makhzan*), a strong building, constructed generally of brick or stone within a fortified place, or in the neighbourhood of a military or naval station, in order to contain in security the

gunpowder or other warlike stores which may be necessary for the defence of the place, or for the use of the troops who are to perform military duty in the province or district. [BOMB-PROOF; CASEMATE.]

The buildings in which gunpowder is contained are constructed with every precaution necessary to insure dryness. They are generally in places remote from other buildings; they are furnished with metallic conductors, in order to avert danger from lightning; and for security against the attempts of ill-disposed persons, they are surrounded by a wall and ditch. When in situations where they may become the objects of hostile measures, they are made shell-proof. They should always be built to admit sufficient daylight to render the use of lanterns unnecessary.

The great magazines which have been constructed in this country consist of several parallel vaults, separated from each other by brick partition walls, in which are doorways for affording lateral communication. Each vault is about 90 feet long, 19 feet wide internally, and from the floor to the crown of the arch 19 feet high. The side walls are from 8 to 10 feet thick, and are strengthened by buttresses built at intervals against them. The concave or interior surface of each vault, in a vertical and transverse section, is nearly of a parabolical figure, above the springing courses; and the exterior surface has the form of two inclined planes meeting in a longitudinal ridge-line above the middle of the vault. One of the vaults is usually kept empty, so that the gunpowder may be moved from one place to another, a process necessary to keep it in good condition. The thickness of the brickwork forming the vaulted roof is therefore various: at the crown it is 7 or 8 feet, and on the hances about 3 feet, this being considered sufficient to resist the shock of falling shells. Temporary magazines, such as are formed to supply the batteries in a siege, are generally made of wood covered with earth.

On board a man-of-war the magazine is of great strength. It is situated in the hold, and is separated by a transparent screen from the light-room, in which lanterns of a special kind are kept to light the magazine—the introduction of fire in any form into the magazine itself being absolutely forbidden. In case of a fire in the vicinity, the magazine can be immediately flooded.

MAGAZINE is the name given to many periodical publications—generally issued monthly. The oldest is the *Gentleman's Magazine*, commenced in 1731, and still (1866) flourishing. [PERIODICALS.]

MAGDALEN COLLEGE, OXFORD, was founded in 1456, by William of Waynflete, bishop of Winchester and lord high chancellor of England, for a president, forty fellows, thirty scholars called *Demies*, a schoolmaster, an usher, four chaplains, an organist, eight clerks, and sixteen choristers. By an ordinance framed for the college under powers granted by the Act 17th and 18th Vict. c. 81, the statutory restriction of fellowships to certain counties and dioceses is abolished, and ten fellowships are to be suspended, and ten demys to be added to the statutable number. Demys hereafter to be filled up, are to be tenable without reference to place of birth, for five years and no longer. Twenty exhibitions are to be established for deserving persons in need of support at the university: and four professorships (to

be called Waynflete Professorships) are to be founded and maintained within the college in lieu of the lectureships mentioned in the previous statutes. The visitor is the bishop of Winchester. The college has thirty-seven benefices and two perpetual curacies in its gift.

Magdalen College stands upon a plot of ground at the entrance of Oxford from London bounded on its east side by the Cherwell. The buildings are extensive. The entrance-court leads into a larger quadrangle, which contains the chapel, hall, and library. South of the chapel and on the south side of what is called the Chaplain's court stands the tower of the college, the beautiful proportions of which render it one of the chief ornaments of Oxford. The great quadrangle was begun by the founder in 1473, though not finished till after his death. The foundation of the tower was laid in 1492. The foundations of what are called the New Buildings of this college, on the north side of the great quadrangle, were laid in 1733. The chapel, which had been refitted and decorated in an incongruous manner in the time of Charles I., was restored to its former magnificence under the direction of Mr. Cottingham in 1833. (*Oxford University Calendar*, 1866.)

MAGDALEN HALL, OXFORD. The school, with the refectory and chambers erected by Bishop Waynflete for students previous to admission into his college, and adjoining its buildings, obtained the appellation of St. Mary Magdalen Hall as early as 1448, and was governed by one of the fellows till 1602, when it became an independent hall. The president and fellows of Magdalen College, being desirous of recovering this site, obtained, in 1816, an Act of Parliament which authorized them to prepare for the reception of this society Hertford College, which had lapsed to the crown, and the principal and other members removed there on its completion in 1822. This hall is possessed of one benefice; and of several scholarships and exhibitions, all of which are tenable for three years.

MAGDALENE COLLEGE, CAMBRIDGE, was built by Edward Stafford, duke of Buckingham, in the year 1519, under the name of Buckingham House, on the site of an ancient hostel belonging to the abbey of Ely, Ramsey, and Walden. The duke of Buckingham not having completed the building at the time of his attainder, the college fell to the crown, and was granted to Thomas, Lord Audley, lord high chancellor of England. Formerly there were four fellowships on the foundation of the college and fourteen bye fellowships; but by the new statutes no person is hereafter to be elected to any bye fellowship, and there are to be eight open fellowships. It is also declared by the new statutes that (excepting those scholarships and exhibitions, the right of preference to which is preserved to particular schools) all restrictions shall be entirely removed, and the total amount of such scholarships and exhibitions shall form a general fund for open scholarships. This fund shall be so far augmented from the revenue accruing to the college by the abolition of bye fellowships, that there shall be three open scholarships of at least 60*l.*, three of at least 40*l.*, and six of at least 20*l.* a year each.

This college, which stands on the north side of the Cam, consists of two small courts. On the north

side of the second is a stone building, the body of which is appropriated to the reception of the Pepsian Library. This library was bequeathed to the college by Samuel Pepys, Esq., secretary of the Admiralty in the reigns of King Charles II. and King James II. (*Cambridge University Calendar*, 1866.)

MAGDALENA, River. [GRANADA, NEW.]
MAGDEBURG, one of the three governments of the Prussian province of Saxony. Its area is 4446 square miles, and the population in 1861 was 779,784. The government is divided into fifteen circles. The country is one of the finest parts of the Prussian monarchy, consisting chiefly of a fertile and level tract; the hills in the south-west, which are offsets of the Harz, are low, and in other parts the surface is merely varied by gentle elevations.

Magdeburg, the capital of the government and of the province of Prussian Saxony, and one of the strongest fortresses in Prussia, stands on the left bank of the Elbe and an island formed by its arms, in 52° 8' N. lat., 11° 39' E. long., 80 miles S.W. from Berlin. The town consists of three parts, called Altstadt, Neumarkt, and Friedrichs-stadt; and of two suburbs, Sudenburg and Neustadt. It is ill built, with narrow, crooked streets. The most remarkable buildings are—the noble cathedral, which was completed in 1363, the town-hall, the government house, the artillery barracks, and the theatre. Of the squares the largest are, the old market-place, in which is a statue of Otho the Great; and the cathedral square, which is surrounded by handsome buildings and avenues of trees. The town has numerous charitable, literary, and scientific institutions, schools, gymnasia, libraries, and picture galleries. It has also manufactures of silk, broad cloth, leather, gloves, lace, tobacco, jewellery, pottery, beer, spirits, &c. The town has an active trade, facilitated by railways to Berlin, Hamburg, and Dresden, and by steam-packets on the Elbe. Magdeburg is very ancient, dating from the eighth century, and is rich in historical associations; it is the see of a bishop, was at one time a member of the Hanseatic league, and long the capital of an archbishopric, which was secularized at the peace of Westphalia. It suffered during the religious wars of the sixteenth and seventeenth centuries, being sacked and nearly destroyed in 1631. It had sustained a siege of twenty-eight weeks against the Imperialists, under Tilly; and when it was at last taken 30,000 of the inhabitants were butchered. The French took it in 1806, and annexed it to the then kingdom of Westphalia, but it was restored to Prussia in 1814. The civil population of the city and suburbs in 1861 was 78,665; and the military, 7636.

Aschersleben. [ASCHERSLEBEN.]

Burg, 15 miles N.E. from Magdeburg, on the railroad to Berlin, is a busy manufacturing town of 15,000 inhabitants, most of whom are employed in the cloth and tobacco factories.

Halberstadt, an old town with about 23,000 inhabitants, stands on the Holzemme, 27 miles S.W. from Magdeburg, and has manufactures of woollen cloth, tobacco, leather, carpets, gloves, straw hats, starch, and soap, with oil refineries, breweries, and a trade in corn and wool. The chief buildings are the cathedral; the church of Unsere Liebe Frau, which

is built in the Byzantine style, and dates from 1005, but is now not used as a church; ten Protestant and two Roman Catholic churches; a Jews' synagogue; town-house; theatre; college; diocesan and normal schools; public libraries; and private museums and picture galleries. The town is inclosed by walls, outside of which are several suburbs.

Quedlinburg, a walled town, the birthplace of Klopstock, the poet, and Karl Ritter, the geographer, stands on the Bode, 30 miles S.W. from Magdeburg, and has 14,000 inhabitants, who manufacture beet-root sugar, spirits, and woollen cloth. This place was long famous for its convent, the superioress of which was in spiritual matters subject to the pope only, was a princess of the empire, and had a vote in the diet. At the Reformation the abbess embraced the Lutheran religion, and the institution continued, but with greatly diminished means, till 1802, when the convent was sequestered.

Schwitzedel, a walled town 50 miles N.W. from Magdeburg, stands on the Jetze, which divides it into the Old and the New Town. It has six churches, two hospitals, a gymnasium, and 1740 inhabitants, who manufacture woollen stuffs, gloves, needles, beer, spirits, &c.

Schönebeck, 10 miles S.S.E. from Magdeburg, stands on the left bank of the Elbe, and has important salt-works, which yield 672,000 cwts. of salt annually, and 8269 inhabitants, who manufacture tobacco, leather, chemical products, gloves, &c.

Stendal, a walled town, entered by five gates, stands on the Uchte, 35 miles N.N.E. from Magdeburg, and has 8079 inhabitants, engaged in the manufacture of cloth, calico, and leather.

MAGELLAN. [MAGALHAENS.]

MAGENIE, FRANÇOIS, the distinguished anatomist and physiologist, was the son of a physician at Paris, and born at Bordeaux in 1793. He was educated at Paris; and through the interest of his father became the pupil of the celebrated Boyer, and afterwards his demonstrator of anatomy. He was subsequently appointed physician to the Hôtel Dieu; and in 1831 he succeeded to the chair of anatomy in the College of France. He was one of the most skilful and experimental anatomists of modern times; and his various experiments on living animals, to determine the functions and properties of the blood and nerves, have placed him at the head of European physicians. His experiments on the absorption of poisons, such as strychnine, prussic acid, &c., more clearly demonstrated the nature of their action on the animal system. So numerous, and apparently cruel, were his experiments, that the French authorities thought proper to interfere. He was the first to demonstrate successfully that the veins were organs of absorption, and indeed the great agents in the absorption of liquids. He was also a laborious writer, and among other works, produced '*Éléments de Physiologie*;' '*Leçons sur les Phénomènes physiques de la Vie*;' '*Leçons sur les Fonctions et les Maladies du Système Nerveux*;' '*Leçons sur le Sang*,' &c. He was also a contributor to various scientific dictionaries and encyclopædias—as the '*Dictionnaire de Médecine usuelle*;' '*Encyclopédie des Gens du Monde*,' &c. He died in 1856.

MAGENTA, a town and commune of Italy, in the province of Pavia, sixteen miles west of Milan;

population about 6000. It contains four churches—one of considerable size, and manufactures of soap, wax candles, and whetstones. The wine of the district is held in good repute. There is a station near the town on the railway from Turin to Milan.

Magenta was the scene of a great battle in the war which established the independence of Italy. In the spring of 1859 the Austrians had entered Piedmont, and advancing to within a few miles of Turin, occupied the country between the Dora, Sesia, and Ticino, while the Sardo-French army was posted south of the Po, supported by Alexandria and Casale, and receiving supplies from Genoa. Towards the end of May the French emperor suddenly changed his plan of operations, and by a brilliant series of movements turned the right wing of the Austrians, and encamped his army on the west side of the Sesia. On the morning of the 4th of June, the allies, in two great divisions, one under General M'Mahon, and the other under Napoleon himself, moved forward from Turbigo on the north, and Novara on the south, in order to effect a junction at Magenta, and fall with overwhelming force on the Austrians. Napoleon, in crossing the Ticino, met with an obstinate resistance, and the issue seemed doubtful until M'Mahon, successful on his side, brought up his division to the emperor's aid, and advanced on Magenta. About six o'clock the Austrians occupied the town, and bravely defended it for ten hours against the combined forces of M'Mahon, of Canrobert, and of the Imperial Guard, which, after a furious strife, had fought its way from the Ponte Nuovo, each house being defended and stormed as if it were a battery. The arrival of the French reserves compelled the Austrians, though reluctantly, to fall back; and on the morrow, defeated and disorganized, they retired in a southerly direction, leaving open the road to Milan to Napoleon and Victor Emmanuel.

The Austrians lost 13,000 killed and wounded, and 7000 prisoners; the French 3700 killed, and 735 prisoners.

This important victory has recently been commemorated by the erection of a monument on the battle-field. The design was furnished by Signor Giovanni Brocca, and combines in one the purposes of a tomb, a chapel, and a monument. The style is Egyptian as to form, and Lombardian in ornament, with the basement fitted up as a chapel, where mass will be duly celebrated on the anniversaries of the battle. It consists of an imposing obelisk placed upon a solid cubic basement; total height, 65 feet. The sides are ornamented, at one-third of their elevation, with marble bas-reliefs, representing the Emperor Napoleon, Victor Emmanuel, and the principal types of the French army. Above these, on other bas-reliefs, are represented wreaths of laurel and oak, and surmounting an inscription in Italian—'All' Esercito Francese. . . . Napoleone III. e Vittorio Emanuele Alleati. . . . La Riconoscenza e la Pietà. . . . Magenta, iv. Giugno, MDCCCLIX.' (To the French army—Napoleon III. and Victor Emmanuel allied—Gratitude and Piety—Magenta, June 4, 1859.) Near the summit of the obelisk are four openings, with a decoration in the form of a star. These openings, illuminated by a powerful lamp kept burning in the interior, give the monument by night the appearance of a lighthouse; so

that by night, as well as by day, the memorial of Magenta proclaims its purpose and commemorates the brave who perished in the cause of Italian unity, and whose mortal remains are interred in the crypt beneath the basement chapel.

MAGGIORE, LAGO. [LAGO MAGGIORE.]

MAGHERAFELT. [LONDONDERRY.]

MAGI, the name of the priests among the Medes and Persians. The Magi formed one of the six tribes into which the Medes were originally divided (Herodot. i. 101); but on the downfall of the Median empire they continued to retain at the court of the Persian conquerors a great degree of power and authority. The learning of the Magi was connected with astrology and enchantment, and they were held in the highest reverence. No transaction of importance took place without or against their advice; and they exercised the most unbounded influence both in private and public life. In the course of his religious reform Zoroaster reorganized the Magi, and re-enforced their ancient laws, which were very simple and severe, but which had been so far neglected as to allow them to live in indolence and luxury. They were divided into three orders: the Destur Mobeds, or Perfect Masters; the Mobeds, or Masters; and the Herbeds, or Disciples.

MAGIC is the pseudo-art by which the mediæval philosophers professed to obtain a mastery over the secrets of the unseen world, and to communicate with demons and invisible spirits. In a more general sense it includes every species of divination of the future, whether under the names of astrology, necromancy, sorcery, vauderie, or witchcraft; while of late years it has even been made to include the common tricks and sleight-of-hand performances of vulgar conjurors. In its original application it signifies the doctrine of the Magi; because the Chaldean priests were supposed to have gained their extraordinary knowledge, superior wisdom, and remarkable skill from familiar spirits or other supernatural agents. It may therefore be briefly defined as the art, or science, which teaches us to perform various phenomena, and obtain an insight into coming events by the application of mysterious means, known only to the initiated, which command the services and interposition of good and evil spirits.

Magic appears to have had its origin on the plains of Assyria, and the worship of the stars was the creed of those pastoral tribes who, pouring down from the mountains of Kurdistan into the wide level where Babylon afterwards raised its thousand towers, founded the sacerdotal race of the *Chasdim* or *Chaldeans*. To these men were soon allotted peculiar privileges and ascribed peculiar attributes, until, under the name of Magi, they acquired a vast and permanent influence. They studied the heavens with constant vigilance, and closely investigated the qualities and properties of plants and minerals. They were not only priests, but astronomers, physicians, and prophets. Their temples were astronomical observatories as well as holy places; and the legendary Tower of Babel, in the Book of Genesis, is probably but the mythical equivalent of a vast edifice consecrated to the study of the seven planets, or, perhaps, as the *Bab* (court or palace) of *Bel*, to the brilliant star of good fortune alone. Availing themselves of the general adoration of the stars, they

appear to have invented a system of astrology—the apotelesmatic science—by which they professed to decide upon the nature of coming events and the complexion of individual fortunes, with especial reference to the planetary aspects.

In this system of mythology the places of rank and power were necessarily given to the sun and moon. To calculate their daily positions, the heavens were mapped out into constellations, and belted round with the zodiac, which, with its twelve signs, represented the aggregate and distinctive 'residency' of the sun throughout the year. Each 'sign,' or month, was ruled by a god, who superintended his own 'house,' and also controlled, or kept watch over, the corresponding month. Each month was divided into three parts, and each part governed by a deity, so that in all there existed thirty-six, named counsellors, who formed a sort of celestial senate, and half of whom attended to sublunary, half to heavenly affairs. The seven planets were named *interpreters*, because their diurnal course was supposed to indicate the march of human destiny and the procession of mundane events. Saturn, or old Bel, as the remotest planet, was regarded as the most powerful, and worshipped as the chief interpreter. Young Bel (afterwards the Jupiter of Roman mythology), Merodach (or Mars), Nebo (or Mercury), were reputed of the masculine gender; Sin (or the Moon), and Mytilla, Beltis (or Venus), were invested with feminine attributes. Shamus was the Sun-god. These male and female deities controlled the fates of men, the changes of the weather, and even influenced the characters or properties of metals; gold being identified with the sun, silver with the moon, iron with Mars, lead with Saturn, tin with Jupiter. In this belief may be discerned the first faint traces of that alchemical science which deluded so many inquiring minds in a later age.

The Chaldean priesthood was divided into three orders: the *aschapim*, or singers, who exorcised evil spirits; the magicians, sages absorbed in lofty thought; and thirdly, the astrologers, who read the stars. Cicero refers to them as the earliest sooth-sayers, who ascribed miraculous powers to herbs, and wrought miracles by their agency. They also made use of charms or talismans, inscribed with various images and symbols, and, generally, acquired so wide a renown in the 'dark portions of the world,' that the common name of Chaldeans was bestowed upon the astrologers of all nations.

For fuller details of this remarkable sacerdotal order, and of Chaldean religion, the reader may consult Rawlinson's 'Five Great Monarchies,' vol. i.

In Persia, magic assumed a yet more definite development. The Chaldeans had attributed the origin of all things to a great central everlasting fire. The foundation of the Persian system, usually ascribed to Zerdusht, or Zoroaster, was the existence of two antagonistic principles—Ormuzd, the principle of good, and Ahriman, the principle of evil. In Persia, everything associated with science or religion was included under the denomination 'Magic.' The Persian priests were named the Maguse, or Magi; but they did not arrogate to themselves the entire credit of intercourse with the gods. Zoroaster, who was king of Bactria, made some reservations for the sake of exalting the regal power, and taught that

the kings were illuminated by a celestial fire which emanated from Ormuzd. Hence the sacred fire always preceded the monarch as a symbol of his illustrious rank; and Plato says the Persian kings studied magic, which is a worship of their gods.

The same conception of an antagonism between the good and evil principles is visible in the subordinate deities of the Persians. Ormuzd presided over the Amschuspands, or immortal saints, ideal personifications of the solar forms; and Ahriman over the Devs or Dews (hence, perhaps, our word *Devil*), who were supposed to originate all that was dark and evil in nature. To obtain, therefore, the assistance and patronage of the Amschuspands, and to escape the maleficent influence of the Devs, was the great object of the religious observances of the Persians. When the Greeks obtained some knowledge of these mysteries, they misrepresented and misunderstood their meaning; mistook the prayers of the priest for the invocations of the enchanter; transformed religion into 'magic,' and magi into 'magicians.'

It was in Egypt that magic received its development as an art. That strange and weird land was the cradle and nursery of the sciences, which, at the outset, were mainly applied to magical purposes. Religion here was intimately associated with medicine, or the healing science; the temples were the first hospitals; and the sick were employed as agents to reveal the wishes of the gods. 'The Egyptians declare,' says Diodorus, 'that Isis had rendered them great services in the healing science, through the curative methods which she made known to them; that now, having become immortal, she takes a singular pleasure in the religious services of men, and specially occupies herself with their health; and that she assists them in dreams, thereby manifesting her peculiar benevolence. This is proved, not by fable, as among the Greeks, but by veritable facts. In reality, all nations of the earth testify to the power of this goddess in regard to the cure of diseases by her influence. In dreams she reveals to those who are suffering the fittest remedies for their ailments, and by implicit obedience of her orders, invalids have recovered—contrary to the expectation of the world—who have been given up by all the physicians.'

The most famous temples in Egypt were those of Isis, at Memphis and Busiris; of Serapis, at Canopus, Alexandria, and Thebes; of Osiris, of Apis, and Phtha. Isis, the wife of Osiris, derives her name, it is said, from the Coptic word *isi*, or plenty, and would seem to typify the earth; but she is usually represented as the goddess of the moon (*σελαβήγος*, 'the horn-bearing.') Isis was also employed as a personification of wisdom, and to a certain extent she may be regarded as a symbol of the eternal will, her shrines bearing the enigmatic inscription—'I am the all that was, that is, that will be; no mortal can raise my garment.' Horus was the son of Isis, and instructed by his mother in the art of healing. Horus, synonymous with Light, is the king or spirit of the sun.

Apis was another divinity, worshipped under the guise of a spotted ox. Phtha was the eternal spirit, the creative essence of all things; and his symbol was the everlasting fire of the temples, which burned both day and night.

Finally, Thout, Thot, or Tacut, was worshipped as a god, whom the Greeks call Hermes, the inventor of all arts and sciences, and Trismegistus, or Thrice-great. All historians agree that he was a friend and associate of Osiris; that he taught the Egyptians the useful arts and sciences; and that he deserves a prominent place among the physicians who have received divine honours.

Astrological science was earnestly and eagerly studied by the Egyptian priests. It was their belief that the different stars exercised a powerful influence on the human body. Their funeral ceremonies may be quoted as an illustration, for they agree in sharing among the divinities the entire body of the dead. To Ra, or the Sun, they assigned the head; to Anubis, the nose and lips; to Hathor, the eyes; to Selk, the teeth; and so on. To ascertain the nativity, the astrologer had only to combine the theory of the influences thus exercised by these star-related gods with the aspect of the heavens at the moment of an individual's birth. It was an element of the Egyptian, says an eminent authority, as well as of the Persian astrological doctrine, that a particular star was interested in the natal hour of every human being; and the prevalence of this belief, even in the Christian community, is shown by the legend of the Magi, who had seen the birth-star of our Saviour in the East, and had followed its guidance till they arrived at his home in Bethlehem. In Egypt, as in Assyria, the chemical properties of bodies were referred to divine or sidereal influences. The shores of the Nile were the classical country of chemistry, or rather of alchemy; and the false and the true science equally derive their name from *Chemi*, the 'Black Land.'

Through the instrumentality of Orpheus, Musæus, Pythagoras, and others, who had travelled in Egypt, and been initiated by the priests into their mysteries, magic found its way into Greece, and there assumed various novel developments. It lost much of its religious, and gained more of a romantic character. 'The lively imagination of the Greeks,' as the writer of this article has elsewhere remarked, 'was not content with ascribing the operations of nature to the power of unseen divinities, but made all nature divine; planted a deity in every river, an immortal being in every grove, every fountain, every murmurous rill. Instead of elevating man to the gods, it brought down the gods to man, and placed their celestial hall among the clouds that gathered on the summit of the fabled Olympus. The free spirit of the Greeks revolted from the theocracy of Egypt, from its mysterious omnipotent priesthood; but their quick, keen intellect penetrated as eagerly as the graver wisdom of the Chaldeans into the science of the starry influences, and the relations existing between the human and the divine.'

The Greek sorcery was chiefly manifested in the peculiar rites of the Orphicotelesta, the invocation of the dead, the cave of Trophonius, the oracles of the gods, and the worship of Hecate. The latter mysterious deity—the moon-goddess—was the patron divinity of the sorcerers. From her, as from one of the powers of the nether world, proceeded phantoms that taught witchcraft, hovered among the tombs, and haunted crossways and places accursed by the blood of the murdered or the suicide. 'The Mormo,

the Cereops, the Empusa, were among the goblin crew that did her bidding.' 'Accompanied by the souls of the dead, the terrible goddess, with her ever-changing form, wandered over the earth, while the howling and whining of dogs announced her approach. She presided over the rites of purification and expiation; reptiles and loathly animals and all repulsive mixtures were associated with her service. The vervain and the root of the rue were hers, myrrh and storax flavoured the lizard mast set in her honour under the crescent moon, when, constrained by some barbarous spell or archaic word of power, she revealed herself in dream to her expectant adorsers.'

From Greece we pass on to Rome, which borrowed her magic, no less than her art and literature, from poetic Hellas. The occult science does not appear to have been known to the Romans until about 200 years before the Christian era. But they had previously cultivated a modification of the Etruscan sorcery, comprising the divination of the future, the worship of the dead, the evocation of their *lemures*, or phantoms, and the mystic ceremonies of the Mana-Genita, a nocturnal goddess of awful character. Numa was the great teacher of the ancient Roman magic, which probably partook both of a religious and medical character.

The Christian church, at the outset of its history, forbade the practice of pagan magic, but taught what may be described as a magic of its own. Both Origen and Tertullian held that mania and epilepsy were produced by the action of demons or evil spirits confined within the bodies of the sufferers, and that these were to be exorcised by certain forms of words. The church formally recognized the efficacy of exorcism in 367, when the council of Laodicea ordained that only those should practise it who were duly authorized by the bishops. Connected with magic and magical rites were the supposed curative properties of the relics of saints, and the divine origin popularly ascribed to visions and ecstatic trances. Eclipses, meteors, hurricanes—these were considered portents of war, revolution, and pestilence. On the eve of any great political convulsion the spirits of the dead roamed the affrighted cities. A spell was supposed to rest in holy water; wounds were healed by the recital of the Lord's prayer; and the events of the future were foretold by casual reference to texts of Scripture.

Such was the magic embraced by the great body of the people. The educated classes accepted the graceful conceptions of the Neo-Platonists, and proclaimed the existence of a world of intermediate beings, who could be rendered obedient to man by the utterance of certain mysterious spells. From the *Timæus* of Plato they borrowed the idea of the macrocosm and microcosm. From Pythagoras they obtained their notions of the properties and character of demons. They asserted the sympathy of the human body with the earth, and with miraculous powers inherent in pictures and statues. Finally, they attributed great virtue to the use of certain words in the evocation of spirits.

In the middle ages—to quote again from ourselves—magic asserted its supremacy over the whole of Christian Europe; but it had entirely lost the religious character communicated to it by the Chal-

deans. It had degenerated into the 'Black Art.' It dealt only with the night-side of nature, with the Evil One and his imps, with the loathsome practices of witchcraft, and the enchantments of the necromancer. The scholar rose superior to this low kind of theurgy, but he, too, no longer sought communion with the 'heavenly powers'; he devoted all his energies to the discovery of the philosopher's stone and the elixir of eternal youth—to the sources of illimitable wealth and endless life. The philosophical aspect of the pure magic was entirely lost, and a purely chymical science rose as its substitute. Not the Chaldean magic but the Arabian alchymy occupied the minds of the subtle and laborious. And at this epoch all Christendom was involved in so dense a darkness, so thick an obscurity of ignorance, that the least flash of intellectual light endangered the life or liberty of the enlightened, and drew down upon them the suspicions of the vulgar and the hate of the bigoted. So it happened that magicians and heretics in due time became regarded as synonymous terms. The student who had obtained some insight into the mysteries of science was also denounced as a sorcerer. It is true that the pretensions of the enchanter were universally credited, but his position was full of danger; and while, on the one hand, he was frequently entertained at the table of princes, on the other, he was occasionally burned at the stake. In spite of these perilous results the superstition was never in want of students and professors, who felt a huge delight in their own delusions, and loved to practise on the fears and credulity of the vulgar. They studied the phantasies suggested by the novelties of optical science; made use of ventriloquism, of narcotic drugs, and stupefying fumes. 'All that could impose upon the imagination and subdue the will was called into requisition by the sorcerer to terrify and beguile his dupes. Thus, then, magic gradually passed out of the sphere it had originally occupied, became the enemy instead of the servant and assistant of the priesthood; and except in that abortive revivification of Neo-Platonism which we call Rosicrucianism, was suffered by the scholar and the philosopher to become an instrument of imposture in the hands of the charlatan.'

Nowadays, there survives of the ancient magic only its shadow. Professors of astrology occasionally advertise themselves, and their dupes sometimes make public the deceptions by which they have suffered; but an active and earnest world has no time for the fancies and the fables which exercised so powerful an influence over our forefathers. Mesmerism and electro-biology are but sorry substitutes for magic; and the tricks of the Davenport Brothers may not be compared with the achievements of the mediæval necromancers.

Having sketched thus briefly the history of the rise and decline of the magical art, we must limit our concluding notices to the two important topics of witchcraft and Rosicrucianism.

Rosicrucianism, which we have already described as a modification of Neo-Platonism, appears to have been first preached in Europe by Christian Rosencreutz, or 'Rose-Cross,' a German philosopher. While travelling in the Holy Land he is said to have fallen ill at a place called Damear, and being hospitably entertained by some Arabian philosophers, obtained

from them the germs of the pseudo-philosophy now identified with his name. He returned to Europe in 1401, and attracting a select band of disciples, initiated them into the new doctrines, binding them by oath to keep them secret for a hundred years. Rosencreutz died, it is said, in 1484. But it is certain that some of the Rosicrucian tenets are derived from the well-known quack, enthusiast, and physician, Paracelsus, who asserts the existence of a race of invisible beings, subordinate to the angels, and superior to man, but acknowledging the control of the possessors of the philosopher's stone.

Rosicrucianism was first revealed to the outer world by one Johann Valentine Andrea, a German scholar, born at Herrenberg, in the duchy of Wurtemberg, in 1586. His writings created a great commotion in Germany and England, and a crowd of enthusiasts hastened to enrol themselves in an order whose members possessed such wonderful privileges. Michael Mayer, a German physician of repute, claimed for the fraternity the most extraordinary endowments. They were gifted, he said, with all the graces of nature, which, at their pleasure, they could bestow upon the rest of mankind. To hunger and thirst, to the attacks of disease, to old age and to the usual afflictions of humanity, they were indifferent and impenetrable. Their contemplations surpassed all that had been conceived by the greatest minds since the creation of the world. They were destined to effect the regeneration of man before the end of time arrived. Wisdom and virtue they possessed, as might be supposed, beyond all their fellows. A volume belonged to the fraternity wherein could be read all that had been, or ever would be, written. They controlled the most powerful spirits and demons, and could render themselves invisible to mortal eyes.

Such were the pretensions of the more extravagant Rosicrucians, but the order included some able and earnest men who were simply the disciples of a new kind of mysticism, and concealed their theories under the cloak of an allegorical and symbolic language. It was their object to revive the doctrines of the Neo-Platonists, of such men as Pselus, Plotinus, and Iamblichus, and to investigate, as closely as might be, the secrets of universal nature. They aimed at holding converse with the spirits of the other world, at annihilating the obstacles of time and space, at penetrating to a knowledge of the operations of natural forces, at repressing the sensual in man and developing the psychical, so that the human intellect might hope to comprehend the inner voices of heaven.

Rosicrucianism has not been without a powerful literary influence. It suggested the sylphs and gnomes of Pope's 'Rape of the Lock'; the exquisite Ondine of La Motte Fouqué; Sir Walter Scott's White Lady of Avenel; and much of the imagery of Goethe's 'Faust' and Bulwer Lytton's 'Zanoni.'

Among its most eminent professors have been Robert Fludd, John Heydon, Jacob Böhme, Cornelius Agrippa, Trithemius, and Dr. Dee.

Witchcraft in Europe appears to have originated in the superstitions that rapidly grew up around the simple faith of the primitive Christians. The idea of demonology, familiar to the Mohammedan nations of the East and the tribes of Northern Europe, was engrafted upon Christianity. The evil principle was invested with the personality of Satan, and the 'fallen

stars of the morning' were transformed into inferior demons, resembling the Teutonic fiends in their attributes and character. They were also clothed with various circumstances of grotesque horror, drawn from classic fable. The existence of these maleficent beings once determined, and their relations to humanity, the theory would soon arise that they might be rendered subservient to the will of man, and here Paganism was again drawn upon for the rites of the ancient enchanter. The adventurers who professed to control Satan and his devils received the name of *witches*, from *wekkan*, 'to prophesy,' or when of the male sex, of wizards or warlocks. They loved to injure and ruin their fellows; to curse them with misfortunes, loss of money, loss of life, murrain among their herds, and death in their households. The whole character of mediæval witchcraft was cruel and sanguinary, and no grosser or filthier creed ever led captive the ignorant. In course of time it became the object of a pitiless persecution, and every pretended or supposed witch was hunted to the death. The accusation of witchcraft enabled Philip Augustus to destroy the Knights Templars, and as a witch Joan of Arc is supposed to have been burned. The trade of 'witch-finding' became a profitable one, and many an innocent woman who had incurred the hatred of her neighbours was doomed to a painful death by a mercenary informer. [WITCHCRAFT.]

For fuller details upon the important questions connected with magic, the reader may consult Ennemoser's *History of Magic*; Wier, *De Prestigiis Demonum*; Naudé, *Lives of the Magicians*; Lenglet du Fresnoy; Maury, *La Magie et L'Astrologie*; Godwin, *History of the Necromancers*; Scott, *History of Witchcraft*; Wright, *Narratives of Sorcery and Witchcraft*; Salverte, *Philosophy of Magic*; Adams, *Dwellers on the Threshold*; Colquhoun, *History of Magic*; Levi, *Dogme et Rituel de la Haute Magie*; and the works of Paracelsus, Dr. Dee, Robert Fludd, Comte de Gabalis, &c.

MAGIC LANTERN is a species of lucernal microscope, invented by Kircher, its object being to obtain an enlarged representation of figures on a screen in a darkened room, by means of the pencils of light issuing from a lamp or candle and passing through a convex lens.

The instrument consists of a lantern, generally of tin, and of a cubical form, in the interior of which is the light; and at a perforation in one of the sides is applied a tube, projecting horizontally from it, which carries two glass lenses.

A groove in front of the lantern and parallel to that front receives a rectangular frame containing the glass plates on which are painted, with transparent colours, the objects of which an enlarged view is to be obtained.

A remarkable improvement in the manner of employing the magic lantern was first exhibited in London in the year 1802. The lantern itself was similar to but larger than that which served for more general purposes, and the images were represented on a transparent screen, which was stretched in a vertical position across a theatre or an apartment; and this being made quite dark, the spectators occupied the space in front of the screen, while the apparatus was disposed on the opposite side.

All light was excluded both before and behind the

screen, except that which, in proceeding from the lantern, produced the image to be observed; and the screen being itself invisible, the spectators could scarcely divest themselves of the idea that they were looking into a dark cavern, in which the objects appeared to be gradually advancing towards or receding from them. The illusions produced caused the name of *Phantasmagoria* to be applied to the apparatus. The introduction of the lime light has of late years much improved the effect of objects exhibited by the magic lantern.

MAGIC SQUARE. This term is applied to a set of numbers arranged in a square in such a manner that the vertical, horizontal, and diagonal columns shall give the same sums. Such arrangements were known very early to the Hindoos, Egyptians, and Chinese, among whom, as also among the Europeans of the middle ages, a belief existed that such squares had astrological and divinatory qualities. Emanuel Moschopolus, of Constantinople, wrote on them in Greek in the middle of the fifteenth century. (See Montucla's 'History,' vol. i. p. 346; 'Encyclopédie Méth.,' art. 'Quarrés Magiques;' Hutton's 'Dictionary;' and the 'Mathematical Recreations' of the same author.)

The following is a sample of a magic square:—

2016	4212	1656	3852	1296	3492	936	3132	576	2772	216
252	2052	4248	1692	3888	1332	3528	972	3168	612	2412
2448	288	2088	4284	1728	3924	1368	3564	1008	2808	648
684	2484	324	2124	4320	1764	3960	1404	3204	1044	2844
2880	720	2520	360	2160	4356	1800	3600	1440	3240	1080
1116	2916	756	2556	396	2196	3996	1836	3636	1476	3276
3312	1152	2952	792	2592	36	2232	4032	1872	3672	1512
1548	3348	1188	2988	432	2628	72	2268	4068	1908	3708
3744	1584	3384	828	3024	468	2664	108	2304	4104	1944
1980	3780	1224	3420	864	3060	504	2700	144	2340	4140
4176	1620	3816	1260	3456	900	3096	540	2736	180	2376

The methods which have been given for the formation of magic squares are divided into different rules, according as the number in each side is odd, evenly even, or oddly even. A general method which shall apply to all cases is yet wanting. For a full account of these rules see Hutton's *Mathematical Recreations*.

MAGILUS, De Montfort's name for a genus of testaceous molluscs, the form of whose shell varies very much, according to its different stages of growth, and the circumstances in which it is placed. Example, *Magilus antiquorum*.

MAGINDANAO. [PHILIPPINES.]

MAGISTRATE, a word derived from the Latin *magistratus*, which contains the same element as *magnus* and *magister*, and signifies both a person and an office. A Roman *magistratus* is defined to be one who presides in a court and declares the law, that is, a judge. The kings of Rome were probably the sole *Magistratus* originally, and on their expulsion the two consuls were the *Magistratus*. In course

of time other offices, as those of prætor and ædile, were created; and those who filled these offices were elected in the forms prescribed by the constitution. The original notion of a magistratus, then, is one who is elected to an office, and has jurisdiction.

In England the term magistrate is usually applied to justices of the peace in the country, and to those called police magistrates, such as there are in London, though the term is also properly applicable to the sheriff and the coroner. It has also been applied in other ways; for instance, people have sometimes said that the king is the chief magistrate in the state. But these applications of the term do not agree with its proper sense. A Roman magistratus was elected, and so far he differed from an English justice of the peace; he also exercised delegated power in his jurisdiction, in which respect, as well as being elected, he differed from the king of England, who is not elected, and does not exercise delegated jurisdiction, but delegates jurisdiction to others.

In Scotland this term, though in a strict sense applicable to all persons in authority, is generally employed in reference to the provost and bailies of burghs. These officers have both a civil and criminal jurisdiction within burgh. In civil matters they have cognizance of all debts and questions of possession among the inhabitants; and royal burghs are believed to have the same civil jurisdiction within the burgh as the sheriff has in his territory. (Ersk. i. 4, 21.) Their criminal jurisdiction, however, is now very limited, and extends only to cases of petty riots and matters of police; but where a royal burgh possesses a grant of sheriffship or regality [LORDS OF REGALITY] it enjoys a jurisdiction, not only civil but criminal, as ample and extensive as sheriffs now have or lords of regality formerly had. The magistrates of burghs have also right, with consent of the town council, to impose assessments upon the inhabitants for the use of the burgh. Magistrates are elected by and out of the town council for the time being, the councillors being chosen from the whole body of electors residing or carrying on business within burgh.

MAGLIABECCHI, ANTONIO DA MARCO, born at Florence in 1633, was an indefatigable reader, and had a prodigious memory. He employed his scanty savings in buying books, and gradually collected a vast library, which after his death became the property of the city of Florence. Magliabecchi left no work of his own. Some of his letters have been published in various collections. He died at Florence, in 1714, eighty-one years of age.

MAGNA CHARTA. If the Magna Charta granted by King John did not properly found the liberties which the English nation enjoys, or if it was not the original of those privileges and franchises which the barons (or the chief tenants of the crown, for the names are here equivalent), ecclesiastical persons, citizens, burgesses, and merchants enjoy, it defined them, it formed in its written state a document to which appeal might be made, under whose protection any person who had any interest in it might find shelter, and which served, as if it were a portion of the common law of the land, to guide the judges to the decisions which they pronounced in all questions between the king and his subjects.

Besides the great charter, there was granted at the

same time a charter relating to the forests only. The rights of the church were also secured by the great charter.

The provisions of the Magna Charta are numerous, and some of them have fallen into desuetude. The substance of the Great Charter is given by Blackstone in his 'Commentaries,' who also wrote a treatise on it.

King John was compelled to grant the charter by an armed force, consisting of a very large portion of the baronage, which he was unable to resist. The charter was sealed in the open field, at a place called Runnymede, between Windsor and Staines. The memorable day was June 5, 1215.

The late Record Commission caused to be engraved and published an exact fac-simile of the charter, from a copy preserved in the archives of the cathedral church of Lincoln, with others of the greater charters. In the first volume of their work, entitled 'The Statutes of the Realm,' these charters are all printed, with English translations.

MAGNA GRÆCIA, or MAJOR GRÆCIA, a term used to designate the south of Italy, which contained many flourishing Greek colonies. It does not appear to have been applied to the country north of Cuma and Neápolis.

The time in which the name of Magna Græcia was first applied to the south of Italy is uncertain. It is used by Polybius and subsequent Greek and Roman writers.

MAGNESIA. [MAGNESIUM.]

MAGNESIA, MEDICAL PROPERTIES OF. Oxide of magnesium, termed also, from the mode of procuring it, calcined magnesia, or *Magnesia usta*, is an alkaline earth, possessing the usual qualities of alkalies in their habitudes with acids, and likewise the property of exciting generally purgative action of the intestines. This last-mentioned power gives it a distinctive character among alkaline remedies, as it can be employed not merely to counteract acidity, but also to remove the exciting cause when that consists in the presence of crude or undigested acid-yielding materials in the stomach. Its action as a purgative seems mainly to depend upon its meeting with acids in the stomach, and so forming soluble salts. When these are not present, the magnesia remains undissolved, and if used repeatedly may accumulate in the intestines, and, becoming agglutinated by the mucous secretions, give rise to much uneasiness. When, however, acidity exists, either along with constipation or diarrhœa, more particularly in children, from the milk disagreeing, or from a diet unsuited to their delicate organs of digestion being forced upon them, magnesia is a very proper medicine, especially as it appears to possess a specific power of diminishing gastro-intestinal irritation. It is generally expedient to add rhubarb to it, and combine it with some carminative. In such a state of combination it is peculiarly useful in what is termed diarrhœa crapulosa, arising from too great a mixture or too large a quantity of food.

Sulphate of Magnesia, or *Epsom Salts* ($Mg\ O, S\ O_3 + \cdot 7\ Aq$), in the ordinary form, as met with in the shops, are small acicular crystals. This renders them liable to be confounded with those of oxalic acid, to avoid which the sulphate may be dissolved, and by re-crystallization they are obtained in large

four-sided prisms, or four-sided pyramids. It is soluble at 60° in three times its weight of water.

Sulphate of magnesia is a convenient antidote in cases of poisoning by the salts of lead or barytes.

MAGNESIA ALUM, *Magnesian Pharmacolite*, and *Magnesite*, are three naturally formed minerals, in which magnesia is a chief element.

MAGNESIAN LIMESTONE, a component element in the new red sandstone system. This rock is seen to greatest perfection in England between the rivers Tyne and Tees, between the rivers Wharf and Dun, and between this last river and Nottingham. When crystalline, it is called *dolomite*. Its mode of aggregation varies extremely. In many situations (Thorp Arch, in Yorkshire) it is a soft powdery stone traversed nevertheless by veins of calcareous spar; about Tadcaster, and generally between the Nid and the Dun, it is a firm though hardly compact rock, often traversed by sparry veins and full of irregular crystallized cavities. The crystals are generally carbonate of lime, sometimes mixed with oxide of iron. Farther south the stone becomes more crystalline in its character. The general colour of the magnesian limestone (lower portion) is white, yellow, rich pale brown, or reddish. The upper rock is commonly of a gray, smoky, or purplish hue, and is usually interstratified with thin clay partings; the lower one very rarely.

Various authorities have clearly distinguished the most common organic fossils of this rock. We shall only observe here that, in respect of fishes (*Palæoniscii*, &c.), mollusca (*Producta*, *Spirifera*, &c.), and zoophyta (*Retepora*, &c.), this rock shows an extreme analogy with the carboniferous system. Its place, by mineral analogies, may be rightly fixed in the poecilite system; but by the affinities of organic existence it will be classed with the more ancient rocks.

MAGNE'SIUM (Symbol, Mg), a peculiar metal, of which magnesia is the oxide. Its existence was first demonstrated by the electro-chemical researches of Sir H. Davy. Magnesium is of a white colour, like silver; its lustre is metallic and brilliant; it is very malleable, and fuses at a red heat. When heated to redness in the air or in oxygen gas, it burns brilliantly, and, combining with oxygen, becomes magnesia. In chlorine gas it burns spontaneously.

Oxygen and *Magnesium* (Mg O) form the oxide, or *Magnesia*. Specific gravity, 3.65. It is colourless, inodorous, and tasteless, if pure; it is very nearly insoluble in water, although when moistened it exhibits the alkaline property of turning vegetable yellows brown. *Chlorine* and *Magnesium* (Ch¹ M¹) form a transparent colourless mass; it is inodorous, intensely bitter, very deliquescent, and soluble both in water and alcohol. This salt is one of the saline ingredients of sea water. *Bromine* and *Magnesium* form small acicular crystals, which have a sharp taste, are very deliquescent, and soluble both in water and alcohol. *Fluorine* and *Magnesium* unite when magnesia is dissolved in hydrofluoric acid. The compound formed is insoluble in water, or in hydrofluoric acid, and is not decomposed by a red heat. *Iodine* and *Magnesium*.—A compound of these is obtained when magnesia is dissolved in hydriodic acid; it is very soluble in water, and known only in solution.

Magnesia, or *Oxide of Magnesium*, combines with

most acids to form salts, and also forms a *hydrate*. This hydrate is a saline compound, white with a greenish tint, foliated, and easily splits into thin flexible laminæ. It has a pearly lustre, translucent on the edges. It is composed of about 31 water and 68 magnesia, with a little oxide of iron and manganese. *Nitric acid* and *Magnesia* readily combine, and yield nitrate of magnesia (Mg O, NO₅ + 6 Aq). The solution is colourless, and extremely bitter. *Carbonic acid* and *Magnesia* form carbonate of magnesia, which has a yellowish white colour, with a flat conchoidal and sometimes earthy fracture. It is opaque and very difficult to break. It combines with the hydrate to produce the carbonate of magnesia used in medicine. *Sulphuric acid* and *Magnesia* constitute the salt long and well known by the name of *Epsom Salts*, having been first obtained from a spring near the village of Epsom, in Surrey. [MAGNESIA, MEDICAL PROPERTIES OF.]

MAGNET (derived from the Greek *μάγνης*) is a metallic body possessing the remarkable property of attracting iron and some other metals. It is said to have been found abundantly near Magnesia in Lydia, from which circumstance its name may have been derived. The attracting power of the magnet was known at a very early period, as references are made to it by Aristotle, and more particularly by Pliny. When found native, it is generally a heavy ferruginous ore of a dull grayish colour, but the ores of cobalt and nickel also frequently possess the magnetic properties.

The universal law, that reaction is coexistent with action, implies, that iron must react on the magnet; and it is evident that all the iron in the mass of the earth must act upon a magnet. It is also now known that electrical currents influence magnetic bodies [ELECTRO-MAGNETISM], while heat has an influence on magnetic intensity. Hence it follows as a mechanical consequence, that if a magnetic needle or cylinder be suspended by its centre of gravity, so as to be free to move in any direction round that point, it will not take an arbitrary position like unmagnetized bodies, but must take a specific direction, namely, that which represents the resultant of all the magnetic forces to which it is subject. [DECLINATION OF THE MAGNETIC NEEDLE].

One essential property by which a magnet differs from soft iron under the magnetic influence is this:—If we separate a magnetic bar into any number of minute parts, each such part will be endowed with polarity, similar to the whole; the position of those poles, or foci of greatest attraction, is permanent in a magnet of a given form; but in soft iron it will change when the distance of the iron from the influencing magnet is altered. [MAGNETISM; MAGNETIC INTENSITY.]

During a thunder storm, the poles of a magnet are frequently inverted; the appearance of the aurora borealis is often attended with vibrations of the compass needle, to the extent of several degrees. The actual mode in which the aurora is produced being unknown, it is impossible to decide whether the aurora is itself the cause of this magnetic phenomenon or whether both are attributable to some unknown common cause.

MAGNETIC INTENSITY. When a magnetic needle is freely suspended by its centre of gravity

it is then acted on by all terrestrial bodies containing the magnetic fluids. The direction of the resultant of all such forces in the earth may be regarded as possessing parallelism throughout the extent of the needle, and the latter acquires in consequence a like direction in the plane of the magnetic meridian, of which the position becomes in this manner known.

When a magnet is brought near a needle thus suspended, if the number of vibrations performed by the latter in a given time be observed, it will be found, by an investigation similar to that which is used for a common pendulum, that the intensities of the attractive and repulsive forces vary inversely as the squares of the distances; but it is now known that those intensities become inversely proportioned to the distances simply, when the distances are less than one-eighth or one-fourth of an inch. For the action of the earth on a suspended needle, see TERRESTRIAL MAGNETISM.

The balance of torsion has occasionally been used to discover the relative intensities of magnetism as distributed in bodies; in straight and narrow laminae it has been found by Coulomb to be nearly proportional to the square of the distance from the middle point.

MAGNETISM. If we take a natural or artificial magnet, and spreading over a piece of paper a quantity of fine iron filings, place the magnet on the paper, on taking it up we shall find that the iron filings are attached to it in some degree over all its surface, but they will be principally accumulated at two points situated near the ends of the magnet: these points are called the poles of the magnet. Sometimes, when a magnetic bar is rolled amongst iron filings, we may find several such points along the bar; the magnet is then said to have consecutive points. When a magnetized needle is suspended horizontally on a pivot armed with agate, it assumes a particular direction, nearly north and south. The pole N, at the north extremity of the needle thus adjusted, is commonly called the north pole of the needle; the other, S, the south pole; though the contrary names would be more correct in connection with the theory of magnetism.

If we now bring a piece of soft iron near the pole N, it will be attracted to that pole and become attached to it, so that the exertion of a mechanical force is necessary to separate them. In this way a magnet held vertically will sustain a piece of iron, provided the weight of the iron does not exceed the magnetic force. The pole S has a similar attractive power on iron; the cause of this attractive power is called *Magnetism*. (Plate 1, figs. 1, 2.)

The force of magnetism is exerted without alteration through substances which are not magnetic, and the same is true with respect to the electrical forces when non-conducting bodies are interposed in the direction of their action. On the other hand, the effect of the magnetic forces is considerably modified when substances which are capable of becoming magnetic by influence are situated near the magnet; and a similar effect takes place by the decomposition of the neutral electricities when under the influence of an electrized body. [ELECTRICITY].

In order to observe the action of magnets on each other, make two magnets or magnetic needles to float on water, distinguishing the poles of one by N

and S, and of the other by N' and S'. Bring either the pole N near to N', or S to S': the needles or magnets will separate to a greater distance, and with the greater energy the nearer these poles are placed to each other. On the contrary, if we bring N and S' near each other, the needles will approach and unite those points; and the same happens when the points N' and S are made contiguous: hence this law—*Magnetisms of the same name are mutually repulsive; those of contrary names are mutually attractive*. In the article ELECTRICITY, it has been shown that the same law is true with respect to the two electricities.

The magnetism predominant at the north pole of a needle is called *Austral Magnetism*, and that which predominates at the south pole is termed *Boreal Magnetism*. The quantities of the austral and boreal magnetic fluids in all magnetic bodies are equal; for when we bestow magnetic qualities on iron or steel by the influence of loadstones, hammering, sudden cooling in the magnetic meridian, &c., no new magnetism is communicated; but the natural magnetisms, which previously neutralized each other, are now decomposed. Again, if a magnetic needle be freely suspended by its centre of gravity, the action of terrestrial magnetism produces no linear motion, but only imposes a direction on the magnetic axis; now all the boreal fluid in the globe attracts all the austral fluid of the needle, and *vice versa*, while the like fluids in both repel: hence a motion of progression would be generated, unless the resultant of the repulsive forces on the needle was exactly equal and of an opposite direction to the resultant of all the attractive forces; and the rotatory motion of the needle shows that the points of application of these forces are different; but the intensity of terrestrial magnetism may be regarded as uniform throughout the extent of the needle, and its direction parallel. In order, therefore, that the resultants should be equal and contrary, the sums of the boreal and austral forces of the needle must be equal. In this respect magnetism resembles the natural electricities of all substances.

If we place a bar of soft iron, suspended by a collection of silk strings at its middle, in a direction parallel to the magnetic axis of the dipping-needle, the action of terrestrial magnetism will have full effect on the bar, its natural magnetisms will be decomposed, and it will acquire a polarity similar to that of the needle, its poles repelling the similar poles of the needle, and attracting the contrary poles. If the bar be left for a long time in the direction of the magnetic axis, so as to acquire some oxygenation, or if it be heated to a red heat and suddenly cooled by immersion in water, it will acquire a coercive force, and become permanently magnetic. Iron crosses, weathercocks, &c., which have been long kept in a fixed position, or have been struck by lightning, acquire magnetic properties in the manner above described.

It is a remarkable circumstance connected with the change of molecular disposition caused by the action of heat, that, if we gradually heat a bar of iron, the intensity of its action on a magnet increases, and arrives at a maximum when the bar is brought to a cherry-red heat; with higher degrees of heat the intensity is diminished, and is totally inappre-

ciable when the bar has reached a bright white heat; on cooling, it recovers its powers of action by similar steps, and the same law holds true if the magnet be heated instead of the bar. Hence, in producing the greatest development of magnetism by influence, we see the advantage of using iron or steel bars at a red heat.

Cavallo, Bennett, and Coulomb remarked the indications of magnetism given by various substances, as copper, silver, &c. Coulomb formed very fine needles of various substances, and, suspending them by silk strings between the opposite poles of two powerful loadstones, found that they were acted on by the latter. This phenomenon was formerly attributed to the existence of minute quantities of iron or iron compounds in those different bodies, but this is now known to be a mistake. Faraday has shown that nearly all substances, even gases, have properties in relation to magnetism; and as regards the phenomena which they exhibit, they are divided into two bodies, *paramagnetics* and *diamagnetics*. To the former class belong iron, nickel, cobalt, manganese, crown glass, and platinum; to the latter, bismuth, phosphorus, antimony, heavy glass, zinc, tin, flint glass, mercury, water, lead, silver, copper, gold, alcohol, ether, and arsenic. The term *magnetic* is often used as synonymous with *paramagnetic*. The distinction between the two classes is, that a needle or bar of paramagnetic material, when suspended freely between the two poles of an electro-magnet, takes an *axial* position, that is to say, disposes itself in a straight line joining the two poles; whereas a bar of diamagnetic material takes an *equatorial* position, that is, a position at right angles to the joining line. Again, a body of the former kind, if brought nearer to one pole than the other, is attracted, while a body of the latter class is, in similar circumstances, repelled. The magnetic properties of crystals depend upon their form as well as upon their material, uniaxial crystals having a tendency to place their optical axes in an axial or in an equatorial position, according as the crystals themselves are (in the geometrical sense) positive or negative.

The earliest method of magnetizing a bar of hard iron or steel was by drawing it throughout its whole extent at right angles over one of the poles of a strong magnet; but the magnetism thus developed is feeble, and apparent only at the extremities of the bars, or in some consecutive points formed by peculiarities in the material of the bar, or in the mode of operation. Du Hamel placed two steel bars of equal length parallel to each other, connecting their corresponding extremities by pieces of soft iron interposed; then, taking two bundles of magnetic bars, he united their poles of contrary name near the middle of one of the steel bars, and, inclining the bundles, made one of them pass towards one extremity of the other bar, the second passing in the contrary direction, and then successively repeated the operation, when both the steel bars became strongly magnetized, but with contrary magnetisms at the corresponding extremities of each.

A fine steel needle may be very strongly magnetized by being placed in the axis of a wire twisted into the form of a helix, the extremities of which are brought in contact with the wires of a powerful galvanic battery. The poles of a bar magnetized to

saturation are near its extremities, within generally a few lines, while the intensity becomes insensible at the distance of a few inches; in a thin bar the intensity may be represented by the difference of the ordinates of two logarithmic curves, the origin of one being at the austral, and of the others at the boreal extremity of the needle. (Plate 2.)

When bodies containing neutral magnetisms are made to rotate rapidly round an axis, the magnetism becomes developed and acts on the needle; thus a plate of copper made to revolve rapidly in a horizontal plane will influence a compass-needle placed over it, and produce in it a rotation in the same direction; on which subject several valuable observations have been made by M. Arago, Sir John Herschel, &c. It has also produced a second mathematical memoir from M. Poisson, in which the mechanical force generated by rotation is introduced into the general equations deduced from his theory of the distribution of magnetism in bodies.

Several Magnetic Observatories have been established in various parts of Europe, Asia, and America, from which many valuable contributions to Terrestrial Magnetism have been obtained.

(For the theory of magnetism as connected with electricity consult Robison's *Course of Lectures*; Biot's *Physique*; Becquerel, *Traité de l'Electricité*; Captain Kater's, and Dr. Faraday's Papers in the *Phil. Trans.*; Sir D. Brewster, article *Magnetism* in 'Encyclopædia Britannica.' For the mathematical theory on this subject—the *Memoirs*, by Poisson; Ampère's *Electro-Dynamic Treatise*; Murphy's *Electricity*, chap. vii.; and for more recent developments, Professor J. D. Forbes' *Dissertation*; and Professor W. Thomson's papers in the *Phil. Mag.* for 1850 and 1851, and in the *Phil. Trans.* for 1851, Part I.)

MAGNETISM, ANIMAL. [ANIMAL MAGNETISM.]

MAGNITUDE. This term is generally used synonymously with quantity, and is sometimes even confounded with number. The distinction between the first two terms is not more marked than this:—He who answers the question 'how much?' describes the quantity, and he who answers 'how great?' describes the magnitude. But since magnitude is generally used in our language as applied to amount of space, we may best describe our own idiom by laying down quantity as the general term, and stating magnitude to mean usually the quantity of space. The term, however, must be considered, in a mathematical point of view, as originating with Euclid (whose word is *μέγεθος*); and it is used by him, not particularly as applied to space, but also to everything which admits of the introduction of the notion of greater or less. In this sense, then, we have many magnitudes (all moral qualities for instance) which are not the object of mathematical reasoning. So necessary is the notion of magnitude to our conception even of things which we cannot measure, that we borrow idioms from subjects within the province of mathematics. Thus we speak of force of mind, and of it being greater in one individual than in another. According to the definition of magnitude, namely, 'that of which greater or less can be predicated, when two of the same kind are compared together,' it follows that we include both mental as well as material objects of conception. But the mathematics inter-

pose the postulate that no such object can be made matter of exact reasoning, unless in cases which admit of the comparison being performed according to some method, the results of which shall be self-evident, and inseparable from our notion of the thing measured. Let A and B be two magnitudes of the same kind; they are then, and then only, the objects of mathematical comparison, when other magnitudes equal to A and B can be found, and added together as often as may be desired; and when, moreover, any collection of As can be compared with a collection of Bs, so as to ascertain which is greater or less than the other. Angles furnish an instance of magnitude, the conception of which is exceedingly vague in the mind of most beginners, but which takes precision and certainty in the course of mathematical study. Magnitudes, thus capable of comparison, are the objects of the doctrine of *Proportion*. That part of geometry which precedes proportion considers only the simple alternative of equal or unequal, modes of inequality being necessarily deferred until after that consideration.

By the magnitude of any bounded space the mathematician means the results of measurement; but the common idiom refers to that which the mathematician calls for distinction *apparent* magnitude. It is correct, in the common meaning of the term, to say, that a man at a little distance from the eye is larger than a remote mountain. In thus judging of objects, the angles which they subtend at the eye furnish the means of comparison. Experience, derived from the combination of sight and touch, teaches us how to make those deductions which are necessary before we can learn the absolute from the apparent magnitude.

It is soon found that an object as it recedes grows smaller, that is, subtends a less angle. It is also seen that the recess is accompanied by a loss of brightness and distinctness. The former is a consequence of the loss of light which takes place in its passage through the air; were it not for this, the same object would be equally bright at all distances; for though the quantity of light which enters the eye is diminished by increase of distance, yet the surface from which the light appears to proceed is diminished in the same proportion. The loss of distinctness is a consequence, first of the loss of light, next of the different proportion in which different colours are lost; the effect of the interposed atmosphere amounting to laying on more or less of the blue colour of the atmosphere over the whole. Our perception of magnitude depends both on the subtended angle and on the distinctness; we learn from experience that, of two objects seen under the same angle, the less distinct, as being the more distant, must be the larger. That habit is our guide can readily be shown by producing instances in which we are deceived, the object being either such as is not commonly seen, or seen under unusual circumstances. A colossal statue mounted on a column does not suggest the idea of a man of unusual size to persons in general, unless when some person mounts the same height and affords means of comparison. In a fog, which diminishes the distinctness of objects, but does not affect the angles under which they are seen, these objects are sensibly increased in apparent size, and distant hills appear nearer in a clear day

than in a hazy one. Those who wear spectacles may satisfy themselves by breathing on the glasses, and watching an object as the moisture evaporates, that increase of distinctness gives apparent approximation.

The angle subtended by an object is inversely as its distance, which is sufficiently near for common purposes when angles are small, which is generally the case. And a man of 6 feet high, at a distance of 100 feet, is seen under an angle of $3^{\circ} 26'$. The sun is seen under an angle of $32'$, and the moon under an angle of $29\frac{1}{2}'$ to $33\frac{1}{2}'$.

MAGNOLIA, a genus of plants, the type of the natural order *Magnoliaceæ*. The species of Magnolia are trees or shrubs, all natives of North America and Asia. *M. grandiflora*, Great-flowered Magnolia, or Laurel Bay, is an evergreen tree, reaching sometimes a height of 70 feet. It is one of the tallest and handsomest trees of North America. It has large pale-green shining leaves nearly 10 inches long, with large white flowers. It has been cultivated in England for the last century, and in this country attains a height of from 20 to 30 feet. *M. glauca*, deciduous Swamp Magnolia, is a native of North America, in low, moist, swampy ground at a little distance from the sea, from Massachusetts to Florida and Louisiana. The bark has a bitter and aromatic odour resembling sassafras. On this account it has been used in America as a substitute for other aromatic bitter barks, as Cascarella, Canella, &c., and, it is said, with great success. Although not much used in Europe, very favourable reports of its efficacy in chronic rheumatism, ague, and remittent fever have been given. The flowers are of a cream colour and have a sweet scent, which Kalm says may be smelt at a distance of 3 miles. The flowers are followed by red berries, which give the tree a handsome appearance. *M. umbrellata* is a native of North America, in the Carolinas, Georgia, Virginia, and New York. The wood is soft and spongy, and on the mountains of Virginia is called Elmwood. *M. acuminata* is a native of North America, from Pennsylvania to the Carolinas. The fruit is about 3 inches long, and resembles a small cucumber, whence in America it is called Cucumber-tree. A tincture is made of the fruit, and is used in cases of rheumatism. *M. Yulan*, or *conspicua*, grows in China, where it has been cultivated since the year 627. Its native name is Yulan. It is a very showy tree, having white flowers sometimes diffused with purple, which give out a most delicious perfume. *M. purpurea*, the Purple-flowered Magnolia, is a native of Japan, and seldom attains a greater height than 10 feet. The bark when bruised has an aromatic odour. The flowers are more or less purple without, and always white within. It is a very ornamental species, and worthy of cultivation. The best situation for it is against a wall, when its branches will reach a height of from 15 to 20 feet.

MAGNOLIACEÆ, an important natural order of albuminous polypetalous Exogens, consisting of bushes and trees, inhabiting the temperate parts of both the Old and New World. In England, where they are exotics, they are among the most highly valued of ornamental plants, and every species which can bear the climate, or which will thrive in conservatories, has been collected with great care.

The genera *Talauma* and *Magnolia* have the singular property of dropping their seeds out of the back of the seed-vessels when ripe, allowing them to hang down, each suspended by a long extensible elastic cord, composed of delicate spiral vessels.

In consequence of the seeds of *Magnoliaceæ* containing an abundance of oil, which often becomes rancid soon after they are gathered, it is difficult to transport them to a considerable distance in a living state. The best method of succeeding in that object is to pack the seeds in earth as soon as they are ripe, pressing them close and securing them in a box. Under such circumstances they will preserve their vitality for several months.

MAGOPHONIA (Gr. *Μάγων Φόνος*, 'slaughter of the Magi'), the name of an important festival among the Persians, held in commemoration of the expulsion of the Magi, as mentioned by Herodotus, Strabo, and other ancient writers. It arose from the following circumstances. On the death of Cambyses, the throne of Persia had been occupied by one of the Magi, named Smerdis; when seven of the principal nobles conspired to overthrow him. They were successful; the usurper was killed, and the people rose and massacred all the Magi that could be found. Darius, son of Hystaspes, was then elected king. In commemoration of this event, the grand festival of the Magophonia was instituted, and celebrated for ages. On this day the Magi were not allowed to appear in public; and the people were at liberty to slay them wherever they were met with.

MAGPIE. [CORVIDÆ.]

MAHABHARATA, or BHARATA ('belonging to Bhârata and his descendants'), the most celebrated epic poem of the Hindus after the 'Râmâyan'a.' A passage in the introductory part of the work (1, 2296) has given ground for the assertion that it contains the round number of a hundred thousand distichs or sloçâs; but in order to complete this enormous amount, the 'Harivansa,' a mythological history of Krishna, and sundry other pieces, have been added. The eighteen component fictions (Parva) of the 'Mahâbhârata' contain about 85,000 sloçâs, and even these may be reduced to 24,000 distichs, of which the original 'Bhârata,' without its episodes, is said to have formerly consisted. (1, 101.) The principal subject of the 'Mahâbhârata,' to which its middle sections particularly are consecrated, is a long civil war between two dynasties of ancient India, the Kurus and Pândus.

In this main texture of the 'Mahâbhârata' is interwoven a great variety of episodes; or more properly speaking, the history of the Pândus and Kurus is the leading thread by which many ancient traditions, moral reflections, poetical descriptions, and popular stories of every kind, have been connected. It is important to observe that these accessory elements, which now form almost three-fourths of the whole epopee, are stated in the poem itself not to be constituent parts of the original 'Bhârata;' in fact, they are for the most part very loosely inserted; and as many of them are epic productions of considerable length, the principal theme is not only frequently interrupted by intervening episodes, but often totally lost sight of, even when the most active progression should be expected.

Compared with the 'Râmâyan'a,' the 'Mahâbhâ-

rata' is wanting in unity and internal coherence; it is rather a collection of ancient epic poems, gathered round the central history of the Kurus and Pândus; but for this reason it surpasses the former poem by a greater variety of pleasing scenes and attractive situations, particularly in its episodes, the characters of which are very often delineated with so peculiar a delicacy, and with so strongly marked an individuality, as to leave a powerful impression on the reader. Finally, the 'Mahâbhârata' may be looked upon as a most ample source of every kind of antiquarian lore, and as the only Sanscrit work, if we except the 'Annals of Kashmir,' by which a considerable quantity of the most valuable historical fragments has been preserved. The poem is evidently of later date than the 'Râmâyan'a,' but neither the precise time in which it was composed, nor even the epoch of its finally assuming its present shape, can yet be ascertained.

A complete edition in the original Sanscrit, carefully collated by learned Pundits with the best manuscripts in the library of the Sanscrit College of Calcutta, has been published by the Asiatic Society of Bengal in five quarto volumes. Various fragments and stories of the 'Mahâbhârata' have been translated into English; and several episodes have been published separately. An analysis of the leading story is given by Professor Monier Williams in his *Indian Epic Poetry* (London, 1863). See also Professor Max Müller's *History of Sanscrit Literature*.

MAHMUD I. was raised to the throne of the Ottomans in 1730. He continued the war begun under his predecessor Ahmed against Nadir Shah of Persia, but with no success, and made peace in 1736. He was more successful against Austria, from which he recovered Belgrade; and Russia, which gave up Oczakow. In a new war with Persia, commenced in 1747, he was unfortunate; but he took little part in these transactions, which were managed by his favourites. He died in September, 1754.

MAHMUD II., Sultan of Turkey, the younger son of Abdu-l-Hamid, or Ahmed IV., was born on the 14th of Ramazân, A.H. 1199 (July 20, 1785). The murder of Selim, his uncle, while attempting to regain the throne of which he had been deprived, and the deposition of Mustafa, who had occupied his place, led to the elevation of Mahmud, July 28, 1808. In spite of the threatening state of the empire, Mahmud boldly proclaimed that he would carry out the reforms of Selim. Several pashas were severely punished for disobedience; but when the turn of the janizaries came, they broke out into open rebellion. Mustafa was proclaimed sultan, and the rebels cried out for the head of Mahmud. Mahmud then ordered his captive brother, Mustafa, to be strangled together with his infant son; and those of Mustafa's women and concubines who were pregnant, four in number, were sewn up in leather sacks, and drowned in the Bosphorus. By these murders Mahmud became the only male descendant of Osman, which was a matter of great importance, the popular belief being that Turkey would last no longer than the family by whose great ancestor the empire was founded.

Mahmud succeeded in crushing this bloody rebellion after a struggle of two days, and having conciliated the janizaries, he turned his attention to his relations with the European powers. He made peace

with Russia at Bucharest, May 28, 1812, on conditions more favourable to him than the unfortunate turn of the war allowed him to expect.

Mahmud availed himself of the peace to continue the work of reform. But his success against Ali Pacha, and other rebellious chiefs, was followed by fresh difficulties. No sooner was Ali's head exposed on the gate of the seraglio, than Mahmud had to prepare for a contest with Russia, and an open rebellion of the Greeks. The defeat of the Turko-Egyptian fleet at Navarino by the combined British, French, and Russian fleets, freed Greece from her invaders. None of his defeats dispirited the sultan, and he boldly proclaimed 'a holy war' against Russia. In the meantime, however, events had taken place which led to the destruction of his formidable enemies the janizaries. The sultan, who had for some time resolved upon their destruction, had excited their anger by his reforms and continual adoption of European customs, and an open rebellion was the consequence. On the 15th of June, 1826, while the sultan and the grand vizir were in the country, the janizaries marched in order of battle to the palace of the grand vizir, which they took and burnt down, and they were preparing to attack the seraglio when Mahmud returned, and having nearly the whole population of Constantinople on his side, the janizaries were driven for shelter within their barracks, the Et-Meidân. Their resistance, however, only delayed their fate for a few hours; 6000 janizaries perished in the course of one day; several hundreds, who had not taken part in the action, but were known as rebels, were massacred in the streets or in their houses, and 15,000, who had kept quiet, were exiled to different places in Asia Minor. On the following day, June 16, a hattî sherîf pronounced the abolition of the military corporation of the janizaries. The Russian war which followed proved unfortunate for the sultan, and the empire would have fallen a prey to the Russians, but for the interference of the great European powers, headed by England, through whose mediation the war was concluded by the peace of Adrianople, September 14, 1829. His next war was with Mehemed Ali, in which his pride was still further humbled. The ruin of the sultan seemed to be inevitable. He was saved by his greatest enemy: a Russian fleet and a Russian army stopped the progress of Ibrahim Pasha, the son of Mehemed Ali, who was advancing through Syria to Constantinople. On May 4, 1833, peace was concluded at Koniah, and Mehemed Ali obtained the object of his armament, the investiture of Syria and Adâna, but he remained a tributary vassal of the Porte. So much was Turkey weakened through this war, that Mahmud, despairing of further independence, threw himself into the arms of Russia, and on July 8 signed the treaty of Unkiar-Skelessi, by which Russia bound herself to assist Turkey with an army whenever she should want it, in acknowledgment of which Mahmud promised that no armed ship of foreign nations should be allowed to pass the Dardanelles without the permission of Russia. The remainder of the sultan's reign was occupied by wars against Mehemed Ali, who obtained still further advantages. The sultan died July 1, 1839, a few days before the news of the battle of Nisibis, in which Ibrahim Pasha won a decisive victory over the Turks.

MAHOG'ANY, a beautiful species of cabinet wood, so called from *Mahogani*, the American name of the tree, which is the *Cedrus Mahogani* of Miller, and the *Swietenia Mahogani* of Candolle. It is a native chiefly of the Bay of Honduras, whence it is largely exported to this country. It is also exported from Cuba, Jamaica, Hispaniola, and South America generally. The tree is straight and tall in its growth. It is about 4 feet in diameter, and sometimes rises 60 feet from the spur to the limb. Its foliage is of a beautiful deep green; the flower of a reddish or saffron colour; and the fruit as large as a turkey's egg. Some of these trees grow to a height of 100 feet. The wood is usually hard, takes a fine polish, and is much used in all kinds of cabinet work. The first appropriation of this valuable wood in England possesses some historical interest. At the latter end of the last century, an eminent physician, Dr. Gibbons, had a brother, a West Indian captain, who brought over some planks of this wood as ballast. The doctor being then engaged in building a house in King Street, Covent Garden, his brother thought they might be of service to him; but the wood being found too hard for the carpenters' tools, it was laid aside as useless. Soon afterwards, Mrs. Gibbons wanting a candlebox, the doctor called on his cabinet-maker, Woollaston, in Long Acre, to make him one of some wood that lay in his garden. Woollaston also complained that it was too hard. The doctor said he must get stronger tools. The candle-box was made, and approved; inasmuch that the doctor then insisted on having a bureau made of the same wood, which was accordingly done; when the fine colour and polish were so pleasing, that he invited all his friends to come and see it; among them the duchess of Buckingham. Her grace begged some of the wood of Dr. Gibbons, and employed Woollaston to make her a bureau also, and this contributed to the fame of mahogany, which soon came into general use.

The following were the imports of mahogany into the United Kingdom in 1864:—

	Tons.	Value. £	Average price per Ton.		
			£	s.	d.
From Cuba, . . .	7,493	76,908	10	5	3
“ Hayti and St. Domingo, . . }	1,438	26,234	18	4	10
“ United States, .	1,381	14,135	10	4	8
“ Mexico, . . .	6,685	46,799	7	0	0
“ Central America, 2,340	16,379	7	0	0	0
“ Belize (Hondur.)	20,927	198,934	9	10	1
“ Other parts, . .	744	6,775	9	2	1
Total, .	41,008	886,164			

MAHOMET. [MOHAMMED.]

MAHOMET I. was the restorer of the Ottoman empire, which he found in a state of anarchy. He extended his conquests into Europe, and obliged the princes of Bosnia, Servia, and Wallachia to pay him tribute. He died, after nine years' reign, in 1421.

MAHOMET II., son of Mourad II., was proclaimed emperor of the Ottomans after the voluntary abdication of his father in 1444; Mourad, however, was obliged to resume the reins of government till his death, in 1451, when Mahomet commenced his reign. He prosecuted many successful wars in Europe, taking Constantinople, Corinth, and

Negropont by storm; he, however, met with some reverses at Belgrade and Rhodes. He died in Bithynia in 1481. His epitaph runs thus:—'I designed to conquer Rhodes and subdue proud Italy.'

MAHRATTAS, or MAHARATTAS. The origin of these people, whose wars have filled so large a space in the history of British India, is involved in much obscurity. The Mahratta empire, as it takes a place in modern history, was founded in the latter half of the seventeenth century, in the reign of Aurangzebe, by Sevaji, a Hindu in the service of the king of Bejapûr, who gave him a jaghire in the Carnatic, with the command of 10,000 cavalry. His first act was to supplant his father Shahjee, in 1647, in the jaghire of Poona; on which occasion he increased the number of his soldiers, and levied contributions in all the neighbouring districts. Sevaji died in 1680, and was succeeded by his son Sambaji, who was unable to withstand the power of Aurangzebe, and, falling into his hands, was put to death in 1689. On the death of Sambaji, a great number of chiefs, availing themselves of the natural facilities offered by the country, issued from various points in the mountains, and kept up a constant predatory warfare in the neighbouring provinces, plundering and devastating wherever they penetrated, till they had become, at the death of Aurangzebe in 1707, more powerful than ever. From the death of Sambaji in 1689 till the year 1818, the nominal sovereign or rajah of the Mahrattas had no real power, but was a prisoner, confined in the hill-fortress of Satara, while the government was administered by the peishwa, or minister, whose office became hereditary in the family of Balaji Baiswanath, its first possessor, who fixed his residence at Poona. He was succeeded by his son Balaji Bajerao, who died in 1761.

The next peishwa was Madhoo Rao, who filled the office for eleven years, and after his death was succeeded by his son Narrain Rao. This chief was murdered in 1773. Ragoba, the uncle of Narrain Rao, claimed the right of succession in opposition to Sevaji Madhoo Rao, who was set up by Nana Furnavese as the posthumous son of Narrain, and who administered the government during his minority. Ragoba fled to Guzerat, where he obtained the promise of support from the Guicowar. For some time preceding these events the English government had desired the possession of Salsette and Bassein, then forming part of the possessions of the Mahratta government. They formed a treaty with Ragoba, engaging to replace him in his office, and they obtained possession of Salsette and Bassein. An English force of 25,000 men was then put in motion in his favour; but negotiations had at the same time been opened with the authorities at Poona, and as they confirmed to the English government the possession of Salsette and Bassein, all active assistance was withdrawn from Ragoba, who retired to Surat with only 200 attendants. Sevaji Madhoo Rao died in consequence of an accidental fall in 1795, and his son Bajerao was declared peishwa. This chief continued in power until October, 1802, when, his forces being totally defeated near Poona by Jeswant Rao Holcar, he fled to Bassein, and placed himself under the

protection of the British government. In the following year he was reinstated in his capital by the duke of Wellington. In 1815 Bajerao was detected in the endeavour to form a general confederacy against the English; his capital was in consequence surrounded, and he was forced to cede in perpetuity districts yielding a revenue of 340,000*l.* In November, 1817, the peishwa, in defiance of his engagements, suddenly attacked and destroyed the houses of the British residency near Poona. This treacherous conduct was speedily punished, his forces were on the following day routed by the English troops, and he became a fugitive, and wandered about in various directions until June, 1818, when he surrendered himself to Sir John Malcolm, and renounced all sovereignty for himself and his family, upon the promise of an adequate pension. On this occasion the greater part of the Poona territory, estimated at 50,000 square miles, came into possession of the English. Though small in stature, the Mahrattas are noted for their courage. They are, however, cruel and perfidious, and have always exercised a most disastrous influence on the people subject to them. No distinction of caste exists amongst them, although they are devout worshippers of Brahma. [HOLKAR; SINDIA; POONA.]

MAI, CARDINAL ANGELO, chief librarian of the Vatican, and a member of many of the learned institutions of Europe, was born at Schilpario, in the diocese of Bergamo, in 1782. In 1812, having risen to some eminence in the literary world, especially for his critical knowledge in palæography, he was appointed keeper of the Ambrosian library at Milan. He soon distinguished himself in the walks of classical and antiquarian lore. In 1814 the first-fruits of his valuable discoveries from palimpsest manuscripts made their appearance. Among others came out the orations of Cicero on behalf of Scæurus, Tullius, and Flaccus, which had been found in the convent of Bobbio, but written over by a poet of the eighth century, named Sedulius; likewise inedited fragments of three other orations, 'in Clodium et Curionem, de ære alieno Milonis, et de Rege Alexandrino.' A second edition of these works appeared in 1817. Abbate Mai now followed up his learned researches with great assiduity, and the results have been laid before the world. A few of his edited works, derived from the same source as the preceding, may here be mentioned:—The works of M. Cornelius Fronto; the orations of Q. Aurelius Symmachus; fragments of six comedies of Plautus, found written beneath a Latin translation of the Old Testament; 'Philo Judæus de Virtute et ejus Partibus' (1816); 'Porphyrî Philosophi ad Marcellum'; 'Sibyllæ libri xiv., the Itinerarium Alexandri' (1817); a volume of Scholiasts of the fourth century upon Virgil, discovered under the works of Gregory the Great (1818); 'M. Tullii Ciceronis de Republicâ, quæ supersunt' (1722), considered as the most valuable discovery made by Mai; 'Scriptorum veterum nova Collectio, è Vaticanis codicibus edita' (1825). The whole of his labours were subsequently printed in two collections, one consisting of ten vols. 8vo, and embracing classical literature, and the other of ten vols. 4to, comprehending the early Christian writers. In 1837 our learned collector was created a cardinal; and subsequently, on the death of Cardinal Lambou-

schini, he succeeded to the post of chief librarian of the Vatican. He died in 1854; but he had directed by his will that his vast library should be offered to the Pontifical government for half its estimated value (8000*l.*), and that the proceeds should be applied to the use of the poor in his native village of Schilpario. The pope, however, succeeded in obtaining the library for 10,000 scudi, or about one-fourth the price originally proposed; and this valuable collection now occupies the Borgia rooms of the Vatican.

MAIANO, BENEDETTO DA, a sculptor and architect, was born at Florence in 1444. He first distinguished himself as a carver and inlayer of wood. His works in marble consisted of fonts, pulpits, and tombs. One of his masterpieces is the marble pulpit of Santa Croce. In architecture he did little, but he built the portico of the church of the Madonna delle Grazie near Arezzo; a chapel for himself on his own estate near Prato; and he is said to have designed the Palazzo Strozzi. He died in 1498.

MAIDEN. The name of an instrument of capital punishment formerly used at Halifax in Yorkshire, and in Scotland. It was the prototype of the French guillotine, and consisted of a loaded piece of iron with a sharp edge, which moved in grooves in a frame 10 feet high. This piece being raised to the top of the frame and let loose, descended and severed the criminal's head from his body.

MAIDEN HAIR. [ADAMTUM.]

MAIDENHEAD. [BERKSHIRE.]

MAIDSTONE. [KENT.]

MA'ID/E, or MAIANS, a group of brachyurous crustaceans (Crabs), constituting the second tribe of the family of the *Oxyrhynchii*, according to the system of M. Milne-Edwards. The genera are numerous.

MAIL (from the French *maille*), strictly 'the mesh of a net,' but applied in a collective view to defensive armour formed of iron rings or round meshes. Boyer, in his French dictionary, translates *maille* 'a little iron ring.'

MAIL, COAT OF (also denominated the Hauberk or Habergeon), armour for the body, of which there were two kinds, one called chain-mail, the other plate-mail. [ARMOUR.]

MAILS AND DUTIES, in Scotch law, are the rents of an estate, whether in money or in grain.

MAIM ('mayhem') is an injury done to the body of a man by forcibly depriving him of the use of some member serviceable in fight, as a means either of defence or offence, and permanently disabling him from offering such an effectual resistance to further attacks upon his person as he otherwise might have done. The destruction of a jaw-tooth, of an ear, or of the nose, or of other members, the loss of which does not interfere with the means of defence or of offence, does not amount to mayhem. But the distinction is by statutory alterations rendered of little importance.

Mayhem was formerly punished by inflicting the same privation upon the offender which he had caused to the party maimed. It was afterwards punishable by fine and imprisonment, as an aggravated trespass. But now, by 24 and 25 Vic. c. 100, whoever shall unlawfully and maliciously wound or inflict any grievous bodily harm upon any other person, either with or without any weapon or instru-

ment, shall be guilty of misdemeanor, and liable to be kept in penal servitude for three years, or imprisoned for two years, with or without hard labour; and if any person hurt or wound with intent to maim, he shall be liable to penal servitude for life, or imprisonment for two years.

Concurrently with these proceedings in the name of the Crown, the party injured is entitled to compensation in the shape of damages, to be recovered in an action of trespass; and where the damages found by the jury are not commensurate to the injury sustained, the court may increase them upon inspection of the mayhem.

MAIMBOURG, LOUIS, born in France in 1620, entered the order of Jesuits, and studied theology at Rome. On his return to France, he was employed as a preacher. Having published, in 1682, a work in which he defended the principles of the Gallican Church, '*Traité Historique de l'Eglise de Rome*,' the Pope caused him to be expelled from the order of Jesuits. Louis XIV. on this occasion gave him a pension, and he retired to the abbey of St. Victor at Paris, where he died in 1686. He wrote also several other works, among which are—a '*History of the Pontificate of St. Gregory*,' and histories of Calvinism, Arianism, and Lutheranism.

MAIMONIDES, or more properly MOSES BEN MAIMON, one of the most celebrated of the Jewish Rabbis, was born at Cordova in Spain, about 1131 or 1133.

The most valuable of his writings are—'*Moreh Nevochim*,' or 'Teacher of the Perplexed,' originally written in Arabic, translated into Hebrew by his disciple Samuel Aben Tybbon, and into Latin by Justinian, bishop of Nebio, Paris, 1520, and by the younger Buxtorf, Basle, 1629, with a preface, which contains an account of the life of Maimonides; and '*Yad Hazakah*,' or 'The Strong Hand,' which contains a complete digest of the Hebrew laws. It is written in remarkably good Hebrew.

Maimonides founded a college at Alexandria for the instruction of his countrymen, in which he delivered lectures on philosophy and the Jewish laws. He died in Egypt at the age of seventy.

MAIN. [BAVARIA.]

MAINA, the modern name of a district of the Peloponnesus, which occupies the south-west part of the ancient Laconica, extending along the range of the Taygetus to Cape Matapan. The inhabitants of this mountainous district were never subjugated by the Turks, but lived in a kind of savage independence, often making incursions into and plundering the neighbouring districts occupied by the Turks, and some of them were pirates. They are now subjects of the kingdom of Greece.

MAINE, LE, one of the old provinces of France, was bounded N. by Normandie, E. by Orléanais, S. by Anjou or Touraine, and W. by Bretagne. It now forms the greater part of the departments MAYENNE and SARTHE, and part of ORNE.

MAINE is the most northern of the United States of North America. It is bounded S.W. and W. by New Hampshire, S. by the Atlantic Ocean, E. by New Brunswick, and N. and N.W. by Canada. The southern boundary of Canada, which had long been in dispute between the United States and Great Britain, was definitively settled in 1846, and is

described in the article **BRITISH AMERICA**. Maine extends from $43^{\circ} 5'$ to $47^{\circ} 20'$ N. lat., and $66^{\circ} 50'$ to $70^{\circ} 55'$ W. long. The area is 31,766 square miles. The population in 1860 was 628,276, of whom 1327 were free coloured, and none were slaves.

Surface and Soil.—The coast-line of Maine is indented by numerous bays, of which the principal are—Casco Bay, Penobscot Bay, Frenchman's Bay, Machias Bay, and Passamaquoddy Bay. These bays contain a great number of small islands, about 400 altogether, and some of considerable size; such as Mount Desert, in Frenchman's Bay, and Long Island, Fox Island, and Deer Island, in Penobscot Bay. Though the frost along this shore is very intense in winter, and the numerous islands favour the formation of ice, the harbours are commonly open all the year round, the strength of the tide, which rises from between 24 to 40 feet, preventing their being closed up. Indeed Maine has more good harbours than any other state in the Union. The country rises gradually, but rather rapidly, from the shore. The surface of the state is mostly hilly; but it is only in the north-western and northern districts that the hills rise to the height of mountains, of which the highest, Mount Kathadino, rises to more than 5385 feet. This mountainous district occupies more than one-fifth of the area of the state.

The centre of the state is occupied by a hilly region, which is well drained by numerous rivers with a rapid course. The southern portion is level and marshy. Along the sea-coast, and from 10 to 20 miles inland, the soil is of moderate fertility, and frequently intersected with sandy and sterile tracts; but beyond this region the soil improves, and produces plentiful crops of grain, flax, and hemp.

Rivers.—The rivers in the southern district have a short course. The principal are the Piscataqua, the Saco, and the Presumpscot, or Casco. East of Casco Bay is a deep indentation which receives two considerable rivers, the Androscoggin and the Kennebec. The Androscoggin rises about $45^{\circ} 12'$ N. lat., $71^{\circ} 15'$ W. long., and flowing S. and W., and again S. and W., after a course of about 200 miles joins the Kennebec near its mouth in Kennebec Bay. The Kennebec rises in several branches on the eastern declivity of the mountain-range which separates Maine from Canada: these branches unite in Moose-Head Lake, a sheet of water about 30 miles long from north to south, with a breadth varying from 5 to 20 miles. From this lake the Kennebec issues in a large stream, and the general direction of the remainder of its course is to the south, till it reaches the mouth of the Androscoggin, after a course of about 250 miles. Though its course is obstructed by falls and shoals, like that of the Androscoggin, it is of great importance in the transportation of lumber. The tide ascends to Augusta, 70 miles from the open sea. The Penobscot falls into Penobscot Bay, has a course of about 250 miles, and is navigable for large ships to Bangor, 52 miles from the sea. The St. Croix, or Scodie, which separates Maine from New Brunswick, enters Passamaquoddy Bay after a course of about 100 miles. Lakes and ponds in the interior are very numerous, especially in the north.

Climate.—The winter is very severe. From the 1st of November to the 1st of April the ground is covered with snow, and the rivers and lakes with ice.

The summer on the sea-shore is very hot; the thermometer frequently rises to 90° , and even 96° , and the weather is subject to sudden and great changes. Drought is frequent, but the country generally is healthy.

Productions, &c.—The principal products of this state are maize, wheat, barley, rye, and flax, with pine and other timber; apples, cherries, &c. The minerals comprise marble, iron ore, and lead. The annual value of the cotton manufactures has been estimated at 2,500,000 dollars. Shipbuilding is also extensively carried on—one-third of all the ships of America being built on the rivers and harbours of this state.

Maine has some good canals, and there are about 600 miles of railway open in the state. There are two colleges, with an aggregate of over 200 students, and 43,000 volumes in their libraries, besides ninety-two chartered academies and 6627 national schools, with an average attendance of 91,519 pupils. It has a state prison, and insane, blind, and deaf-mute asylums.

Towns.—Maine is divided into thirteen counties. The following are the principal towns, with the population of each in 1860:—*Augusta*, situated on both sides of the Kennebec, 43 miles from the sea, at the head of the sloop navigation, is the capital of the state. The two parts of the town are connected by a bridge 520 feet long. The state-house is of white granite, and there are several other handsome buildings, including an arsenal and hospital. Population, 7609. *Bangor* is situated on the west side of the river Penobscot, 60 miles from the sea, at the head of the navigation. The Kenduskeag, a stream 190 yards wide at its mouth, divides the city into two parts, which are connected by bridges. The harbour is spacious, and the tide rises 17 feet in it. Close to the city a bridge of 1300 feet in length crosses the Penobscot. There is a great trade in timber, which employs about 2000 vessels. In the town are a theological seminary, and several schools. Steamboats ply daily to and from Portland and Boston. Population, 16,407. *Bath*, on the west bank of the Kennebec, 12 miles from the sea, is one of the chief commercial towns of Maine. Shipbuilding is largely carried on, and there is an active coasting trade by sailing vessels and steamers. Population, 8076. *Belfast*, a port of entry, at the head of Belfast Bay, on the west side of the river Penobscot, 30 miles from the sea, has a spacious and safe harbour, and a large coasting trade in fish and timber. Shipbuilding is also extensively carried on here. Population, 5500. *Bristol*, a sea-port at the head of Bristol Bay, on the Atlantic, in the place where the first settlement of Maine was commenced, in 1625, has many vessels employed in the coasting trade and fisheries. Population, 4000. *Brunswick*, on the south side of the Androscoggin, contains Bowdoin College, which has a medical school, various museums, and an extensive library. Much lumber is brought down the Androscoggin, and there is great water-power here, by which thirteen saw-mills are driven. Population, 4976. *Calais*, on the river St. Croix. The tide here rises 20 feet, and vessels of the largest class ascend to the lower village, which is connected by a railway with the upper village, 2 miles distant. There is a large trade in timber. Population, 4753.

Eastport is situated on Moose Island, in Passamaquoddy Bay, and has a capacious dock. It is the extreme eastern point of the United States, is a garrison town, and has a bridge connecting it with the mainland. Population, 4000. *Freeport*, at the head of Casco Bay, has a small harbour. Population, 2629. *Gardiner* is situated on the west side of the Kennebec. The river Cobbeseconte here enters the Kennebec, with a succession of falls which afford great water-power. Population, 6000. *Hallowell*, on the west side of the Kennebec, has a population of 4769. *Portland*. [PORTLAND.] *Prospect* is situated on the west side of the river Penobscot, at its entrance into Penobscot Bay. Population, 4000. *Saco* is situated on the east side of the river Saco, 6 miles from the mouth, where there is a descent of 42 feet, which affords great water-power. It has numerous mills, and a fine basin below the falls, where vessels take in their cargoes. Population, 5000. *Thomaston*, between Penobscot Bay on the east, and the St. George's River on the west, 5 miles from the ocean, has a large trade in lime. The Maine state prison is situated here, and the prisoners are employed in quarrying and cutting granite for exportation. Population, 3218. *Vassalborough*, on the east bank of the Kennebec, 11 miles N. by E. from Augusta, has great water-power by means of the outlets of two lakes. Population, 4000. *Water-ville*, on the west bank of the Kennebec, at the terminus of a railway 16 miles north of Augusta, has a Baptist college, and many mills and factories. Population, 3965. *Wiscasset*, at the mouth of the river Sheepscot, has a fine harbour, which admits vessels of the largest size, a good trade, and does a good deal of shipbuilding. Population, 3000. *York*, on the north side of York River, 1 mile from the sea, has a harbour which admits vessels of 250 tons' burthen; a lighthouse, and shipping employed in the fisheries. Population, 4000.

Constitution and History.—The governor of the state of Maine is elected annually. The legislature consists of thirty-one senators and 151 representatives, who are elected for one year. It sends two senators and six representatives to Congress.

Maine seems to have been discovered by one of the Cabots in 1497. It was afterwards visited by the French, who called the southern part, west of the Kennebec, Maine, and the eastern part Acadie. The English made some settlements in the southern district about 1635. The first charter was proprietary, and granted in 1639 to Sir Ferdinand Gorges; but in 1652 Maine was united to Massachusetts, under the title of the county of Yorkshire. Massachusetts, in 1819, gave permission to the freemen of Maine to decide the question of a separation, when, the majority of votes being in favour of it, it became an independent state. In its early history it is said that every twentieth settler was killed by the Indians.

MAINE-ET-LOIRE, a department in France, formed out of the old province of Anjou, and named from its two principal rivers, the Maine and the Loire, is bounded N. by the departments of Mayenne and Sarthe, E. by Indre-et-Loire, S. by the departments of Vienne, Deux-Sèvres, and Vendée, and W. by Loire-Inférieure. Its greatest length is 77 miles, its greatest breadth 60 miles. The area is 2750 square miles, and the population 526,012.

Surface.—The department presents a pleasing variety of low hills, mostly planted with vines, and of plains, which are very fertile. The fields are inclosed by ditches and quickset hedges, within which clumps of trees are planted here and there, the whole giving a warm and agreeable aspect to the country.

Rivers.—The department belongs entirely to the basin of the Loire, which river crosses it from E. to W., and forms in its course several beautiful islands. The northern districts are drained by the Mayenne and its feeder the Oudon, by the Sarthe and its feeder the Loir, and by the Authion. [MAYENNE; SARTHE; LOIRE-ET-CHER; INDRE-ET-LOIRE.] The Mayenne and the Sarthe unite above Angers, and form the *Maine*, which after a course of about 5 miles falls into the Loire S. by W. of Angers. These last-named rivers are navigable; the Loire steamers between Nantes and Tours ply up the Maine as far as Angers. The chief feeders of the Loire from the left bank in this department are the Thouet and the Layon. The Sèvre-Nantaise, and its tributary the Moine, drain a small portion of the south-west of the department. The department is traversed by the Orléans-Nantes Railroad. The climate is healthy, and the temperature mild; winter is rainy; west and south-west winds prevail.

Soil, Products, &c.—The soil is generally fertile, yielding corn more than enough for the consumption. The chief crops are wheat, rye, barley, and pulse of all kinds. Other valuable products are hemp, flax, nuts, excellent fruits, &c. About 11,000,000 gallons of white and red wine are made annually, some of which is of good quality. A considerable quantity of effervescing wine, resembling the true champagne and rivaling it in quality, is manufactured. The department is famous for its melons. A considerable quantity of cider is also made. The forests, which are extensive, consist chiefly of oak and beech. The pasturage is good, and great numbers of horses, mules, horned cattle, and sheep are reared. Deer and wild boars are met with in the forests; wolves and badgers are sometimes seen; foxes, weasels, and wild cats are more common. Feathered game is very abundant. Fish is plentiful; the rivers are infested by otters. Among the reptiles are vipers, adders, the common snake, and land-lizards.

The minerals worked comprise slate, granite, marble, and flint. The quarries of the former, especially those of Angers, are vast and frightful excavations, worked right from the surface of the ground. The principal manufactures carried on are linens, challets, gingham, and calicoes. Grain is extensively exported.

Divisions, Chief Towns, &c.—The department is divided into five arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Angers, . .	9	89	159,981
Baugé, . .	6	66	78,641
Segré, . .	5	61	63,407
Cholet, . .	7	77	127,926
Saumur, . .	7	83	96,057
Total, .	34	376	526,012

In the arrondissement of Angers the chief town is ANGERS, which is also the capital of the whole department. *Chalennes*, prettily situated at the foot of a hill between the Layon and the Loire, 14 miles S. by W. from Angers, has 6089 inhabitants, who manufacture serge, handkerchiefs, and brandy. *St.-Georges*, W. of Angers, and near the right bank of the Loire, has a population of 2757. *Ponts-de-Cé*, a town of 3739 inhabitants, stands about 4 miles S. from Angers, at the entrance of the Authion into the Loire. It takes its name from the series of bridges that here connect the banks of the Loire with the intervening islands. These bridges form one of the most important passes of the Loire; they are partly of wood and partly of stone, and contain 109 arches in all, the entire length, including the causeway, being 3280 yards. The town consists merely of rows of houses built along the causeways connecting the bridges. About half a mile below Ponts-de-Cé, and on the right bank of the Loire, is an ancient Roman encampment. Six miles S.S.W. of this town, 306 soldiers were drowned while crossing a bridge in April, 1850.

The arrondissement of Baugé is named from its chief town, *Baugé*, which stands E. of Angers, near the Couesnon, a feeder of the Authion, and has a civil tribunal, a college, and 3546 inhabitants, who manufacture coarse woollens, linen, and articles of horn. The old castle built here by Foulques Nera is well preserved, and forms now one of the finest hospitals in Maine. In 1421 the English, under the duke of Clarence, were defeated here. *Beaufort*, situated in an extremely fertile country on the right bank of the Loire, has a communal college, and 5260 inhabitants, who manufacture sailcloth, zinc, leather, &c. There is also a considerable trade in corn, wine, oil, fruit, hemp, &c. *Durtal*, a town of 3528 inhabitants, is built at the foot and on the slope of a hill on the right bank of the Loire, which is here passed by a bridge of cut stone. Earthenware, tiles, bricks, and paper are manufactured here. *Longué*, on the Lathon, a feeder of the Authion, a few miles S. of Baugé, has 4283 inhabitants, who manufacture linen cloth.

The arrondissement of Segré is named from its chief town, *Segré*, which is situated in the north of the department, on the Odon, a feeder of the Mayenne, and has a tribunal of first instance, and 2032 inhabitants. *Lion-d'Angers*, a well built little town, near the junction of the Odon with the Mayenne, has a population of 2745. *Pouancé*, in the north-western angle of the department, has iron-smelting forges and blast furnaces, and 3227 inhabitants.

In the arrondissement of Cholet the chief town, *Cholet*, or *Chollet*, a busy manufacturing place in the south of the department, stands on the Maine, and has a council of Prud'hommes, a college, and 12,735 inhabitants. The town was burnt in the Vendean war by the Vendéans and the Republicans; but it has been since rebuilt. It is famous for the manufacture of linen and pocket-handkerchiefs; the material *chaillet* deriving its name from this town. Flannel, calico, cotton yarn, and leather are also made; there is a brisk trade in these articles, and in cattle and agricultural produce. *Beaupréau* stands on the Erve, a feeder of the Loire, 27 miles S.W. from Angers, and has a college, and 3821

inhabitants. There is a fine turreted château near the town. Leather, flannel and other woollen stuffs, and linen are manufactured. *Chemillé*, E. of Beaupréau, on a river called Ionne, is an old town with 4703 inhabitants, who manufacture linen of all kinds, calico, cotton yarn, and paper. *St.-Florent-le-Vieil*, a town of 2368 inhabitants, stands on a steep hill above the left bank of the Loire.

In the arrondissement of Saumur the chief town, *Saumur*, stands in a charming situation on the left bank of the Loire, at a distance of 40 miles by railroad W. from Tours, and has 14,079 inhabitants. It has a civil tribunal and a tribunal of commerce, a communal college with a library, a riding school for the army, a theatre, baths, &c. Linens and cambrics are manufactured here, but it lost its industrious Protestant artisans through the revocation of the edict of Nantes by Louis XIV., and has now little more than half the population it possessed two centuries ago. There are several fine promenades; the view from the castle over the valley of the Loire is very splendid. The environs of Saumur, along the left bank of the Loire, abound in druidical monuments. *Doué*, S.W. of Saumur, is a well built little town, with 3337 inhabitants, who trade in corn, linen, iron, and cattle. It possesses one of the finest fountains in France, both in an architectural point of view and on account of the abundance of its waters. *Fontevrauld*, in the south-eastern angle of the department, 9 miles from Saumur, has a population of 3394. The town owes its existence to the famous abbey of Fontevrauld, founded in 1099, of which the great church, a magnificent monument of the twelfth century, and all the other buildings now remaining, have been converted into a central prison. The abbey possesses great interest for an Englishman; it contains the cemetery of the Norman kings of England and the counts of Anjou. The tombs of Henry II. and his queen, Eleanor of Guienne, of Cœur-de-Lion, and Elizabeth, the queen of John, alone have been saved from utter destruction.

The department forms the see of the bishop of Angers, is included in the jurisdiction of the High Court (Cour Impériale) of Angers, the Academy of Rennes, and belongs to the fifteenth Military Division, of which Nantes is head-quarters. The department returns four members to the Chamber of Deputies.

(*Dictionnaire de la France; Annuaire pour l'An 1866*).

MAINIOTES. [MAINA.]

MAINTENANCE is defined to be when a man maintains a suit or quarrel to the disturbance or hindrance of right. If he who maintains another is to have by agreement part of the land or debt, &c., in suit, it is called Champerty. Maintenance was an offence at common law, and has also been the subject of several statutes, one of which is the 32 Henry VIII. c. 9.

MAINTENANCE, SEPARATE. [ALIMONY; DIVORCE.]

MAINTENON. [EURE-ET-LOIR.]

MAINTENON, FRANCOISE D'AUBIGNÉ, MARQUISE DE, was born at Niot, in 1635. She was first married to Scarron, the comic poet. When Scarron died in 1660, his widow was left poor; but some of her friends recommended her to Madame de Montespan, the mistress of Louis XIV., as governess

to her children by the king. She thus became known to Louis, who gradually conceived great esteem for her. The king made her a present of 100,000 livres, with which she purchased the estate of Maintenenon, when the king conferred on her the title of Marquise. Having consulted his confessor, Père La Chaise, the latter advised a private marriage; and in 1685, Louis, who was then forty-seven years of age, was secretly married to Madame de Maintenenon, who was fifty years old, by the archbishop of Paris, in presence of the Père La Chaise and two more witnesses. The marriage was always kept secret, and Madame de Maintenenon herself never avowed it. She exercised great influence over the king. After the death of the king she retired to Saint Cyr, where she died in 1719.

MAINZ, *Mentz*, or *Mayence*, the Roman *Moguntiacum*, the capital of the province of Rheinhessen in the grand-duchy of Hesse-Darmstadt, is situated on the left bank of the Rhine, a little below the junction of the Main with that river, on the slope of a hill, in 50° N. lat., 8° 11' E. long., and had in 1861, 41,279 inhabitants, exclusive of a garrison of 10,000 troops, half Prussian and half Austrian. It is connected, by a bridge of boats and a railway iron bridge over the Rhine, with the village of Kastel, or Kassel, included in its system of fortifications, which render Mainz one of the strongest fortresses in Europe, and a chief bulwark of Germany against France. As a fortress it belongs to the German Confederation, and the military governor, who retains his post five years, is alternately an Austrian or a Prussian general. The town is ill built. The streets are narrow, crooked, and gloomy, though there are many handsome edifices. Of the squares, the principal is the Parade, which is surrounded with avenues of trees. Of the eleven churches, of which one is for Protestants, the most remarkable are the cathedral, a vast building, surmounted by a lofty cupola; the church of St. Ignatius, which is considered a model of beautiful ecclesiastical architecture; St. Peter's; and St. Stephen's. The other chief buildings are the grand-ducal palace, the arsenal, the palaces of the commandant and of the vice-governor, the episcopal palace, the theatre, &c. A bronze statue of Gutenberg (the inventor of printing, and a native of Mainz), modelled by Thorwaldsen, and cast in Paris, was erected in an open space opposite the theatre in 1837; the expenses were paid by subscriptions from all parts of Europe. A literary club now occupies the site of his house. A gymnasium has taken the place of the former university, and there are several schools. The city library consists of above 110,000 volumes, and in the same building there are extensive collections of Roman antiquities, medals, &c. The Eichelstein in the citadel is supposed to be a monument in honour of Drusus Germanicus, brother of the Emperor Tiberius. The environs are very beautiful, and the prospects over the surrounding country magnificent. Mainz is a free port; it has few manufactures, but the commerce is considerable. Steamers ply regularly to the chief towns on the Rhine. Two railroads run from Kassel, one E. to Frankfurt-am-Main, the other N. to Wiesbaden. The town was taken by the French in 1797, but ceded to Hesse-Darmstadt in 1815.

MAINZER, DR. JOSEPH, was born at Trèves in the year 1801. He received a liberal education at the college of his native town, and was afterwards apprenticed to a mining engineer in the coal-fields of Dutweiler and Saltzbach. But he was soon compelled to abandon this career by the utter inadequacy of his physical strength for its arduous labours. From his earliest years he had evinced great musical ability, and an ardent attachment to the science, employing all his leisure hours in its cultivation. He now determined to embrace the musical profession, and placed himself as a pupil under Kinck, the kapelmeister to the grand duke of Darmstadt, who himself had been a pupil of Kittel, the last disciple of Sebastian Bach. When he had exhausted all that Kinck could teach, he repaired to Munich, where he studied under the Chevalier Seyfried, and to Vienna, where his master was the once celebrated Abbé Stadler. At Rome he received lessons from the Abbé Baini, the director of the music of the pontifical chapel. After a course of study which extended over two years, he returned to Trèves, and commenced the development of that new system of musical instruction which is associated with his name, and which had long occupied his thoughts. His system soon became popular, and in 1830 he removed to Paris, where he speedily obtained a liberal and extensive patronage; but the police growing suspicious of his popularity, and connecting it with political designs, compelled him to close his singing-classes. He then occupied himself with private lessons, and in contributing art-papers to the *Revue des Deux Mondes*, the *Revue du Nord*, and other periodicals of reputation. For six years he superintended the musical department of the *National*, and for a considerable period acted as the Paris correspondent of the *Leipzig Musical Gazette*. He removed to England in 1844, and popularized his system in most of the great cities, finally establishing himself at Manchester, where he successfully laboured until 1851. He wrought much good in his generation, but his works are now held in very little esteem.

MAIRE (whence the Mayor of a corporation), among the ancient Franks the title of the supreme magistrate or political head of the state. He was usually elected by the nobles as a set-off against the absolute power of the sovereign, and at length became possessed of all the rights and prerogatives of royalty. Indeed, neither rank nor dignity exempted a Frank from obedience to him. These Maires were actual ministers in peace, and independent generals in war. At length, after a long abuse of exorbitant power, they brought both constituents and masters into subjection. It is related, however, that Clotaire II., king of Western France, after his conquest of Burgundy, prevailed on the nobles of that kingdom, on the death of the Maire Varnacarius, to suppress that dignity in his favour. But under his successor, and irrevocably from the reign of his grandson Clovis II. of France, the royal dignity and that of Maire of the palace became separate offices in the state, each possessing his distinct rights and prerogatives.

MAIRE, JACQUES LE, was born about 1590. He is remembered as the discoverer of the Straits of Le Maire, and the first navigator who doubled Cape Horn: he was incited to the enterprise by the right of the Dutch East India Company to prohibit any vessel not belonging to them to double the Cape of

Good Hope. He died in December, 1616, on his voyage home from Batavia.

MAITLAND, SIR RICHARD, of Lethington, was born in 1496. He studied law in France, and on his return to Scotland followed that profession. In 1550 his book of 'Reports of the Decisions of the Court of Session' commences; and about the same time he appears in the sederunts of the court as an extraordinary lord of session. Sir Richard became blind about the year 1559, about which date he concludes his 'History and Chronicle of the House and Surname of Seaton.' In 1562 he was made lord privy-seal; but this office he in a few years afterwards resigned in favour of his second son John. He died March 20, 1586. His valuable collection of Scottish poetry is now preserved in the Pepysian Library, Magdalen College, Cambridge. His poetical writings have been printed by the Maitland Club.

MAITTAIRE, MICHAEL, was born in France, 1688, of Protestant parents, who settled in England at the revocation of the edict of Nantes. He was educated at Westminster school under Dr. Busby, whence he went to Oxford. From 1695 to 1699 he was second master in Westminster school. In 1699 he resigned that appointment, and devoted the remainder of his life to literary pursuits. He died August 4, 1747, at the age of seventy-nine.

Maittaire was a learned and laborious scholar. He edited many of the classical authors, with useful indexes, and also wrote several works, of which the most important are—'De Græcæ Linguæ Dialectis,' Lond., 1706, 1742, the best edition of which is by Sturz, Leip., 1807; 'Historia Typographorum aliquot Parisiensium, Vitas et Libros complectens,' Lond., 1717; 'Annales Typographici ab Artis Inventæ Origine ad Annum 1557 (cum Appendice ad Annum 1664),' Amst. and Lond., 1719–1741.

MAIXENT, ST. [SÈVRES, DEUX.]

MAIZE, or *Indian Corn*, is a plant commonly cultivated in the warmer parts of the world, where it answers a purpose similar to that of wheat in more northern countries. It is the *Zea Mays* of botanists, a monocœious grass, of vigorous growth, with stems not more than two feet high in some varieties, and reaching the height of eight or even ten feet in others. Each grain has a long thread-like style, which projects beyond the enveloping sheaths; and as there are some hundreds of them upon each spike, the whole form a long tassel, which looks as if made of silk. A plant generally bears two full ears, the grains of which vary greatly in number: some of the largest ears in America contain at least 800 grains.

This plant in its wild state is met with in Paraguay, in Chili, and in North America. The bread made from maize is not so palatable to some as wheat bread; but by mixing it in certain proportions with wheat, it makes a very pleasant food. In the United States of North America, Indian corn forms almost the only bread eaten by many of the people; and in the slave-states it is the only bread that the negroes eat. It is not, however, in the shape of baked bread that maize is most generally used in Europe, but in boiled messes and soups, as peas are with us.

A light, moist, and warm soil suits this plant best. It thrives well on land broken up from grass. The time for sowing maize in the south of France is the month of April; farther north, it is sown later. The

distance between the rows of maize varies from two to four feet. The seed is sometimes sown in the furrow after the plough, and sometimes put in with the dibble. Two or three inches deep is sufficient to make the seed germinate readily. In warm moist climates the plant is very soon above ground. When the plants are three or four inches out of ground, and no frost is feared, they are thinned out to two feet apart, and in very rich soil three feet is better. Maize, however sown, must be repeatedly hoed. At the first hoeing the plants which are too close are pulled up. When the plants are a foot high, there is a second hoeing; and when the flowers are ready to expand, a third hoeing is given, to kill weeds and open the surface of the soil slightly. The young ear is preserved as a pickle, like young cucumbers: when a little advanced, it is roasted on the coals, or before the fire, and is pleasant to eat: in the green state, when the grains are still soft and milky, it is boiled and used as a vegetable, and is considered a delicacy.

When the maize is fully ripe, the ears are twisted off by hand and laid in a dry place; they are turned occasionally, that the sheath may not become musty, and are then stored in a dry place. The leaves are gathered for fodder a short time before the ears are pulled. In America and in Italy mattresses are stuffed with the dry sheath, which makes a cool and elastic bed.

Horses, pigs, and poultry are fond of maize; it gives the flesh of the last two a peculiarly fine flavour. One of its most important uses in Europe is to be cut green as food for cows, oxen, and sheep. In a proper climate there is no plant which gives so great a mass of green food. Its produce is most abundant. The imports in 1865 were 7,000,000 cwts.

MAJESTY. Among the Romans the word *majestas* was at first used to signify the power and dignity of the people, and also of their representative assemblies who derived their power from them. On the establishment of the empire, the appellation became exclusively the attribute of the emperors, and from them it descended to those of Germany, who considered themselves their successors. It is now usually bestowed on all sovereigns, but its adoption is of comparatively recent date. 'Your Grace,' or 'Your Highness,' was the mode of addressing the king, in England, up to the latter part of the reign of Henry VIII., when the term Majesty was first employed. Henry II. was the first king of France so styled. Louis XI. and his successors were granted the title of 'Most Christian Majesty,' by a bull from the pope; and by virtue of the same authority Ferdinand and Isabella of Spain obtained for the sovereigns of that country the title of 'Most Catholic Majesty.' The same power also conferred the title of 'Apostolic Majesty' on Maria Theresa and her successors. The queen of England is personally addressed as 'Your Majesty,' but in writing, as 'The Queen's Most Excellent Majesty.'

MAJOLICA, the name given to a kind of earthenware, first manufactured in the island of Majorca. It was afterwards produced at Faenza, from which it is sometimes known as *Faience ware*. Specimens of the original Majolica and Faience are now comparatively rare, and fetch a high price in the market. They are eagerly bought up by *connoisseurs* in articles of *vertu*. The ware now commonly referred to under

this name, is much used in Italy, and is not of great value.

MAJOR, in Music, a term applicable to the imperfect concords, but chiefly to the interval of the 3rd. It is also used to distinguish the mode which takes a major or sharp 3rd, from that having a minor or flat one. The *major* mode has always a greater 3rd—*i.e.*, a 3rd consisting of two tones; and the *minor* mode has always a minor 3rd—*i.e.*, a 3rd consisting of a tone and a semitone.

MAJOR (Lat. 'greater'), a field-officer next in rank below a lieutenant-colonel, and immediately superior to the captains of troops in a regiment of cavalry, or to the captains of companies in a battalion of infantry. His duty is to superintend the exercises of the regiment or battalion, and on parade or in action to carry into effect the orders of the colonel. The major has also to regulate the distribution of the officers and men for the performance of any particular service. His daily pay in the life-guards is 1*l.* 4*s.* 8*d.*; in the foot-guards, 1*l.* 3*s.*; in cavalry, 19*s.* 8*d.*; infantry, 16*s.* The regulation price of his commission in the cavalry and infantry of the line is 3200*l.* There are no majors in the artillery, engineers, or marines.

A brigade-major is a staff-officer who performs for a brigade, or in a garrison, duties corresponding to those of a major in a regiment or battalion.

A serjeant-major of a regiment is a non-commissioned officer, who in general superintends the military exercises of the soldiers: on parade, he has the care of dressing the line.

MAJOR-GENERAL. [GENERAL.]

MAJORCA. [BALEARIC ISLANDS; SPAIN.]

MAKRIZI, a celebrated Arabic writer, was born at Cairo, between 1358 and 1368. It appears that he resided at Cairo during the greater part, if not the whole of his life, that he discharged at different times the duties of several public offices, and that he died, at an advanced age, in 1442.

Makrizi wrote several historical works, of which the most important is his 'Description of Egypt,' which gives an account of the history of the country from its conquest by the Mohammedans, as well as a description of its natural history and antiquities, and of the manners and customs of the inhabitants.

MALABAR, a maritime district of British India, in the presidency of Madras, between lat. 10° 15' and 12° 18' N.; long. 75° 15' and 76° 55' E. Its boundaries are—W., the Arabian Sea; S., Cochin; E., Mysore and Coimbatore; N., Canara and Coorg. The coast-line abounds in shallow havens, and extends for about 125 miles. The area of the whole district is a little over 6000 square miles, and the population numbers about a million and a half. The shores are generally low, barren, and sandy, but the interior is traversed by the Western Ghats, and in some of the streams descending from them gold dust is found. Iron ore is dug in the hills. So great was the demand for the teak timber with which the mountains are covered, and which is of superior quality for shipbuilding, that the woods were in some danger of being exhausted, and extensive tracts of waste land have been planted by order of the government. The products of the soil are those usually found in eastern latitudes; the climate on the sea-coast is warm and equable; the mean temperature

being about 78° Fahr. Many diseases, chiefly caused by unwholesome food and filthiness, are prevalent; and from the same causes cholera has often been severe. Nearly all the tropical animals, except the lion, are found, and the sea and inlets swarm with fish of excellent quality. The principal places in Malabar are Cochin, Cannanore, Pennani, and Tellicherry. The population consists of Hindoos, Mussulmans, Christians of different denominations, and Jews. The Hindoos are divided into several castes—the Brahmin and the Puttar (both of whom burn their dead); the Nairs and the Tiars, or cultivators of the ground. The Nairs, the second in rank, are a numerous and influential caste of the military class, and always carry with them a naked sword. If touched by a Tiar or a slave, they are considered defiled, and must immediately wash their bodies; but before the establishment of the British rule they at once slew the unfortunate individual who came in contact with them. Malabar was annexed to the British dominions at the downfall of Tipoo Saib, before which slaves were a numerous and degraded class; but slavery is now abolished, and measures taken to provide employment for the emancipated, and education for their children. Fanatical outbreaks are common among the native Mussulman farmers, especially in the interior. They are fierce and bigoted ruffians, but the native traders are a very peaceable class.

MALACCA, a town in Southern Asia, situated on the western coast of the Malay Peninsula, in 2° 14' N. lat. and 102° 12' E. long., on the Straits of Malacca. The remains of Portuguese and Dutch forts still occupy summits around the town, the principal edifices in which are the barracks, court-house, town-house, gaol, civil and military hospitals, and convict prison. Altogether the town is well built and presents an imposing appearance from the sea. It contains the church of our Lady del Monte, the scene of the labours and supposed miracles of St. Francis Xavier, 'the Apostle of the East.' Malacca was first visited by the Portuguese in 1507, and was taken by Alfonso Albuquerque in 1511. It continued in a flourishing condition till 1640, when it was taken from the Portuguese by the Dutch. The British obtained possession of it in 1795, the Dutch in 1801, the British again soon afterwards, the Dutch again in 1814, and the British finally captured it in 1824.

Besides the town, this colony consists of a tract of country about 40 miles long and 30 miles wide. The country lying along the sea-coast, to the distance of 12 or 15 miles, is low and nearly level; in many parts swampy, and mostly covered with wood. The climate is salubrious, the thermometer ranging from 72° to 85° Fahr. The soil near the coast is fertile, but in the interior it is not so, being mainly valuable for its tin mines. The exports comprise gold dust, tin, hides, poultry, pepper, rattans, lace, aloe-wood, ebony, ivory, and Chinese hardware, to the value of about 400,000*l.* annually. Its imports are worth about the same, and consist of British and Indian manufactured goods, opium, rice, salt, &c. The settlement, previously a dependency of the Bengal presidency, was separated therefrom in 1861. In 1860 the inhabitants of the province numbered 80,792.

The bulk of the population consists of Malays. There are some Hindus and Chinese, and also some descendants of the Portuguese and Dutch.

MALACCA, THE STRAITS OF, separate the Malay Peninsula from the island of Sumatra. They begin on the north between Diamond Point on Sumatra, and the island of Pulo Penang, near the shores of the continent, about $5^{\circ} 20'$ N. lat., and terminate on the south between the most southern cape of the Asiatic continent, the Tanjong Burus ($1^{\circ} 15'$ N. lat.), and the islands of Carimon or Krimun (1° N. lat.). Its direction is from north-west to south-east, between $97^{\circ} 30'$ and $103^{\circ} 40'$ E. long. At its northern extremity it is 250 miles wide, but it diminishes to 30 miles near the southern end. Perhaps in no part of the globe is the temperature of the air less subject to changes than on these shores. In the Straits of Malacca, are the British settlements of PENANG, MALACCA, SINGAPORE, generally called the STRAITS SETTLEMENTS, which are all under one governor, whose head-quarters are at Singapore.

MALACHI, the last of the twelve minor prophets. Nothing is known of his life; and indeed, as the name occurs nowhere else as a proper name, and signifies 'messenger,' many conjectures have been ventured as to the real person, some identifying him with Ezra, and some supposing that he was an incarnate angel. It is probable, as the editor of the 'Pictorial Bible' thinks, 'that the prophecy is anonymous,' and that the title Malachi is given to the prophet from the distinct prediction concerning 'my messenger' (iii.1), which has always been considered by both Jews and Christians as one of the most remarkable and important prophecies in Scripture. Its authenticity and canonical authority have never been questioned.

MALACHITE (Gr. *μαλάχη*, 'mountain green'), the native-green carbonate of copper, which is found in a few localities of Siberia and South Australia. It is seldom met with in masses of more than ten or twenty pounds' weight; but in Siberia there is a bed of malachite supposed to weigh half a million pounds, which lies imbedded at a depth of 280 feet in a copper mine. When polished it has all the appearance of a bright and beautiful green marble, intersected and variegated with light-coloured veins. But so little was known of this mineral before the Hyde Park Exhibition of 1851, that the public knew not whether the specimens there exhibited were stone or composition. Of late years, however, a malachite manufactory has been established at St. Petersburg, the material of which is chiefly derived from a mine in Siberia, belonging to MM. Demidoff; and their specimens of large doors, vases, and other articles are very beautiful. The fragments of malachite are first sawn into thin plates, about the tenth of an inch in thickness. The artist has to determine what convolution or pattern the different green-tinted markings will present in the finished article, and he so selects the veneers, or small pieces, as to attain that object. When the pieces have been fixed with cement on some substance, as marble, copper, or iron, the small interstices are filled up with cement mixed with particles of malachite, and coloured with a powder of the same material. After this the grinding and final polishing takes place. The process, however, is very tedious and expensive. The malachite doors, which

excited so much admiration at the Great Exhibition, employed thirty workmen for a whole year. Moreover, the cost of the raw material is very great. The average pieces brought up from the mine are valued at 15s. per lb.; and there is, besides, considerable waste in the working. All these circumstances materially add to the costliness of the articles produced.

MALACOLOGY. The science of *Molluscous* or *Soft-bodied Animals* (*Μαλακὸς*, 'soft,' and *λόγος*, 'a discourse'), includes the knowledge of such animals, whether protected by shells or entirely naked, and their distribution into classes, sub-classes, families, genera, and species. In this more extended and philosophical view of the subject *Conchology* may now be considered as merged; and the more modern classifications are based upon the anatomy of the soft parts and the habits of the animals, as well as upon the structure of the shells in those molluscous forms which have that protection.

The shell collector of former days looked upon his drawers, if they were rich in rare species or varieties, as containing an assemblage of gems; and indeed the enormous prices given for fine and scarce shells, joined with the surpassing beauty of the objects themselves, almost justified the view which the possessor took of his cabinet of treasures. They were to him objects of the greatest delight; and the energetic zeal with which he collected, and the sacrifices that he made to procure a fine and perfect *Many-ribbed Harp*, a *Gloria Maris*, or *Cedo Nulli*, among the cones, an *Aurora* or *Orange-cowry*, a *Voluta aulica* or *Voluta Junonia*, &c., were only comparable to the extravagancies of those visited by the tulip mania when it was at its height. But though they were the delight of his eyes, they were, in nine cases out of ten, little more to the owner of them: they were mere trinkets on which he looked doatingly without knowing, and scarcely wishing to know, the organization of the animal whose *skeleton* only was before him. This innocent trifling came at last to be viewed in its true light by some collectors worthy of better employment, who put off childish things and went deeper into the subject. Lister, Adanson, Linnaeus, Poli, Cuvier, Lamarck, De Blainville, and others, gave dignity to this department of zoology, and gradually raised the science to its proper rank; whilst the comparatively imperishable nature of the covering of the testaceous molluscs became, in the hands of such men as William Smith and his followers, among the most valuable records by which the stratification of the earth's crust could be demonstrated, and its geological history deciphered.

M. de Blainville's term, *Malacozoa*, or *Malacozoaria*, is not generally adopted in this country.

[ANIMAL; CONCHACEA; CONCHIFERA; CONCHOLGY; CEPHALOPODA; GASTEROPODA.]

MALACOPTERYGII, according to Cuvier, the second great division, or order, of Osseous Fishes, the species of which are distinguished by all the rays of the fins being soft and cartilaginous, exhibiting minute articulations, and often divided into small fibres at their extremities. It frequently happens, however, that the anterior ray of the dorsal or of the pectoral fins is hard and bony—a character observable in nearly all the species of the *Silurida*, and in many belonging to other families.

The greater portion of the fishes of this order have

the scales formed of simple laminae, and with smooth margins; in this respect differing from the species of the *Percidae*, *Sciaenidae*, &c., in which the edges of the scales are pectinated or serrated. The *Pleuronectidae* or Flat Fishes, however, present the latter structure of scale, and yet, according to Cuvier, are placed in the *Malacopterygii*. M. Agassiz on this account removes this group to another section, and he also arranges the *Siluridae* in another group, owing to the structure of their scales.

The *Malacopterygii* are divided into three sections. First, the *Abdominales*, in which the ventral fins are situated on the abdomen, far behind the pectorals. In the second section (*Subbrachiales*) the ventral fins are situated immediately beneath the pectorals, and the pelvis is suspended to the bones of the shoulder. In the third section (*Apodes*) the ventrals are wanting.

MALACOSTRACA (Μαλακίστρακα), a term employed by Aristotle to designate the *Crustacea* generally, but confined by Dr. Leach in his arrangement to the second order of the class. The *Malacostroaca* of Leach are divided into three tribes:—1. *Brachyuri*, 2. *Macrouri*, 3. *Gasteruri*.

MALAGA, an episcopal town, seaport and capital of the province of the same name, is situated in 36° 45' N. lat., 4° 30' W. long., on the shore of the Mediterranean, and has 113,000 inhabitants. The Guadamedina, a mere brook in summer, but in winter a stream of considerable volume, enters the sea immediately to the west of the city. Malaga is of great antiquity. It was possessed successively by the Carthaginians, Romans, Goths, and Arabs. In 1487 Ferdinand and Isabella wrested it from the Moors after a siege of three months. Malaga has suffered severely in different epochs from the plague, which on one occasion cut off 20,000 of the inhabitants in forty days, and in 1803–4 the yellow fever decimated the population. It is, however, much resorted to in winter on account of the salubrity of its climate. In fact winter in an English sense is unknown, and it is considered by many to be superior as a resort for invalids, to any place in France or Italy.

From the earliest ages, under all the nations who have possessed it, Malaga has been renowned for its commerce. Its imports are colonial produce, broad cloths, cottons, laces, spices, hardware, and cutlery. Its exports amount to about 1,000,000*l.* sterling annually. They consist of wine, grapes, muscatel raisins, almonds, figs, lemons, olive oil, brandy, anchovies, and lead. Though the streets are narrow, tortuous, ill-paved, and dirty, the city has a gay and cheerful aspect, as the exteriors of the houses are whitewashed or painted yellow. Many of the roofs are flat, as in the East, and are surmounted by square towers with open galleries, where the citizens enjoy the cool sea-breezes. The city has several schools and public hospitals, two large iron-foundries, and a royal cigar factory. Malaga possesses a cathedral, a light and handsome building in the Græco-Gothic style, which is nearly 400 feet long, 180 broad, 125 in height, and is surmounted by a spire 302 feet high. The other public buildings are the bishop's palace, four parish churches, five hospitals, the opera-house, custom-house, legal seminary, and a convict dépôt. The harbour of Malaga is spacious enough to accommodate a large fleet; it is protected on the east by a massy stone mole, five

furlongs in length, and terminated by a handsome lighthouse. The harbour may be entered during any wind. The sea is, however, gradually receding, and the Moorish dockyard and quay are now in the town, while the alameda or public walk was covered with water in the last century. The great boast of Malaga is the Moorish castle, built in 1279, and covering the slope of a hill immediately to the east of the city; it is of great extent, and still shows the effects of the Christian artillery in the siege of 1487.

MALARIA. [MIASMA.]

MALAVILLY, a town of Hindustan, in the province of Mysore, rendered memorable by the victory obtained in 1779, by General (afterwards Lord) Harris, over Sultan Tippee's army.

MA'LAXIS, a genus of plants belonging to the natural order *Orchidaceæ*, and to the tribe *Malacideæ*. Of this genus there is one British representative, *M. paludosa*. It is a small plant, with a stem from one to four inches in height.

MALAY PENINSULA constitutes the most southern extremity of the continent of Asia, extending between the Gulf of Bengal and the Straits of Malacca on the west, and the Gulf of Siam and the Chinese Sea on the east. It is united to the continent at its northern extremity. Its most southern points form the northern shores of the Straits of Singapore. Kwi Point, in the Gulf of Siam, and the mouth of the Tenasserim River, which enters the Gulf of Bengal, may be considered as constituting its northern boundary; they are situated near 12° N. lat. Cape Burus, the most southern promontory of Asia, in 1° 15' N. lat., and Cape Romania in 1° 17', constitute the two extremities of the Straits of Singapore. The peninsula lies between 98° and 104° E. long. It is 750 miles long, with a width varying between 60 and 180 miles. The area is estimated at 45,000 square miles.

The peninsula is traversed by a mountain range, which has several peaks 3000 feet high, while a few of the mountains attain an elevation of 6000 feet.

The comparatively small width of this peninsula and the disposition of the mountain range prevent the formation of considerable rivers. The largest which are known are the Muar and the Pahang; the former falls into the Straits of Malacca, and the latter into the Chinese Sea. The number of small rivers is very great, and there probably is no country better watered than this peninsula.

The climate differs on the eastern and western sides of the peninsula, according to the peculiar action of the monsoons. The eastern side is most affected by the N.E. monsoon; the western in part by the S.W. monsoon, but is in part sheltered from both monsoons.

The soil seems not to be distinguished by fertility. The plants cultivated are chiefly rice, pepper, cotton, coffee, and a great variety of fruits.

Cattle are few in number, but buffaloes abound. No sheep are kept; hogs and fowls are plentiful. In the uncultivated tracts and woods tigers, leopards, and rhinoceroses are frequently met with, and sometimes elephants. Among the birds, that kind of swallow which makes the edible nests is the most remarkable.

The most important articles of commerce are from the mineral kingdom. Gold and tin are plentiful,

and are regularly exported—about 20,000 ounces of the former, and 2400 tons of the latter, annually.

The bulk of the population consists of Siamese and of Malays. The former occupy the isthmus of Krah and the districts north of $6^{\circ} 40' N.$ lat., and the latter the remainder of the peninsula. [MALAYS.] The entire population is computed to be about 200,000.

The northern part of the peninsula, as far south as the bay of Chai-ya, is immediately subject to the king of Siam. On that bay are two harbours, called Chai-ya and Bandon, and on the opposite western coast the harbour of Plunga or Pongo. The district between the bay of Chai-ya and Cajoe Patani is partly governed by Malay sovereigns, dependent on the king of Siam, and partly belongs immediately to Siam. The kingdoms of Calantan and Tringano on the eastern, and that of Queda on the western side of the peninsula, are only nominally dependent on Siam. Tringano, situated at the mouth of the little river Tringano, seems to be a considerable place. Two other towns are Queda and Alustar. The British colony of Penang, or Prince of Wales Island, is partly situated within the kingdom of Queda. The southern extremity of the peninsula is divided between the kingdoms of Pahang and Johore on the eastern side, that of Rumbowé in the interior, and those of Salangore and Perak on the western coast, together with the British colony of Malacca. These kingdoms are independent, and under the protection of the British.

MALAYS, a nation of southern Asia, who occupy the shores of the Malay Peninsula, and the larger islands of the Indian Archipelago. In person the Malays are short, squat, and robust. The face is of a round form, the mouth is wide, and the teeth remarkably fine. The chin is rather of a square form; the angles of the lower jaw are very prominent. The cheek-bones are high, and the cheek consequently rather hollow. The nose is short and small, never prominent, but never flat. The eyes are small, and always black. The complexion is generally brown. The hair is long, lank, harsh, and always black.

The Malays have made considerable progress in civilization, but more in the island of Java than on the other islands of the Indian Archipelago. They are well acquainted with agriculture and some of the mechanical arts. They have also made some progress in medicine and music. They are undoubtedly more civilized than any of the nations of southern Asia which inhabit the countries between China and Hindustan. Most of them are Mohammedans.

In the larger islands the Malay population generally occupies only the lower tracts along the coast, and the original inhabitants have retired before them into the interior.

MALCOLM, SIR JOHN, G.C.B. and K.L.S., was born at Eskdale, Dumfriesshire, Scotland, in 1769. He went early to Hindustan, and was engaged in the wars against Tippoo Sahib and the Mahrattas; but his chief employments, and those in which he most distinguished himself, were in his diplomatic missions to the court of Persia. He was successively governor of Mysore and Bombay. He wrote a valuable 'History of Persia,' a 'Political History of India,' and a 'Life of Lord Clive.' He died in 1836.

MALDIVES, or MALEDIVA ISLANDS, lie in the Indian Ocean, and extend nearly on one meridian from $7^{\circ} 6' N.$ lat. to $0^{\circ} 40' S.$ lat., or nearly 550 miles; but in no part is the breadth of the chain supposed to exceed 50 miles in a direct line. The most northern group or Atoll is about 350 miles from Cape Comorin, the nearest point of Hindustan. The islands are upwards of 1000 in number. They are inclosed and protected from the sea, which during the south-west monsoon is violently agitated, by narrow strips of coral reefs, which surround them like a wall. This protecting wall in many places scarcely reaches the surface of the water; in other places it forms a long sandy beach, perhaps less than six feet above the level of the sea, and is either circular or oblong. Each of these circular inclosures contains breaks, which constitute convenient passages for vessels or boats to enter. The channels which divide these Atolls, or Atollons (for so they are called), are in some places deep and safe, and are navigable by ships.

Within the Atolls the sea is not agitated by storms, and there are always soundings in twenty or thirty fathoms' water. The islands are generally situated along the inclosing coral wall, the central part of the Atolls containing only few of them. They are all small; not many of them exceed a mile in length and breadth, and a few are less than half a mile. They are generally circular or lozenge-shaped. Many are mere narrow strips, 50 or 100 yards broad, forming a circle, which incloses a lower tract, filled up with broken coral rocks, and dry at spring tides. Within this ring there is sometimes a considerable depth of water, from one to ten fathoms, so that a perfect lagoon is formed. The highest part of the islands is from 6 to 14 feet above water.

All the islands are covered with a thick impenetrable jungle, among which there are many fine large trees. A little Indian corn, sugar, cotton, and millet are cultivated. There are few animals on the islands, but fish is abundant on the shores. The climate is pleasant, but not healthy to Europeans.

The inhabitants are Mohammedans. Two languages are in use among them; the common, which seems to be peculiar to the people, and the Arabic, as a learned language. They have also a peculiar alphabet. The whole population may amount to between 150,000 and 200,000. They carry on a little trade with Bengal. They are ruled by a chief, called the Sultan, who pays tribute to the British governor of Ceylon. He resides on the Mali or Maldiva Atoll, which contains the largest of the islands, called Mali; its circumference is about seven miles.

MALDON. [ESSEX.]

MALE FERN, the rhizoma, incorrectly termed root, of the *Nephrodium Filix Mas*, has been celebrated from ancient times as an anthelmintic. The root-stock of young plants should be collected in spring or summer, and a fresh supply obtained every year, as a change occurs in the part a few months after being collected. It should be quickly dried, and preserved in glass or earthenware vessels in a dry place. The interior should exhibit a greenish colour, and possess a disagreeable odour, with a bitter, harsh, astringent taste.

It consists of an oil (which may be extracted by

sulphuric ether), resin, tannin, sugar, starch, and woody fibre. The oil, which is of two distinct kinds, one pure and the other united with resin and an extractive, is the active principle. Formerly a powder of the whole substance was administered; but, as the dose of this is bulky, Peschier has recommended pills of the ethereal extract, which are found to be very efficacious against that kind of tape-worm which is denominated the *Bothriocephalus latus*, or Broad Tape-worm. The common mode of administering it is to give a certain number of pills at night, and a like number in the morning, followed by some brisk cathartic, as the male fern only kills but does not expel the worm.

MALEBRANCHE, NICOLAS, one of the most illustrious disciples of Des Cartes, who both gave to his master's views a wider development, and imparted to them clearness and vivacity, was born at Paris, 1638. His attention was directed to philosophy by accidentally meeting with the work of Des Cartes, 'De Homine.' Abandoning his previous literary pursuits, he devoted ten years to the examination of the Cartesian philosophy, and acquired the reputation of surpassing all his contemporaries in a knowledge of its true spirit and tendency. As the result of his philosophical meditations, he published, in 1673, the first book of the 'Recherche de la Vérité,' which was quickly followed by the other five.

The philosophical writings of Malebranche are both elegant and perspicuous: neither the clearness of the thought is sacrificed to the graces of composition, nor the ornaments of language to simplicity. If the profound originality of his ideas gained him any admirers, the novelty and boldness of his assumptions exposed him to much opposition.

The other works of Malebranche were partly controversial and partly religious. Of the latter we may mention the 'Entretiens d'un Philosophe Chrétien et d'un Philosophe Chinois sur la Nature de Dieu,' Paris, 1708; 'De la Nature et de la Grace,' Amsterdam, 1680. The following are of a mystical character, blending religion with metaphysics:—'Traité de la Morale,' Rott., 1684; and 'Entretiens sur la Métaphysique et sur la Religion,' Rott., 1688.

MALEIC ACID. An isomeric or fumaric acid, obtained by distilling malic acid at a temperature of about 350°; it consists of H¹ C⁴ O³.

MALESHERBES, CHRÉTIEN GUILLAUME DE LAMOIGNON, the associate of Turgot and those illustrious statesmen who sought by moderate reforms to prop the weakness of the old monarchy of France, was born at Paris, December 16, 1721. Among other offices, he held those of president of the Cour des Aides, and minister of the king's household. When Louis XVI. was brought to trial, Malesherbes claimed the post of his defender. His fearless intrepidity entailed upon him the hatred and suspicions of the party in power, and he was guillotined April 22, 1794, meeting his fate with resignation.

MALESHERBIA/CEÆ, a natural order of polypetalous Exogens. The species are in many cases remarkable for the beauty of their yellow or blue flowers, and have been cultivated in this country, their seeds having been brought from Chili and Peru. They are, however, seldom seen, and are of no known use.

MALHERBE, FRANÇOIS DE, was born in

1555, at Caen, in Normandy. He accompanied Henri of Angoulême, son of Henri II., who went to Provence as governor in 1579, and remained attached to his household till that prince's death in 1585. He was patronized by Henri IV., upon whose death his widow, Mary de' Medicis, settled a pension upon him. He died in 1628.

Malherbe has been styled by competent judges the restorer of the French language and poetry. The eulogium bestowed upon him by Boileau is well known:—

'Enfin Malherbe vint, et le premier en France
S'it sentir dans les vers une juste cadence.'

MALIBRAN, MARIA FELICIA, afterwards Madame de Beriot, one of the most distinguished singers of any age or country, was born in Paris in 1808. When eight years old she was brought to England, where she remained for eight years, acquiring a thorough knowledge of the English language, and cultivating her musical gifts with the utmost assiduity. Her father was a man of fierce temper, but an excellent musician, and he taught his daughter the principles of the art, a knowledge which, unfortunately, few singers have ever possessed. She made her *début* in London as Rosina, in the 'Barber of Seville,' June 7, 1825, and her success was so marked that she was engaged as one of the principal singers at the York festival of that year. She then paid a visit to the United States, where she was induced to accept the hand of a man of double her age, M. Malibran, a merchant and banker, who was reputed to be enormously rich. The marriage in every respect proved unfortunate. Her husband treated her harshly, and soon afterwards becoming bankrupt, was thrown into prison. Malibran immediately abandoned to the creditors the provision that had been made for her by the marriage settlements; and separating from her husband, returned to Europe. In 1828 she appeared at Paris in the opera of 'Semiramide.' Her success was immense; she became the favourite of the fastidious Parisian public, and played a long rôle of characters with an ability which justified the enthusiasm which she evoked. In 'tender strokes of art,' in vivacity, feeling, and the display of the gentler emotions, she showed herself unrivalled.

Her next engagement was at the London Italian Opera, where she appeared on the 21st March, 1829, and during the season played a wide range of characters—Desdemona, Rosina, Semiramide, Romeo, Tancredi, Ninetta, and Zerlina. From that time to the day of her death she remained the idol of the British public, who admired not only the depth and extent of her passionate genius, but the force and purity of her moral character.

The incidents of a successful artist's career are neither many nor interesting. We pass on to her melancholy end, which was undoubtedly hastened by her incessant labour. In March, 1836, having been regularly divorced from M. Malibran, she married the celebrated violinist, De Beriot, and after a brilliant season of English operatic performances at Drury Lane, repaired to Manchester in September, to fulfil an engagement at the great festival. Worn out with her long-continued exertions, and aware that repose was absolutely essential to her health, she could not consent to disappoint the public, and sung at the morning and evening concerts of Wednesday, the 14th

September, with a splendour and power which surpassed all her former efforts. But while the rapturous plaudits of her admirers 'rent the air,' she lay in a state of syncope from exhaustion. She was bled, and removed to her home, where she expired on the 23rd of September, in the twenty-ninth year of her age.

MALIC ACID (Lat. *Malum*, 'an apple') was discovered in 1785 by Scheele. It received its name from having been first obtained from the juice of apples, in which it exists in considerable quantity; but it also exists in many other fruits, and in the berries of the mountain ash. Malic acid is colourless, inodorous, very sour to the taste, and acts strongly on vegetable blues; in a moist air it is deliquescent; it is very soluble both in water and in alcohol. Nitric acid converts it into oxalic acid. Its saline compounds are called malates, some of which exist in nature. They are not an important class of salts.

Malic and citric acids are isomeric bodies, both being composed of, when anhydrous, $C_3H_4O_5 \cdot 2H_2O$.

The crystals contain one equivalent of water; whereas those of citric acid contain different proportions of it, according to the circumstances under which they are formed.

When malic acid is subjected to a heat of about 350° Fahr., it is decomposed, and the results are two isomeric pyro-acids, namely, maleic or equisetie, and the fumaric or pyromalic acids.

MALICE OR DOLE is defined in Scotch law to be a corrupt or evil intention in the mind of a person, prompting and inducing him to commit a criminal act, and forms an essential element in all crimes. In most crimes the nature of the act is sufficient evidence of the existence of dole. It is not necessary to constitute a crime that the malice should be directed against any particular person: nor is it indispensable in all cases that there should be evidence to show an intention on the part of the accused to commit the particular crime with which he is charged. Wherever there is undoubted proof of a fixed and settled resolution to do some violent and atrocious mischief, even although the event may turn out more disastrous than the pannel originally intended, he is in the estimation of the law as culpable as if he had foreseen and compassed all that had happened. (Hume, Com. I. 25.) In civil actions for slander, malice is in the ordinary case presumed, the insult or injury complained of being sufficient evidence of its existence.

MALICIOUS INJURIES. The law relating to malicious injuries to property was amended and consolidated by the 24 and 25 Vict. c. 97. The injuries, such as arson, destruction of works of art, injuries to buildings, manufactures, trees, vegetable productions, fences, mines, sea and river banks, ponds, bridges, viaducts, cattle, vessels, are all provided for by this Act, and the different degrees of punishment established.

MALINES. [MECHELEN.]

MALL or **PALL MALL**, the name given to those places in London, and other English towns, where there were formerly alleys for playing at tennis. The word is derived from the mallet with which the ball was struck, and which was sometimes called by the compound name pall-mall, from the Italian *palla*, 'a ball.'

MALLARD. [DUCKS.]

MALLEABILITY is that property of certain metals which admits of their being extended by the blows of a hammer or by pressure. In this quality gold exceeds all other metals; thus, the gold-leaf sold in books is so extremely thin, that less than 5 grains cover about 270 square inches, and the thickness of each leaf does not exceed $\frac{1}{100000}$ part of an inch. The order in which malleable metals exhibit this property is as follows:—Gold, silver, copper, platinum, palladium, iron, aluminium, tin, zinc, lead, cadmium, nickel, cobalt. Metals which are malleable are also ductile, that is, they may be drawn into wire. Iron which has been made hot by hammering loses its malleability, and cannot be again hammered till it has been annealed.

MALLEACEA, or **MALLEIDÆ**, a family of monomyarian Conchifers or bivalve Shells, according to the system of Lamarck, most of the genera of which are to be found in the family *Margaritacea* of De Blainville. They belong to the *Ostracea* of Cuvier, and the *Oxygonæ* of Latreille.

Animal, with the mantle non-adherent, entirely open in its whole circumference, without tube or particular opening, prolonged into irregular lobes, especially backwards; foot canaliculated, and almost always furnished with a byssus.

Shell, black or horn colour, inequivalve, inequilateral, very irregular; hinge without teeth; marginal ligament sublinear, simple, or interrupted by crenulations; muscular impression subcentral, fixed generally by a byssus furnished by the animal.

We may enumerate the following genera:—*Posidonia* (fossil); *Vulsella* (seas of warm climates); *Crenatula* (seas of India and Australia, and also of South America); *Perna* (Indian Ocean); *Malleus* (East and West Indies, Australasia); *Gervillia* (fossil); *Inoceramus* (fossil); *Catillus* (fossil); *Pulvinites* (fossil). Lamarck places *Avicula* [AVICULA] among the *Malleacea*, but M. de Blainville arranges it within the circle of his family *Margaritacea*, and M. Rang regards it as the type of a family which he terms '*Les Aviculés*.' The fossil species of *Malleacea* are very numerous.

(See Deshayes, Professor Phillips, Mr. Lonsdale, Dr. Fitton, Dr. Mantell, Professor Sedgwick, Sir R. I. Murchison, and others.)

MALLET, DAVID, was born about the year 1700, at Crieff, in Perthshire, died 1765. He studied at the University of Edinburgh, made the tour of Europe as tutor to the sons of the duke of Montrose, and ultimately settled in London. He is known from his ballad of 'Margaret's Ghost,' and his tragedies of 'Eurydice,' 'Mustapha,' and 'Elvira.'

MALLORCA. [BALEARIC ISLANDS.]

MALLOW. [CORK.]

MALLOW, MARSH. [ALTHÆA OFFICINALIS.]

MALMESBURY. [WILTSHIRE.]

MALMESBURY, WILLIAM OF, one of the most valuable of our old historians, is said to have been born in Somersetshire, about 1095 or 1096. When a boy, he was placed in the monastery whence he derived his name, where in due time he became librarian, and according to Leland, precentor. He is generally supposed to have died about 1143. His principal writings are—'*De Gestis Regum*' (the history of the kings of England); '*Historiæ Novellæ*' (the modern

history); and 'De Gestis Pontificum' (the history of the prelates of England), containing an account of the bishops and of the principal monasteries, from the conversion of the English by St. Austin to 1125. These were published by Sir Henry Savile among the 'Scriptores post Bedam,' folio, 1596, reprinted, folio, Francof., 1601. English translations of these, and of some of his other works, have been published.

MALMESBURY, JAMES HARRIS, EARL OF, was the only son of James Harris, the author of 'Hermes' and other well-known philological works. He was born at Salisbury, April 21, 1746. On leaving Oxford in 1765, he was sent for a year to study at Leyden. He then, after being eight months at home, set out in 1767 on a short continental tour; and in the autumn of the same year, through the patronage of Lord Shelburne, was appointed secretary of embassy at Madrid. The temper and firmness, as well as talent, with which he managed the negotiation with regard to the Falkland Islands, gave so much satisfaction to his government, that he was the following year appointed to the post of minister at the court of Berlin. He retained this mission for four years. In 1777 he was sent as ambassador to St. Petersburg, and having in the meantime received the Order of the Bath in 1780, he remained in Russia till his health compelled him to return home in 1784. In 1788 Mr. Pitt offered Sir James Harris the post of minister at the Hague, which he accepted. While at the Hague, he succeeded in negotiating, in April 1788, the treaties of alliance with Holland and with Prussia, by which the power of the stadtholder was at that time preserved from being overthrown by the democratic party. For this service, Sir James was raised to the peerage as Baron Malmesbury.

Lord Malmesbury continued to act with the Whig party in Parliament till 1793, when he formed one of the body of the friends of Mr. Fox who went over to ministers with Burke and the duke of Portland. Lord Malmesbury was now sent by Mr. Pitt on a mission to Berlin, where he prevailed upon the new king of Prussia to enter into a second alliance with England and Holland. In 1794 he was employed to negotiate the marriage between the Prince of Wales and Caroline, the daughter of the duke of Brunswick, and accompanied her to England.

His last missions were in 1796 and 1797 to Paris and Lisle, to negotiate a peace with the French Republic, and which were attended with no result. In 1800 he was created Earl of Malmesbury and Viscount Fitzharris. He died in London, November 20, 1820, leaving a son, who succeeded him in the title, and three daughters.

MALMÖ, a strongly fortified town in the Swedish division of Malmölan, is situated about 55° 40' N. lat., and near 13° E. long. It is built on the widest part of the Sound, nearly opposite the town of Copenhagen, on level ground, and has a good and safe harbour, protected by the fortress of Malmöhus. The town is well built, and has regular streets. In the middle is a fine square, 166 yards long and 144 wide. The inhabitants (in 1861, 20,149 in number) carry on an active commerce in corn. Cloth, stockings, hats, gloves, carpets, soap, leather, starch, and looking-glasses are made. Malmö has a citadel and a port, consisting of an artificial inner harbour, and an outer roadstead.

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MALMSEY, (so called from having been first made at Malvasia in the Morea), a luscious and high-flavoured wine made in the island of Madeira from grapes of a peculiar kind, which are suffered to attain the last stage of ripeness before they are gathered. Malmsey wine has much body, and will retain its good qualities for a long time. When newly made, Malmsey Madeira is of the same golden hue as the ordinary wine of the island, but its colour is materially deepened by age. It contains 16 to 17 per cent. of alcohol. Malmsey wine is also made in the island of Teneriffe, but the quality is greatly inferior to that of Madeira.

MALO, ST. [ILLE-ET-VILAINE.]

MALOPE, a genus of malvaceous plants, consisting of two species, one of which is commonly cultivated as a favourite hardy annual. This plant, *Malope malacoides*, is common in Barbary, where it is found among stones and rocks, which it ornaments with its large crimson flowers; it is also met with in Sardinia and other parts of the south of Europe.

MALPAS. [CHESHIRE.]

MALPIGHI, MARCELLUS, was born near Bologna in 1628. He studied medicine in that university, and in 1653 received his doctor's degree. He is now chiefly remembered in connection with his discoveries in the anatomy of the skin and of the secreting glands. He first described clearly the structure of the tongue. He proved that the colour of the skin depends on the rete mucosum, the cutis of white and of coloured races being always of the same rosy hue. He was the first who examined the circulation with the microscope. He published also some excellent observations on the chemical and other characters of the blood; and his works on the process of incubation, and on the structure and physiology of plants, though now almost forgotten, must have been very important additions to the knowledge of his day.

MALPLAQUET, a village in France, department du Nord, 16 miles N.N.W. of Avesnes. It is only remarkable as the scene of the great battle, August 11, 1709, in which Marlborough and Prince Eugene defeated the French under the Marshals Villars and de Boufflers. The allies mustered 93,000 men, with 105 guns; the French, 95,000 men, with 80 guns; but the latter were very strongly posted, on a range of wooded heights, bristling with redoubts and palisades, stockades and abbatiss, which were only approachable by two defiles, locally called *Trouées*, and these completely under fire. By means of repeated and desperate charges, combined with a formidable attack in the rear, Marlborough succeeded in forcing the enemy's lines, and compelling them to retreat upon Bavai. This success, however, was dearly purchased; the allies lost 5544 killed, and 12,706 wounded or missing; the French, about 14,000.

MALT (Ger. *malz*, from *malin*, 'to grind'), is grain, usually barley, which has become sweet and more soluble in water, from the conversion of its starch into sugar by artificial germination to a certain extent, after which the process is stopped by the application of heat. The making of malt, called *Malting*, is thus conducted:—

The barley is steeped in cold water for a period which (as regulated by law) must not be less than

C C

forty hours; but beyond that period the steeping may be continued as long as it is thought proper. Here it imbibes moisture, and increases in bulk; at the same time a quantity of carbonic acid is emitted, and a part of the substance of the barley is dissolved by the steep-water. 100 bushels of grain, after being steeped, swell to the bulk of 120 bushels, and increase 47 per cent. in weight; and the quantity of matter which the steep-water holds in solution varies from 1-50th to 1-100th of the weight of barley. It consists chiefly of an extractive matter of a yellow colour and disagreeable bitter taste. After the grain has remained a sufficient time in the steep, the water is drained off, and the barley thrown out of the cistern upon the malt-floor, where it is formed into a heap called the *couch*, about 16 inches deep. In this situation it is allowed to remain about twenty-six hours. It is then turned by means of wooden shovels, and diminished a little in depth. This turning is repeated twice a day or oftener, and the grain is spread thinner and thinner, till at last its depth does not exceed a few inches.

When placed in a couch, it begins gradually to absorb oxygen from the atmosphere, and to convert it into carbonic acid, at first very slowly, but afterwards more rapidly. The temperature, at first the same with that of the external air, begins slowly to increase; and in about ninety-six hours the grain is at an average about 10° hotter than the surrounding atmosphere. At this time the grain, which had become dry on the surface, becomes again so moist that it will wet the hand, and exhales at the same time an agreeable odour, not unlike that of apples. At the time of this moistening, which is called *sweating*, the roots of the grains begin to appear, at first like a small white prominence at the bottom of each seed, which soon divides itself into three rootlets, and increases in length with very great rapidity, unless checked by turning the malt. About a day after the sprouting of the roots, the rudiments of the future stem, called *acrospire*, may be seen to lengthen. It rises from the same extremity of the seed with the root, and advancing within the husk, at last issues from the opposite end; but the process of malting is stopped before it has made such progress.

As the acrospire shoots along the grain, the appearance of the kernel, or mealy part of the corn, undergoes a considerable change. The glutinous and mucilaginous matter is taken up and removed, the colour becomes white, and the texture so loose that it crumbles to powder between the fingers. The object of malting is to produce this change: when it is accomplished, which takes place when the acrospire has come near to the end of the seed, the process is stopped by drying the malt upon the kiln. The temperature at first does not exceed 90°; but it is raised very slowly up to 140° or higher, according to circumstances. The malt is then cleared, to separate the rootlets, which are considered injurious.

The subsequent processes of brewing and distillation of spirits are described in the articles *BREWING* and *DISTILLATION*.

In brewing ale, porter, and table-beer, three different kinds of malt are employed, which are known as pale or amber, brown, and black or roasted malt—sometimes called patent malt. The pale or amber malt yields the saccharine or fermentable

extract; the brown malt is not fermentable, but is used to impart flavour; and the roasted malt is employed, instead of burnt sugar, merely to give colouring matter to porter. In the brown and roasted malts the sugar appears to be entirely converted into gum and colouring and extractive matters; and hence they are incapable of undergoing fermentation. The brown malt is subjected to a higher temperature in drying than the pale malt, and by a still further exposure to heat in revolving cylinders or roasters it is converted into black or patent malt.

It is generally believed that the excise duty has had the effect, both of limiting the quantity of malt made, and also of checking any improvements in the making. The malt duty was first levied in England in 1697, in Scotland in 1713, and in Ireland in 1783. In the hundred years from 1716 to 1816 there was scarcely any increase in the quantity of malt made in England, the amount never varying far from 24 million bushels in a year. This stationary condition, at a time when the population was steadily increasing, was partly attributed to an increasing taste for tea and coffee, but was chiefly owing to the effect of the duty and restriction. The duty rose gradually from 6*d.* per bushel in 1702 to 4*s.* 6*d.* in 1804: it is now 2*s.* 7*d.* and 5 per cent., or a fraction under 2*s.* 9*d.* per bushel. Since 1830 the quantity paying duty has varied from 30 to 50 million bushels annually. The price has varied from 2*s.* 6*d.* to 10*s.* 6*d.* per bushel, during a century and a half, the average price being 4*s.* 6*d.* The excise regulations were so very stringent in past years that maltsters scarcely knew in what manner to conduct their business. An Act passed to regulate the trade in 1827 contained no fewer than eighty-three clauses, many of which were difficult of interpretation, and more than 100 penalties were enforced under it in less than three years. This was replaced by a better statute in 1830, and since that time several other Acts have been passed to facilitate the operations of the maltster, without endangering the revenue.

The following were the quantities of malt retained for home consumption in the United Kingdom in the years 1858 to 1865, inclusive:—

Years.	Bushels.	Years.	Bushels.
1858 ...	45,105,773	1862 ...	43,688,608
1859 ...	47,746,289	1863 ...	49,072,815
1860 ...	41,754,050	1864 ...	51,796,978
1861 ...	46,650,100	1865 ...	48,946,497

The excise revenue derived from malt during the preceding period will be found in the article *INLAND REVENUE*.

To meet the objection of agriculturists, who urged that the duty prevented them from using malt for the feeding of cattle, an Act was passed in 1864 by which it was allowed to be used for that purpose free of duty, provided it was mixed with a certain proportion of linseed meal, so as to render it unfit for brewing. The Act is, however, to all intents a dead letter, only twenty-eight persons ever having availed themselves of its provisions, and there are at present less than half that number. The Inland Revenue Commissioners in their last report, assert

that the failure of the measure is not to be attributed to the excise restrictions.

In 1865 another Act was passed with the view of removing an objection urged by maltsters, to the effect that the assessment of the duty at so much per bushel, was often unfair in consequence of the difference in the quality of the barley. It is, therefore, now open to the maltster to have the duty charged by weight if he desires it—the standard being fixed at 53 lbs. per bushel.

But nothing less than the total repeal of the duty would seem to satisfy the agriculturists, who maintain that it most seriously interferes with the cultivation of barley, and that the impost is altogether opposed to the principles of free trade. For some years past they have carried on a vigorous, but as yet (1866), unsuccessful agitation to effect their object.

MALTA. The Maltese islands, in the Mediterranean, lie between 35° 49' and 36° N. lat., and 14° 10' and 14° 36' E. long. Malta is 58 miles from the nearest point of Sicily, and 179 from Cape Demas, the nearest point of Africa. Its greatest length is 17½ miles; its greatest breadth is 8¼ miles. The population in 1861 was 131,647 Maltese, 1274 British, and 1134 foreigners; total, 134,055. The mean temperature of the year is 67°, in summer 78°, in winter 57° Fabr. The government is administered by a governor, who is assisted by a council of eighteen members, ten official and eight elected. The annual revenue is about 150,000*l.* and the expenditure often somewhat in excess of that amount. The total military expenditure, defrayed by the English government, for the defence of Malta is about 330,000*l.* per annum, of which only 6000*l.* is provided by the island authorities. The total exports from the country are valued at 3,000,000*l.* per annum, and the imports at 2,250,000*l.* About two-fifths of the shipping employed belong to Italy.

The imports from Malta into the United Kingdom have been gradually decreasing during the last few years. In 1860 they were valued at 195,390*l.*; in 1864 at only 128,013*l.* The chief articles were cotton, silk, and olive oil. The exports from this country to Malta consist, principally, of cotton manufactures, coals, gunpowder, linens, and woollens. The value of the whole exports in 1864 was 870,798*l.*, of which 753,113*l.* consisted of the produce and manufactures of the United Kingdom, and 117,685*l.* of foreign and colonial merchandise. Malta contains two principal ports on the south-east side of the island, which are separated by a tongue of land a mile and a half long, on which are built the castle of St. Elmo and a lighthouse, commanding the entrance to both ports. This tongue of land is 200 feet above the level of the sea, but declines towards the point, and is almost flat at the part where it joins the mainland. On this advantageous position is built the modern city of *Valetta*, which is the seat of the government, and the citadel of the island. It is so strongly fortified as to render the island almost impregnable. The whole works have embrasures and accommodation for upwards of 1000 guns.

The great harbour, which is to the eastward of *Valetta*, is about 3400 yards in length, with an entrance 450 yards wide, defended by a strong fort opposite the castle of St. Elmo, called *Ricasoli*, which crosses its fire, but is commanded by that

castle. The harbour varies in width from 700 to 450 yards, and is surrounded by all the requisite buildings for a naval arsenal: it is one of the finest harbours and naval stations in the Mediterranean. The harbour to the westward, which is called *Marsamuscetto* (a word signifying, in Arabic, 'a place of shelter'), has at its entrance, opposite to and besides the castle of St. Elmo, a small but powerful fort called *Fort Tigné*. It is principally appropriated to vessels arriving from the Levant, and has a large quarantine establishment. Besides these two harbours, there are several bays which ships sometimes enter in stress of weather.

The whole of the southern coast of the island is by nature inaccessible. The rocks rise perpendicularly from the sea to the height of several hundred feet. The island slopes from the southern to the northern side.

The small islands of *Gozo*, *Comino*, and *Filfa* belong to the group of the Maltese islands. *Gozo* is 10 miles long by 5½ wide. In the centre of the island is a ruinous castle, at the foot of which is a populous town called the *Rabbato*. The other two islands are much smaller.

The scene on entering the port of Malta is one of the most striking and beautiful that can be conceived. This magnificent harbour is surrounded with bastions, over which appear handsome buildings and the towers of numerous churches, all built of stone, and presenting the cleanest and most brilliant appearance. On one side stands the city of *Valetta*, towering above the harbour; on the other the three cities of *Vittoriosa*, *Cospicua*, and *Senglea* (commonly called the *Borgo*, *Burmola*, and *Isola*), which in fact form one continued town, covering the two spits of land which project from the eastern side of the harbour like pointing fingers, and forming the inlets or coves already mentioned. *Valetta* and these three cities compose the capital of Malta. *Valetta* is inhabited by official and wealthy persons, and the three opposite cities by manufacturers and traders. The eastern part of the island is separated from the western by a ridge of land which crosses to the westward of *Valetta*, and forms a natural fortification. The island is thus divided into two parts, of which the eastern contains the ancient capital and twenty-two casals or villages. *Città Vecchia*, or the old city, as it is commonly called, but the proper name of which is *Città Notabile*, is situated on a rising ground in the interior of the island, about 6 miles from *Valetta*, and was, before the foundation of the latter city, the capital of the island. It is still the seat of the bishopric, and contains the cathedral, a handsome modern edifice, built on the site of the ancient church. The city is walled, but is of no importance as a fortification. It contains many good and even magnificent buildings, but, with the exception of two large convents, the population is very trifling. A populous suburb, called the *Rabbato*, is inhabited by the dependents of many convents and ecclesiastical establishments in the neighbourhood, and by a large agricultural population. There are extensive catacombs cut in the calcareous rock. The parish churches of the casals are large and magnificent: they are built of the stone of the island, and, being isolated, and well situated in the centre of the habitations, display

their architecture to advantage. Malta is chiefly supplied with water by rain, carefully preserved in tanks; but there is a magnificent viaduct, $8\frac{1}{2}$ miles long, which brings water to Valetta from a spring.

The surface of Malta and Gozo is estimated at 114 square miles, or 72,960 acres, of which about two-thirds are cultivated, and the remaining third is bare rock. There is much good native earth in the valleys, which has been converted into productive fields; but a great portion of the land has been brought to its present state of culture by the industrious native, who with great labour and expense cuts away the hard surface of the rock, and frequently finds a quantity of earth lying inert in the crevices and interstices beneath. The produce of Malta is cotton (which is its staple), wheat, barley, pulse, potatoes, barilla, cummin seed, and sullar, or the French honey-suckle, which is used for fodder. As there is no meadow-land, much barley is cut when green for draught animals; and the straw (which is very fine) is a good substitute for hay. There are no wild animals in the island, and, from the scarcity of pasture, very few cattle are bred. Meat is principally imported from Barbary. Horses are also imported, but some mules are reared, and the asses of Malta and Gozo are much prized, as are also the goats.

The roads in Malta and Gozo, generally speaking, are good, and communicate with all parts of each island. The inland modes of transport are by single-horse carts, and horses, mules, or asses of burden.

These islands enjoy an excellent climate. Its worst feature is the peculiar sirocco wind which prevails for a few weeks in autumn. Malta is eminently fitted for the residence of English invalids from the beginning of October to the end of May.

The natives of Malta are a dark-skinned athletic race, and on that account, and from their Arabic dialect, have often been considered of African origin; but we look in vain for the Arab features. They are hardy and robust. The great bulk of the people who are employed in field-labour are stone-cutters. The Maltese are also excellent seamen, and are esteemed such in all the ports of the Mediterranean.

The Italian language was introduced into these islands during the existence of the Sicilian government, and has ever since been in use, chiefly among the upper, and partly also among the middle classes of the inhabitants of the towns, in addition to their native tongue. The mother-tongue of the people, the Maltese, is used in the country parts and at Gozo, and also among the poorer classes in the towns. A knowledge of the English language is spreading in Malta. There are a university and a high school for the children of the upper classes, and many primary schools.

The religion of the people is the Roman Catholic. The clergy and chapels are numerous. The Protestant clergy and places of worship (consequent on the occupation of the island by the English) are much fewer in number. A church was built on the island by Queen Adelaide about 1840.

Malta is a crown colony, and the local government is conducted by a governor, who, in legislative matters, is assisted by a council of six persons nominated by the Crown. The courts of justice are numerous, and the procedure has been condemned as intricate and costly.

History.—The earliest notice of the Maltese islands is in Diodorus of Sicily (v. 12), in which he says that Malta was a Phenician colony. It is supposed to have been afterwards occupied by the Greeks. The Carthaginians obtained possession of it in B.C. 402; and the Romans in B.C. 242. The Arabs seized it in 870; but in 1120 Count Roger, the Norman conqueror of Sicily, took possession of Malta, and expelled the Arabs. Malta was thus attached to the island of Sicily, and it became subject to the different dynasties which successively governed that island.

In 1516 Sicily, with the Maltese islands, passed to the Emperor Charles V., as heir to the crown of Arragon. On the 4th of March, 1530, Charles granted to the grand-master and religious fraternity of St. John, who had recently been expelled from Rhodes by the Turks, the ownership of all the castles, fortresses, and isles of Malta and Gozo, with complete jurisdiction. The sovereignty of Malta was by this grant in effect surrendered to the Knights, though the form of tenure from the crown of Sicily was maintained by the reservation of the annual payment of a falcon to the king of Sicily or his viceroy. The Knights built formidable defences, and speedily improved the condition of the island. On the 9th of June, 1798, the French expedition to Egypt under Bonaparte, consisting of eighteen ships of the line, eighteen frigates, and about 400 transports, having 40,000 men on board, arrived off the island. The pusillanimity of the grand-master, Ferdinand Hompetch, and the treachery of some French knights of the Order, led to the surrender of Malta to this force, although it was amply fitted for defence. The French government soon became so oppressive that the Maltese revolted, and they besieged the fortified cities from September, 1798, till September, 1800, whilst a blockade was kept up by sea by the Sicilian, Portuguese, and English. Captain Alexander John Ball, who commanded the squadron afterwards appointed by Lord Nelson to besiege Valetta, was in the beginning of 1799 elected by the Maltese as their chief, and the president of their congress. At length General Vaubois made proposals to surrender the place into the hands of the English troops. This act was signed and concluded on the 5th of September, 1800.

At the Peace of Amiens in 1802, it was settled between Great Britain and the French republic that the island should be restored to the Knights of St. John, and be an independent state as formerly, but with some modifications. Other political events prevented the fulfilment of this plan; and England remained in military possession of Malta till 1814. This was a period of great prosperity to the island, with the exception of a serious visitation of the plague in 1813. On the 30th of May, 1814, a definitive treaty of peace, concluded at Paris between France and the allied powers, fixed the lot of Malta, by a formal recognition of its subjection to the crown of Great Britain. But as the cessation of the war opened the ports of Europe, Malta lost much of her recently acquired prosperity. As a military and naval station, it has ever since been kept up with great care; and as a dependency or colony of England, many improvements in the internal government have been made since 1840. The head-quarters of

the Mediterranean fleet, and a dépôt on the route to India, its political importance is very great, and fortifications of an impregnable character have therefore been erected, with arsenals, storehouses, and other appliances.

MALTA, KNIGHTS OF, a celebrated military and religious order, known also by the names of Knights of St. John of Jerusalem, Knights Hospitallers, and Knights of Rhodes. The Order originated in a hospice which was founded at Jerusalem, about the middle of the eleventh century, for receiving the pilgrims from Europe who visited the holy sepulchre. When the crusaders under Godefroy de Bouillon took Jerusalem in 1099, several of them determined to join the institution, and to devote the rest of their lives to the service of the poor pilgrims. Godefroy de Bouillon made a donation of his own lordship of Montboire in Brabant to the hospice of St. John, and several other princes followed his example. The dress assumed by the new Hospitallers was black, with a white cross, having eight points or arms on the left breast. Pope Paschal II. sanctioned the new institution, the members of which bound themselves by solemn vows of chastity, individual poverty, and obedience, to which was afterwards added that of being always ready 'to fight against Mussulmans and all others who forsake the true religion.' For nearly two centuries the Hospitallers, together with the Templars, were the firmest support of the Christians in the East; and when Acre, the last bulwark of Christendom, was taken by the Mussulmans in 1291, the remains of the Order withdrew to Cyprus. In the year 1310 they took possession of the island of Rhodes, and strongly fortified its capital, from which they carried on by sea a deadly warfare against the Mussulmans. In 1522 Sultan Solymán the Great attacked Rhodes for the second time, and after an obstinate defence, captured it, and expelled the knights, who found refuge in Italy. In 1530 Charles V. gave to the Order the islands of Malta and Gozo. After the surrender of Malta to the French, in 1798, the Order as a sovereign body became extinct.

MALTHUS, REV. THOMAS ROBERT, was born in 1766. He was entered at Jesus College, Cambridge, in 1784, proceeded B.A., 1788, and M.A., 1797; took orders, and undertook the cure of a small parish in Surrey. In 1798 he published 'An Essay on the Principle of Population, as it affects the future improvement of Society, with Remarks on the Speculations of Mr. Godwin, M. Condorcet, and other Writers;' but finding that his facts and illustrations were imperfect, in 1799 he went abroad, and journeyed through Sweden, Norway, Finland, part of Prussia, France, and Switzerland, collecting materials for the second edition of his work, which he published in 1803. This work, and his 'Inquiry into the Nature and Progress of Rent,' are the most important of his works. He published many pamphlets of temporary interest, and died in 1834.

MALTON. [YORKSHIRE.]

MALURUS, the name of a genus of birds abundant in New South Wales. They belong to the *dentirostral*, or toothed-billed group of the order *Passeres*. Their characteristics are—bill short, with pretty wide gape; ridge keeled; tip curved, compressed; bristles at the angle of the gape; nostrils

placed in large furrows, surrounded by a membrane; tarsi long and slender; wings short, with ten primary feathers, the first short, the fourth, fifth, and sixth subequal and longest of all; tail tapering and narrow. The Blue Wren (*M. cyaneus*) of the colonists is the type of the genus. It is a beautiful bird, and noted as a singer.

MALUS, ETIENNE LOUIS, was born at Paris, June 23, 1775. On the formation of the École Polytechnique, Malus was admitted as a student, and on quitting the institution he was employed as a professor of mathematics in the military school at Metz; but having an inclination for a more active life, he entered the corps of engineers with the rank of captain, and in 1797 he was sent to join the army of the Sambre and Meuse. At the termination of the campaign, Malus went to Paris, and in the following year embarked with the expedition to Egypt under Bonaparte. He was engaged there in various actions, and superintended the fortifying of Damietta.

In 1801 he returned to France, married soon afterwards, and in 1810 was made lieutenant-colonel. During the rest of his life, all the time he could spare from his professional avocations was spent in the cultivation of the sciences, particularly in optical investigations; and his first published work was entitled 'Traité d'Optique.'

In 1808 the Institute of France having offered a premium for the best mémoire on the subject of double refraction in crystals, Malus entered zealously into this field of research; and while prosecuting his experiments, accidentally made the discovery, that when a pencil of light is reflected from unquicksilvered glass, at an angle of incidence equal to $54^{\circ} 35'$, or from the surface of water at an angle of incidence equal to $52^{\circ} 45'$, the reflected light possesses the same properties as are exhibited by one of the pencils produced by double refraction in a crystal. He observed, also, that when the pencil reflected from a transparent medium, at a certain angle of incidence, is made to fall on another such medium at an equal incidence, if the plane of the second reflection is coincident with the plane of the first, the light is reflected as usual; but if the planes are at right angles to one another, no reflection takes place at the second surface, the pencils of light being wholly refracted.

To the effect produced on light so reflected, he gave the name of polarization; and these phenomena may be said to have laid the foundation of a new branch of physical optics. Malus was immediately elected a member of the French Institute; and in 1811 the Royal Society of London awarded him the Rumford medal. He died in Paris, February 23, 1812, in the thirty-seventh year of his age.

MALVA, a genus of plants belonging to the natural order *Malvaceæ*. *M. moschata*, the Musk Mallow, is native in many parts of Europe, and is found in Britain in grassy borders of fields and by waysides. *M. sylvestris*, Common Mallow, grows on waste places and road sides in Britain, and is native in most parts of Europe. The whole plant, but especially the root, yields when boiled a plentiful tasteless mucilage, which is used in some cases of internal irritation. Decoctions of the leaves are employed in dysentery, and in general for removing

supposed acrimonious humours; but their chief utility is in clysters, fomentations, and poultices. This species is the Malva of Pliny. *M. rotundifolia*, Dwarf Mallow, is common in waste places in most parts of Europe, and is a native of Britain. *M. borealis* is found in Britain, near Hythe in Kent. There are many other species of Mallow. Those mentioned are the only natives of Britain, and the others are of little importance, excepting as ornamental plants.

MALVACEÆ are a large natural order of exogenous plants. A large proportion of the order consists of herbaceous or annual plants, inhabiting all the milder parts of the world, but much the most plentiful in hot countries, where alone a comparatively small number of species become trees. In many cases they are remarkable for the large size and beautiful colours of their flowers, which are, however, fugitive. Among the very numerous species several are of essential service to man. As emollients they are well known in medical practice, the Marsh Mallow (*Althea officinalis*) being one of the most useful among this kind of remedial substances, and a large proportion of the whole order being capable of supplying its place. The hairy covering of the seeds of the various species of *Gossypium* forms the raw cotton so important to our manufacturers. The seeds of *Hibiscus abelmoschus* are warm and musky, and are employed in perfumery as a substitute for musk; those of *Hibiscus esculentus* are used in hot countries as a mucilaginous ingredient in soups. A few species are acid, especially *Hibiscus sabdariffa*. The tenacious fibres procured from the inner bark of many kinds of malvaceous plants are formed into cordage. *Hibiscus elatus* and *H. tiliaceus*, and several kinds of *Sida*, are principally used for this purpose.

MALVERN. [WORCESTERSHIRE.]

MAMELUKES, or MEMLOOKS, the name of a military body which for a long time ruled Egypt. They were first instituted in the early part of the thirteenth century by Malek Salach, grandson of Safadeen, which Safadeen was the brother of the famous Salah Edeen, the Koord, the founder of the Eyoob dynasty of the sultans of Egypt, which succeeded the Fatimides. In 1517 Sultan Selim I. subdued Egypt, and put to death Toman Bey, the last of the Circassian dynasty. A pasha, who resided at Cairo, was appointed by the Porte; but the beys of the Memlooks, twenty-four in number, were the governors of as many districts, and continued almost independent of the Porte till Bonaparte's invasion, when the battle of the Pyramids, in July 1798, destroyed their power. After the English and the Turks had reconquered Egypt in 1801, the capitan pasha treacherously murdered several of the beys whom he had invited to a conference. At last, in 1811 Mehemet Ali, pasha of Egypt, by a similar contrivance, destroyed nearly all the remainder in the citadel of Cairo, and they are now extinct as a body. The Memlooks were recruited entirely from Caucasian slaves.

MAMERS. [SARTHE.]

MAMERTINE PRISONS, places of confinement at Rome, where state prisoners were incarcerated. They were built by Ancus Martius; and from what remains of them, more horrible dens could not be imagined. There were two of them, one above the

other; and the only entrance was by means of a small aperture at the top of the upper prison, down which the prisoner was let. In the same way there was another small opening to the lower subterranean chamber, where humidity and eternal darkness prevailed, without any chance of escape. Jugurtha was among the number of state prisoners who occupied these dreary abodes. They were probably so called from the *Mamertini*, a mercenary band of rebellious soldiers, who were defeated and almost annihilated by Hiero of Syracuse.

MAMILLA, a genus of Mollusca, of the family *Naticida*, in which the shell is heavy and oval, and the spire small and pointed.

MAMMALIA (by some writers anglicized into the term *Mammals*) is a term employed by naturalists to designate all those animals which give suck to their young.

In the Mammalia, the nervous system is concentrated in a true brain (*cerebrum* and *cerebellum*), and a spinal cord; the heart consists of two auricles and two ventricles; the blood is red and warm; the respiration is atmospheric; the lungs are free in a true chest; the jaws are furnished, as a rule, with true teeth; the limbs are usually four, sometimes two; habits arboreal, terrestrial, or more or less aquatic, and the limbs accordingly modified.

Within the class of the Mammalia the porpoises, whales, lamantins, and dugongs are included, animals essentially aquatic as far as *habitat* is concerned, but no farther. [NATURAL HISTORY.]

MAMMALOLOGY, a science having for its object the study and classification of the MAMMALIA. [ANATOMY, COMPARATIVE; ANIMAL.]

MAMMARY GLAND is an organ of considerable interest from its occurring only in that important class of animals to which it gives its name [MAMMALIA], and whose greatest peculiarity is that, while young, their food is the milk secreted by the mammary glands of their mother.

The number of mammary glands varies in different animals. They are composed of ramified ducts which open on the surface of a nipple, or teat, by a very minute orifice. In some animals, as ruminants, there is but one orifice at the extremity of each nipple; in others, and in man, there are several. Each orifice leads into a fine canal, which, however, soon dilates, and ramifies with irregular and tortuous branches in the substance of the breast or udder. Each branch has either a simple closed extremity or terminates in a minute cellule, and numerous capillary blood-vessels ramify on their walls and secrete the milk into them. When the mouth of the young animal, by the action of sucking, produces a partial vacuum over the nipple, the weight of the surrounding medium presses lightly and equally upon the surface of the breast or udder, and propels the milk from the ducts in minute and gentle streams.

At the commencement of pregnancy, the mammary gland, which up to the period of puberty had been but little developed, enlarges; its increase of size keeps pace with the progress of gestation, and before its termination a thin serous milky fluid begins to be secreted. Directly after parturition, the quantity of milk increases, and it becomes more thick and rich, combining in itself all the best principles for the nourishment of the young animal. It continues to

flow for a length of time, proportioned to the age at which the young animal can seek its own food, and then, gradually subsiding, the gland decreases to the same size which it had before pregnancy.

In males of all species only a rudiment of this organ is found; yet there are not wanting instances in which milk has been secreted from the breasts of men and other male animals. (Blumenbach.)

MAMMEA, a genus of the natural family of *Cuttiferae*, so called from the American name (*Mamey*) of *Mammea Americana*, or the American Mammee-tree, which is the only species of this genus, and forms a handsome tree with a spreading and elegant head, resembling that of a magnolia. The flowers are odoriferous. The fruit is large, and has a double rind, of which the outer is thick and leathery; the inner is thin and bitter, and contains the pulp closely adhering to it, which is of a yellow apricot colour. This pulp has a pleasant but peculiar taste, with an aromatic smell. It may be eaten raw, or cut in slices to eat with wine or sugar; or cooked, which deprives it of its gummy portion. It is also preserved in wine sweetened with sugar, or in brandy.

MAMMOTH (Russ. *mamant*, 'an animal of the earth'), the name of an extinct colossal species of elephant, nearly allied to the *Elephas Indicus* of Cuvier, but distinct from the Mastodon. The bones of this huge mammifer have been discovered in various parts of the world, and sometimes in a complete state. In the British Museum is to be seen an entire skeleton, with all the bones skilfully articulated; and in the Museum of St. Petersburg is exhibited a perfect skeleton, the carcass of which was found preserved in ice in the north of Russia towards the end of the last century. In the Museum of Philadelphia is shown a colossal specimen which was found in 1801, at Newburgh, on the Hudson River, in the State of New York, about twelve feet below the surface of a morass. In 1817 the remains of a mammoth were discovered near the town of Goshen, Orange County, within sixty miles of New York. The length of the skeleton was computed at 20 feet; but following its curvature it measured, from the point of the tusks to the end of the tail, 31 feet; the length from the chin to the rump, 15 feet; and the height over the shoulders, 11 feet. The entire skeleton weighed about 1000 lbs. The distinguished traveller and naturalist, Peter Simon Pallas, who was employed by Catharine of Russia to explore different parts of her empire, states that from the river Don to Tchutskoiness, there is scarcely a river that does not exhibit the remains of the mammoth, and that they are frequently imbedded in alluvial soil containing marine remains. Entire carcasses of the animal are seldom found; but isolated bones have frequently been discovered in different parts of the world, especially in Russia, Sweden, Siberia, Iceland, Poland, Germany, Hungary, Holland, and the north of the American continent, in Ireland and Scotland, and occasionally in the alluvial soils of England. Tusks, teeth, and bones of prodigious size have been found in the valleys of the Thames and the Medway; at Trenton, near Stafford; at Gloucester; in the county of Northampton; in Holderness, Salisbury Plain, Essex, and Norwich. They never occur in the regular strata, but in the superimposing drift. Blumenbach, writing in 1803, states that within his knowledge above two

hundred of these elephantine fossils had been found in Germany. It is, however, in the colder latitudes of Asiatic Russia that the mammoth, or fossil elephant, most extensively abounds; and there the ivory tusks are sometimes found in so perfect a state, as to be converted into articles of commerce, and used for ornamental purposes.

MAMMOTH CAVE, THE, is the largest known cavern in the world. It is situated in Edmonston County, Kentucky, and consists of a series of caverns, which have already been explored to a distance of ten miles. It formerly contained remains of fossil elephants, and has probably been the bed of a subterranean river. In fact, it still contains a stream in which two kinds of fish have been discovered—one without eyes, and the other with eyes, but blind. The equability of its temperature at one time induced many persons suffering from consumption to take up their abode in one of its caves; and a hotel was actually built, but it has long been untenanted.

MAMUN. [ABBASIDES.]

MAN constitutes the sole specific example of the only genus, *Homo*, contained in Cuvier's order *Bimana*.

The anatomy and physiology of man are treated of under their appropriate heads in this work. The present article is limited to the consideration of man as an object of natural history.

In man the attitude is erect. The skull is nearly balanced upon the vertebral column, which, though not absolutely straight, yet has its curves so arranged, that when the body is in the erect posture a vertical line drawn from its summit would fall exactly on the centre of its base. The naturally erect position of man requires an expansion of the os sacrum and haunch bones, for the lodgment of powerful muscles; and the strength and size of the lower limbs are such as not only to support with ease the weight of the body, but also to insure firm, easy, and graceful progression; the foot is broad; the leg bears vertically upon it; the heel is tumid beneath; the toes are short, the first far exceeding the rest in size, placed on the same line as the others, and not opposable to them. Man is truly bipedous and plantigrade.

The lower limbs of man being the exclusive organs of locomotion, at least on the ground, his anterior extremities are free. The arms are well developed and muscular; the humerus rotates freely in the shallow articulating cavity of the scapula; the shoulders are kept wide apart by means of well-developed clavicles; the fore-arm is capable of pronation and supination; and the hand is at once an organ of touch and prehension; the thumb is truly opposable to the fingers, which are of unequal length, for the sake of insuring easier manipulation and greater precision. No other animal has a true hand.

In man the chest is large and expanded; it is flattened in front, and has greater dimensions transversely than in depth; the sternum is short and broad; the ribs are, on each side, 7 true and 5 false, total 12. Mammæ 2, pectoral. The teeth of equal length and approximating together, without intervals:—

Incisors, $\frac{4}{4}$; Canines, short, $\frac{1-1}{1-1}$; Bicuspid Molars,

$\frac{2-2}{2-2}$; True Molars, bluntly quadricuspid, $\frac{3-3}{3-3} = 32$.

Food—fruits, grain, roots and animal flesh, cooked; as a general rule, the diet of man is prepared by cooking for the stomach. In the colder regions oleaginous animal food is preferred; rice and farinaceous food in the hotter climates; and various are the degrees between these two extremes, according to latitude and national predilections.

Growth, slow; infancy, long; maturity acquired at a comparatively late period.

Skin, smooth. Natural offensive or defensive weapons denied by nature. Everywhere man uses artificial weapons: the club, the spear, the bow, the knife, and the hatchet are the weapons of savages.

The nervous system is highly developed; the brain is large, convoluted, complex, with the cerebral hemispheres greatly preponderating. The mass of the brain is voluminous in proportion to the size of the nerves communicating with it. In consequence of the volume of the brain, the amplitude of the cranial portion greatly preponderates over the facial. Man has no projecting snout; the face is nearly on a plane with the rising forehead, and therefore below and not anterior to the brain; this position is peculiarly characteristic of man, for the crania of the chimpanzee and orang, which approach nearest to that of man, are altogether posterior to and not above the face. This form, at the same time that it remarkably distinguishes the human from the brute features, is exactly adapted to the erect attitude. In that posture the plane of the orbits is nearly horizontal; the cavities of the nose are in the best direction for inhaling odours, proceeding from before or from below them; the jaws do not project in front of the forehead and chin. But, suppose the posture changed, as painful an effort would be required to examine an object in front of the body as is now necessary to keep the eyes fixed on the zenith, and the heavens would be almost hidden from our view; the nose would be unable to perceive any other odours than those which proceeded from the earth or from the body itself; and the teeth and lips would be almost useless, for they would scarcely touch an object on the ground before the forehead and chin were in contact with it; while the view of that which they attempted to seize would be obscured by the nose and cheeks.

Man is the only animal endowed with the gift of language, as distinguished from mere sounds instinctively uttered, and expressive of feelings or desires.

Man is a true cosmopolite; he inhabits the dreary regions of the polar circle, the temperate latitudes, and the glowing countries of the tropics. He subsists with equal facility under various degrees of atmospheric pressure; the valleys and also the elevated table-lands of South America, some of which are 10,000 feet high, are alike inhabited by man—the barometer standing in the one at 30, and in the other at only 20 inches. Condamine and Bouguer with their attendants lived for three weeks at a height of 14,600 French feet above the level of the sea, where the barometer stood at only $15\frac{3}{4}$ inches, the atmospheric pressure being therefore only a little more than half of that to which they had been accustomed.

Considerable differences occur in the average stature of different races. The Bushmen, for example, of Southern Africa are mere pigmies, the Caffres of the same country are tall and athletic; the Esquimaux are stunted; the Patagonians are often seven feet in height. In all countries individuals are to be found some far below the average standard, some far exceeding it; but these are examples of accidental departure from it. In temperate climates the average stature of the male varies from five feet six inches to six feet.

The great race of man is divided into a vast number of families or varieties, distinguished from each other by physiognomy and slight structural details, by colour, by the characters of the hair, by language, by habits, manners, and customs, and by degrees of civilization. A singular morbid variety of man occurs in all countries, but perhaps most frequently in hot climates. They are termed *albinoes*, and are distinguished by the total absence of the colouring matter of the cuticle, hair, and eyes—hence their skin is of a milk-white or pinkish hue, the hair silky, white, or at most yellowish; the iris rosy, and the pupil red. Albinoes occur among our domestic quadrupeds: white rabbits and white mice are examples. [ETHNOLOGY.]

MAN, ISLE OF, is situated between $54^{\circ} 4'$ and $54^{\circ} 27'$ N. lat., and $4^{\circ} 17'$ and $4^{\circ} 48'$ W. long.; 34 miles from St. Bees' Head in Cumberland; 16 from Burrow Head in Scotland; and 28 from Strangford in Ireland. Its length N.E. to S.S.W. is about 30 miles; its breadth varies from about 8 to 11 miles, but is much narrower at its extremities; and its circumference is about 75 miles. The area is about 220 square miles, or 180,000 acres. The population in 1861 was 52,469, being an increase of 82 only since 1851. At the last census there were 8946 inhabited houses in the island, 477 uninhabited, and 93 building. The Calf of Man is a small island situated to the south-west of the island, nearly a mile from it, and from 3 to 5 miles in circumference. The Kitterlins, another small rocky island, is situated between the Isle and Calf of Man.

The island is intersected by a ridge of hills, which runs from north-east to south-west nearly through its whole length, and chiefly occupies the central parts. The hills compose three chains, separated from each other by high table-lands, and crossed by three very narrow openings. Snaefell, the highest point of them all, is 2004 feet above the level of the sea, and North Barrule rises to 1804 feet. The mountains, commons, and waste lands are supposed to cover 50,000 acres, leaving above 90,000 acres for cultivation. England, Scotland, Ireland, and Wales are visible from the summits of the mountains on a clear day. The Neb, Colby, and the Black and Gray Waters, which flow from the mountains, enter the sea at Peel, Laxey, Douglas, and Ramsey. The coast is in many places very precipitous.

Rocks of mica-slate and clay-slate compose all the mountains. A considerable quantity of roofing slate and building stone is exported from the island. Lead, zinc, iron, and copper are found in the mountainous districts. Granite and other boulders are scattered about the island.

The soil in the south part of the island is a light clay formed by the decomposition of the clay-slate.

The mountainous district is adapted only for pasture, and judicious culture alone can render the hilly parts productive. The northern part is more fertile. The climate is temperate. The agriculture of the country, in consequence of the attention paid to the herring fishery, was formerly left very much to the women, who were accustomed to perform all the hard work of a farm, and frequently without their aid the corn itself would have been unthrashed; but great improvements have been introduced in recent years. The largest part of the island is in the hands of small yeomen, who farm their own estates, which vary from 10 to 200 acres.

The early history of the Isle of Man is obscure. It was governed by a succession of Norwegian kings, until Magnus, finding himself unable to preserve the Western Isles, sold them to Alexander III., king of Scotland, in 1264. The Isle of Man soon afterwards passed into the hands of the English; and in 1307 Edward II. bestowed this island first upon the earl of Cornwall, and then on Henry Beaumont. It passed through many hands until it came to the Stanleys, earls of Derby, who retained the title of Lords of Man. James, earl of Derby, embraced the cause of Charles I. in the civil war, was taken prisoner, and executed at Bolton in 1651. His wife, who figures conspicuously in Sir Walter Scott's novel of 'Peveril of the Peak,' was as obstinate a royalist as her husband. She threw herself into Castle Rushin, and maintained a vigorous resistance, until Christian, who commanded the insular troops, surrendered to the Parliamentary forces under Birch and Dukinfield, stipulating that the islanders should enjoy their rights and liberties. For this act his memory has been burdened with much unjust obloquy. The earls of Derby retained the lordship until 1736, when it passed to the dukes of Athole, who eventually disposed of their rights and patrimony to the crown for a sum of 416,000*l*.

The natives are a Celtic race, and speak a language known as the Manx, which, however, is rapidly becoming obsolete. They retain a plentiful store of those fantastic legends which overawed the reason of a credulous age, and excite the curiosity of our own. Some of the Manx ballads possess an historical importance.

No part of the kingdom possesses more valuable Danish remains. The various tumuli, barrows, weapons, coins, and Runic characters afford clear evidence of the connection which the Northmen had with this island. Rushin Abbey, St. Bridget's Abbey, and the tumulus of Tynwald are among the most interesting relics of antiquity.

The principal towns in the island are Castletown, Douglas, Peel, and Ramsey.

Castletown is situated on the south-west of the island; it is a neat town, with regular streets. It contains two or three chapels, and a well-conducted college. The remains of Castle Rushin are in this town. The population in 1861 was 2692. The courts of chancery and common law are held in Castletown, and it is the residence of the governor. The House of Keys meet here.

Douglas is situated on the south-east coast of the island, on a bay which extends three miles in the form of a crescent, and is sheltered from all winds except the south-east. The old streets are generally

very irregular, but some modern streets are regularly built. Castle Mona, built by the duke of Athole, and a number of good mansions, give a pleasant appearance to this town. Paper, linen, and woollen manufactures are carried on. The population in 1861 was 12,511. There is a pier 520 feet long.

Peel, formerly called *Holm Peel*, *Pile Town*, or *Sodor*, is on the west coast of the island. The castle, which is built on a small rocky island, incloses an irregular space of more than two acres, and is separated from the town by a narrow channel, scarcely a foot deep at low water. Peel has only one church. The population is 2848.

Ramsey is situated on a spacious bay, where there is safe anchorage, on the north-eastern coast of the island. It is built in a straggling and irregular manner. In this town the courts of law for the north part of the island are held. Population, 2890.

The herring fishery is one of the chief occupations of the people. Steam communication is maintained with the three kingdoms.

The established religion is that of the Church of England, but all denominations of Christians have the free exercise of their religion. The episcopal see is supposed to have been fixed at Sodor in the ninth century, but the site of this place is not now known. The bishop of Sodor and Man, whose authority is wholly confined to this island, is a suffragan of the archbishop of York, and has a seat in the House of Lords, but without a vote. He has an archdeacon and his assistant, two vicars-general, and an episcopal registrar; and he holds also an ecclesiastical court, a convocation, and a consistorial court.

All the laws of the island are contained in one small volume. There are no barristers, and the services of the attorneys, who act both as attorneys and barristers, are in many cases rendered unnecessary by the clients pleading their own causes. Law is cheap, and litigation common.

The House of Keys, which has both a legislative and judicial character, consists of twenty-four of the principal commoners of the island. They must have landed property, and have attained the age of twenty-one. They are now a self-elected body, but were formerly chosen by the people. The two deemsters have equal jurisdiction, and are judges in civil and criminal cases. There are a court of chancery, a court of exchequer, and six common-law courts. In these latter, all disputes about land, and all personal actions for the recovery of damages, are tried before a jury. The deemsters administer the oath in the Manx language, deliver the charge, and receive the verdict. There is an appeal from the judgment of a court of common law, first to the House of Keys, afterwards to the governor, and finally to the privy council. A reform in the peculiar constitution and legislation of the island seems urgently called for, and is, at present, in contemplation.

Schools, both in the English and the Manx tongues, have been established in various parts of the island.

The public revenue derived from the Isle of Man has for many years been almost 20,000*l*. per annum less than the expenditure; and as the customs duties were unusually light as compared with other parts of Great Britain, in 1866 an Act was passed to raise them so far as to obtain a revenue sufficient for the expenses of the island.

The total number of vessels which entered the three ports in the Isle of Man in 1865 was 1560 (125,154 tons), and the clearances 835 (82,692 tons). The customs revenue received in the same year was 34,178*l.*, the amount being distributed amongst the different ports as follows:—Castletown, 3688*l.*; Douglas, 25,347*l.*; and Ramsey, 5143*l.*

(Waldron's *Description of the Isle of Man*; Townley's *Journal in the Isle of Man*; Feltham's *Tour through the Isle of Man*; Wood's *Account of the Isle of Man*; *Parliamentary Papers*; Dendy's *Islets of Britain, &c.*)

MANAKINS, the name of a group of small birds remarkable for the rich tints of their plumage (*Pipra* of authors).

MANATIDÆ. A family of animals belonging to the class *Mammalia*, order *Cetacea*, sub-order *Sirenia*. The genus *Manatus*, lamantin or sea cow, is characterized by two small upper acute incisor teeth when young. These disappear in adults, in which also the canine teeth are wanting. The

dental formula of the molars is $\begin{smallmatrix} 8-8 \\ 8-8 \end{smallmatrix}$, with crown

square, divided by a transverse groove. The Manatees are vegetable feeders. Three genera belong to the family—*Manatus*, *Halicore*, and *Rhytina*. Of the three species of Manatees, one is met with on the African coast (*M. senegalensis*), and two on the American coast (*M. latirostris* and *M. australis*). Their flesh is said to be good, and is eagerly sought after. The full-grown forms vary from six to fifteen feet in length. They are noted, like most of this order, for their great attachment to their young.

The *Halicore*, or Dugong, occurs on the shores of the Indian Ocean, and on the east coast of Africa. The upper jaw of the Dugong is bent forward, falls down in front of the lower jaw, and is terminated by two large incisor teeth. Like the Manatee, the Dugong is a vegetable feeder and gregarious. The *Rhytina* was represented by the single species *R. Stelleri*, or Northern Dugong, which has become extinct—the last having been killed, it is said, in 1768.

MANCHA, LA. [CASTILLA-LA-NUEVA.]

MANCHE, LA, a department in France, consisting of the peninsula of Cotentin and the district of Avranchin, parts of the former province of Normandy, is bounded S. by the departments of Ille-et-Vilaine and Mayenne, E. by those of Orne and Calvados, N.E., N., and W., by the English Channel, which is called in French La-Manche, whence the department takes its name. Its greatest length from N. to S. is about 90 miles; its average width is about 27 miles. The area is 2292 square miles, and the population in 1861 was 591,421.

Rivers, &c.—The department is traversed from S. to N. by hills of no great elevation, which branch off from the Armoric chain, and terminate northwards in Cape La-Hague. These hills slope down gradually towards the coast on the eastern and western sides of Cotentin, in some places presenting bold cliffs against the sea, in others subsiding into sands and beaches of vast extent, which are always covered at full tide. Along the coast there are several harbours and roadsteads, the most important of which are—Cherbourg, La-Hogue, Granville, Regneville, Carteret, &c. Among the numerous islands that stand in near the coast, besides the Channel Islands, are—Mont-

St.-Michel, the CHAUSSEY group, Pelée, N.E. of Cherbourg; and Tatihou and St. Marcouf, on the east coast of Cotentin. Most of these islands are fortified and garrisoned; many of them, traditions say, were once joined to the mainland. From the nature of the surface the rivers must be all of short course: the principal are the Vire [CALVADOS]; the Taute, Merderet, Douve, and Selune, all navigable. Capes La Hague and La Hogue, and Point Barfleur, are on the coast. The climate is mild but moist, and too cold for the cultivation of the vine.

Products, &c.—The department yields more of bread-stuffs than suffices for the consumption. Wheat, barley, rye, buck-wheat, black oats (cakes made of which form the chief food of the labouring class), and potatoes are the chief crops. Apple and pear trees are extensively cultivated for making cider and perry, the favourite beverages of the country. Of cider, 44,000,000 gallons are made annually; some of it, especially that made near Avranches, is of excellent quality. Hemp and flax are grown in considerable quantity on the eastern slopes of Cotentin. Fruits of various kinds are sedulously cultivated in the arrondissement of Avranches. Horses of the true Norman breed are numerous, and yield the breeder good prices; they are much sought after as cavalry horses, and are said to be the best in France. The pastures are good and extensive, affording food for a great number of horned cattle of large size and excellent fattening qualities. A considerable number of sheep are fed on the sandy plains (locally called *mielles*) which extend between the sea and the cultivated land; they are small, yield inferior wool, and have sweet flesh. Game, water-fowl, and fish of all kinds are abundant.

The department is rich in minerals. Iron, lead, and coal mines are worked; granite and building stone are quarried; marble, slate, potter's clay, and limestone are found. Mineral springs are numerous; there are a few salt marshes along the coast.

Manufactures, &c.—Manufacturing industry is actively exerted in the making of iron, the working of zinc and copper, the fabrication of plate glass, serge, calico, drugget, cutlery, woollen stuffs, lace, tape, haircloth, linens, porcelain, oil, hardware, cotton yarn, paper, leather, soda made from kelp, basket-work, &c. Shipbuilding is actively carried on at Cherbourg and other towns on the coast. The articles enumerated and the products of the soil support an active commerce and coasting trade.

Divisions, Chief Towns, &c.—The department contains 1,467,308 acres, and is divided into six arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
St.-Lô, . .	9	117	94,855
Coutances, .	10	138	123,032
Valognes, .	7	118	86,044
Cherbourg, .	5	73	98,606
Avranches, .	9	124	116,488
Mortain, . .	8	74	72,396
Total, . .	48	644	591,421

In the arrondissement of St.-Lô, the chief town is St.-Lô. [Lô, St.] *Carentan*, a town of 3110

inhabitants, is situated near the coast among unhealthy marshes on the left bank of the Taute. It was formerly defended by a strong castle, a great part of which remains; this castle was taken by Edward III. in 1346. *Percy*, S.W. of St.-Lô, has a population of 3003. *Torigny*, S. of St.-Lô, a small well-built town of 2082 inhabitants, is famous for its ancient castle, which before the Revolution of 1789 was considered the finest building of the kind in Normandy.

In the arrondissement of Coutances, the chief town, *Coutances*, the capital of the old district of Cotentin, is situated at the confluence of the Soule and the Bulsard, 8 miles from the English Channel, and 41 from Cherbourg. It is in general ill built, with narrow crooked streets, but the situation is very picturesque. The town is said to have existed in Roman times, and to have taken its name from Constantius Chlorus, who fortified it and built the aqueduct now called *Les Piliers*, from the Roman arches of it still remaining. The principal buildings are the cathedral, which is universally admired, the churches of St.-Nicholas and St.-Pierre, the prison, and the theatre. Coutances has a prefecture and public library; it gives title to a bishop, and has communal and theological colleges, and 8062 inhabitants. The industrial products are cutlery, parchment, druggist, muslin, worsted, lace, &c.; the chief trade is in corn, butter, poultry, eggs, cattle, horses, hempen and flaxen thread, wool, feathers, &c. *Cerisy-la-Salle*, 7 miles from Coutances, has a population of 2017; there are several druidical monuments near it. *Gavray*, famous for its long resistance to Duguesclin, stands 12 miles S. by E. from Coutances, and has 1821 inhabitants. *Périers*, N. of Coutances, has a population of 2794.

The arrondissement of Valognes is named from its chief town, *Valognes*, which stands in a pretty valley 11 miles S. by E. from Cherbourg, and has a tribunal of first instance, a college, and 5812 inhabitants, who manufacture hats, lace, and gloves. The principal building is that in which the college and public library are established, and which was formerly a theological seminary. *Barfleur*, an important seaport in the time of the Norman kings of England, and from which it is said that William the Conqueror set out for the conquest of England, stands on the eastern shore of the peninsula of Cotentin; it is now a mere fishing village with 1304 inhabitants, and has a harbour capable of admitting only small craft; about a mile to the N. is a lighthouse, 271 feet above the sea, on Cape Barfleur. Prince William, only son of Henry I., with a retinue of young nobles, sailed from Barfleur in the *White Ship* (La Blanche Nef), which was stranded on a rock soon after leaving the harbour, and only a butcher of Rouen regained the shore. *Briquebec*, situated in a forest of the same name W. of Valognes, has a handsome church, an ancient ruined castle, and 3905 inhabitants. There are several iron mines and mineral springs near this town. North-east of Valognes on the eastern coast of Cotentin is the fortress of *La-Hogue*, which is built on the isthmus of a peninsula terminating in Cape La-Hogue, and defends the roadstead of La-Hogue. Off the cape on the 29th of May, 1692, the French fleet, under Admiral Tourville, was completely defeated by the

combined fleets of England and Holland, under Admiral Russell. *Montebourg*, S.E. of Valognes, has 2214 inhabitants, who manufacture lace, cutlery, and leather. *Sainte-Mère-Eglise*, S. of Montebourg, on the road to Carentan, has a population of 1575. *St.-Sauveur-le-Vicomte*, a well-built town prettily situated on an eminence above the Douve, has 2722 inhabitants.

In the arrondissement of Cherbourg the chief town is CHERBOURG. *St.-Pierre-Eglise*, a small town E. of Cherbourg, has 2265 inhabitants, who manufacture linen and leather. *Les-Pieux*, a small place built on a hill near the west coast of Cotentin, is remarkable for the extensive view from it, in which are included the islands of Guernsey and Jersey, and twenty churches on the peninsula. Population, 1526.

Of the arrondissement of Avranches the chief town is AVRANCHES. *Brécéy*, E. of Avranches, has 2440 inhabitants. *Granville*, a seaport and walled town N.W. of Avranches, having the island of Jersey in sight, has a tribunal of commerce, a naval school, and 17,180 inhabitants. The town stands on a rocky promontory projecting into the English Channel, 30 miles S.W. of St.-Lô. The principal public buildings are the parish church, custom-house, granite mole, inclosing a harbour, citadel, hospital, and public baths. The inhabitants of Granville are enterprising seamen, and are largely engaged in the coasting trade and in the cod, herring, whale, and oyster fisheries. They export corn, flour, butter, cider, poultry, cattle, granite blocks, &c., and import wine, brandy, colonial produce, drugs, salt, hemp, soap, oak and deal planks, iron, &c. Ship-building is carried on. Granville is the seat of a tribunal of commerce, has a school of navigation, and is the residence of a commissary of marine. It was destroyed by the English in 1695, and besieged by the Vendéans in 1793. On the isolated and fortified rock of *Mont-St.-Michel*, stands the famous abbey dedicated to St. Michael the Archangel. The abbey buildings, after the first French Revolution, were made a prison for nobles and priests; it afterwards became a central prison for several departments, and was restored in 1864. The abbey church, which springs from the centre of the other buildings, and crowns the summit of the rock, is greatly admired for the beauty of its Gothic architecture. *St.-James*, S. of Avranches, has a population of 3270, who trade in corn, cattle, flax, and hemp. This place was fortified by William the Conqueror. *Villedieu*, N.E. of Avranches, has 3789 inhabitants, who manufacture hardware and plated goods, lace, and leather.

The arrondissement of Mortain is named from its chief town, *Mortain*, which is situated in the south-east of the department, and has linen manufactures, and 2490 inhabitants. The church of Mortain, founded in 1082, is a remarkable structure; the castle that formerly stood on the hill above the town is a heap of ruins. *Barenton*, S.E. of Mortain, has a population of 2818. *St.-Hilaire-du-Harcourt*, near the confines of Normandie, Bretagne, and Maine, has large markets for the sale of the cattle, corn, and other produce of these provinces; population, 4080. *Sourdeval-la-Barre*, N. of Mortain, has several paper mills, manufactures of cutlery and hardware, and a population of 4056. *Le-Teilleul*, on the borders

of Mayenne, 9 miles S. from Mortain, has 2478 inhabitants.

The department forms the see of the bishop of Coutances; is included in the jurisdiction of the Cour Impériale and University Academy of Caen; and belongs to the sixteenth Military Division, of which Rouen is head-quarters. It returns four deputies to the Corps Legislatif. (*Dictionnaire de la France; Annuaire pour l'An 1866.*)

MANCHESTER, the largest manufacturing city in the world, is situated in the south-east of Lancashire on the river Irwell, which separates it from the borough of Salford. It is 168 miles N.W. by N. from London by the old coach roads, but 188 miles by the London and North-Western Railway. The parish of Manchester is of great extent, and includes numerous townships. Both the city and all the adjacent townships, as well as the borough of Salford, have increased with great rapidity during the present century, and now form the wealthiest and most populous manufacturing community in the British dominions. In 1801 the parish of Manchester contained 112,300 inhabitants; in 1851 the number had advanced to 452,258; and in 1861, the population had still further increased, and amounted to 529,245. The population of the city proper, within the parliamentary limits, in 1861, was 357,979, as against 316,213 in 1851; and of the municipality in 1861, 338,722, as against 303,382 in 1851. According to a return laid before Parliament, the population of the parliamentary city in 1866 amounted to 380,887. Manchester was made a borough by the Reform Act of 1832; a charter of incorporation was granted to it in 1838, since which several Acts for its improvement have been passed; and in 1853 it was made a city. The number of voters in the parliamentary register in 1866 was 21,542. For municipal purposes it is divided into fifteen wards, and is governed by a mayor, who is returning officer, sixteen aldermen, and forty-eight councillors.

The De Gresleys were the original Barons of Manchester; and it was from Thomas de Gresley or de Grelle, one of the barons, that Manchester obtained its governing charter in the year 1304. Many years previously King Henry II. had granted to the De Gresleys the right of holding markets and fairs at Manchester. From the time of Thomas de Grelle's charter to that of the Municipal Reform Bill of our own times, Manchester was governed by a borough reeve elected by the inhabitants, not by a mayor and corporation; and it was not until the Parliamentary Reform Bill of 1832 that this great, wealthy, and populous city received the right of returning members to Parliament.

Manchester is remarkably rich in foundations for the teaching of religion and sound learning. So early as the year 1422, Thomas de la Warr, the last baron of Manchester of that name, having succeeded to the honours and the inheritance of the De Gresleys, founded at Manchester a College, consisting of a warden and eight fellows (of whom two were parish priests), and of two canons, four deacons, two clerks, and six choristers. The cost of erecting the college was 2000*l.*, equal to from 30,000*l.* to 50,000*l.* of the money of present times. The foundation of the college was soon followed by the erection of the

Collegiate Church, or Christ's Church, now the Cathedral. The questionable honour of a right of sanctuary was afterwards conferred on Manchester; but this was soon found to be an intolerable nuisance, and was abolished at the petition of the inhabitants by a special Act of Parliament. The preamble of the Act abolishing the right of sanctuary at Manchester shows how much progress the place had made even in the reign of Henry VIII. The preamble states that the town of Manchester is well inhabited, and distinguished for its trade both in linens and in woollens; that the inhabitants have obtained rich and wealthy livings, and employ many artificers and poor people; and that by 'their strict and true dealings' they have given rise to the resort of many strangers from Ireland and elsewhere with linen yarns, wool, and other necessary wares, for making of cloth to be sold there. The preamble then proceeds to state that in the course of the manufacture of linen the flax and yarn have to lie out in the fields night and day for half a year, to be whitened or bleached, before they can be made into cloth; and that the woollen cloth made in the town and neighbourhood must also hang on the tenters to be dried before it can be dressed. It further states that Manchester, besides being the principal place for manufacturing linens and woollens, is also frequented by the manufacturers of the neighbouring towns and villages to bring goods to be finished and sold. 'Many strangers,' says the same preamble, 'inhabiting other townships and places have used customarily to resort to the said town with a great number of cottons to be altered and sold by the inhabitants, whereby many poor people have been well set to work, as well with dressing and frizzing of the said cottons, as with putting to sale the same.' 'All these persons,' says the preamble of the Act, 'are endangered by the resort of light and evil-disposed persons to the town.' For these and other reasons, it was proposed and enacted that the right of sanctuary should be taken away from the Collegiate Church of Manchester, and be transferred to Chester, where there was no such occupying of merchandise. Such was Manchester in the reign of Henry VIII. and of Elizabeth. It was already an industrious and flourishing manufacturing town, where the woollen and linen trades were carried on with spirit and success; a place much frequented by strangers for the purposes of trade, and the trading capital of all the adjoining districts, as it is to this day. The first Manchester manufacturer of great note was Byron, one of the three famous clothiers of England. About eighty years after his time arose Humphry Chetham, a most successful manufacturer, who nobly employed his great wealth in founding a college and library at Manchester. In the year 1638 Manchester contended with York for the honour of becoming the seat of a university which it was then proposed to found in the north of England. In a memorial numerously signed by the nobility, gentry, clergy, and freeholders, and other inhabitants of the northern parts of England, it is stated that Manchester 'is about the centre of the northern parts; a town of great antiquity; formerly both a city and a sanctuary, and now of great fame and ability by the happy traffic of its inhabitants; for its situation, provision of food, fuel, and buildings, as happy as any town in

the northern parts of the kingdom.' About the same time, Lewis Roberts, in his 'Tressory of Traffic,' says:—'The town of Manchester, in Lancashire, must be herein remembered, and worthily, for their encouragement, commended; who buy the yarn of the Irish in great quantity, and weaving it, return it again into Ireland to sell. Neither doth their industry rest there, for they buy cotton wool in London that comes first from Cyprus and Smyrna; and at home work the same, and perfect it into fustians, vermillions, dimities, and other such stuffs, and then return to London, where the same is vended and sold, and not seldom sent into foreign parts, who have means at far easier terms to provide themselves of the same materials.' Forty years later, Andrew Yarranton, an able writer on trade, in urging the establishment of the tape and thread manufacture in Warwickshire, says 'that if they once fix well in that manufacture there, they will become the great masters of it, as Manchester is of all things it trades in.'

In the great Civil War, Manchester adopted the side of the Parliament very early, and with great determination, and twice repulsed the royalist forces under James, earl of Derby, the lord-lieutenant of the county of Lancaster, who had laid siege to the place. It afterwards, however, became excessively dissatisfied with the rule of Cromwell and the army, and was only kept in subjection by a powerful garrison. The partizans of the house of Stuart in later times became very powerful at Manchester, especially amongst the clergy and the numerous Roman Catholics in and around the city; and this continued to be the case to the rebellion of 1745, when the Pretender obtained some adherents at Manchester.

Until about the year 1730 Manchester did not possess the advantage of water carriage with any other part of the county of Lancaster. The river Irwell is not naturally navigable either to the sea or above the city; but in the year 1731 an Act was obtained for the purpose of rendering it so, from Manchester to the point where it joins the Mersey, and of rendering the Mersey also navigable to the tidewater of the estuary at Warrington, and thus to the port of Liverpool and the sea. This was the first great improvement in the means of communication between Manchester and distant parts. A much greater one was effected between the years 1758 and 1777, when Francis, duke of Bridgewater, constructed his celebrated canals. The first of these extended from the duke's coal mines at Worsley, about 7 miles distant, to Manchester, crossing the Irwell at Barton by an aqueduct which was then considered the greatest work of the kind that existed in England. The second and much more important canal, constructed by the genius of Brindley supported by the wealth of the duke of Bridgewater, was one joining that from Worsley, at a short distance from Altringham, and extending to the estuary of the Mersey at Runcorn, a distance of about 25 miles. By means of this canal the merchants and traders of Manchester obtained a cheap and easy communication with the port of Liverpool and the sea, available at all tides. Subsequently the Manchester and Warrington Canal was greatly improved, extended to Runcorn, and, as the Mersey and Irwell Navigation, became one of the most useful

lines of internal communication in the kingdom. These two canals now belong to the Bridgewater Trust, and notwithstanding the introduction of railways, still afford the means of carrying on the greater portion of the trade between Liverpool and Manchester. In the year 1830 Manchester obtained the advantage of the railway system, and in that respect took the lead of all the manufacturing towns in the kingdom. This additional means of communication has extended with such great rapidity, that it is now the central point of a perfect network of lines.

In addition to the great facilities for trade just described, the modern progress of the manufactures of Manchester owes much of its rapidity to the invention of the steam engine, and the introduction of steam power into the cotton and other trades. Two great beds of coal of extraordinary richness almost encircle the city, and no doubt extend under it, though at a considerable depth. These have been worked with great energy and success, especially on the Pendleton side, where mines have been sunk to the depth of from 1500 to 1800 feet, which yield large supplies of coal suited for manufacturing purposes. Manchester is therefore as well suited for carrying on manufactures that depend on steam as it formerly was for those then depending on water power. Hence the progress of modern invention, instead of arresting its prosperity, has given it a wonderful impulse, the limits of which it is impossible to anticipate. The principal manufacture of Manchester is that of cotton, which has now existed there for nearly 250 years—the Levant cotton having been worked into fustians and velvets as early as the commencement of the seventeenth century. Calicoes were first made in 1772, and muslins in 1781. At present every description of cotton goods is manufactured; and nine-tenths of the raw material, of which nearly 1,000,000,000 lbs. were imported into this country in 1865, chiefly through Liverpool, are consumed in Manchester, or within twenty miles of it.

In addition to the cotton manufacture that of silk is also very extensively carried on at Manchester. This trade was introduced in 1819–20. The manufacture of machinery of all kinds has also become a great source of employment in the town and neighbourhood. There are at present (1866) about 100 cotton, 20 silk, and 20 smallware mills; 40 dye works, 50 iron foundries, and 80 large machinists' shops. There are employed in the cotton mills about 60,000 persons, who earn about 30,000l. per week in wages. There are, at least, 9000 skilled mechanics constantly engaged in the production of steam-engines, spinning mules, looms, and other machinery, chiefly for the production of the various textile fabrics, whose wages average about 28s. each per week, and who need some 2000 labourers to assist them.

The factories of Manchester are simply huge piles of brick, studded with multitudinous windows, yet remarkable, generally, for cleanliness, ventilation, regulated temperature and orderly economy.

The city of Manchester, originally built, like nearly all the cities and towns of England, with narrow crooked streets, has been almost entirely rebuilt and reconstructed during the last fifty years, and now

possesses many of the widest and best streets in the kingdom. Numerous warehouses, many of them quite palatial structures of extraordinary size, well calculated for carrying on business on a most extensive scale, have been constructed in the best business streets. During the same period the introduction of railways and omnibuses has in a great measure changed the habits of the more prosperous part of the inhabitants of Manchester, as well as of other towns, and instead of residing in squares and streets within the city as in former times, they now live in elegant villas in the neighbouring country. Almost innumerable residences of this description have been erected during the last twenty years in the most beautiful parts of the environs of the city.

Amongst the most celebrated buildings in the city are the Cathedral and the Exchange. The first-named is a very handsome Perpendicular building, originally built in 1422, and has become a cathedral only since Manchester was made the see of a bishop. It consists of a nave and aisles, and is rendered conspicuous by its lofty tower, 120 feet in height. The interior presents a striking *coup d'œil*, the roof being finely carved, moulded, and gilded, and the choir containing some admirable carved work. The Exchange, though a tolerably large and handsome building, has become quite unequal to accommodate the trade of the city, and is about to be superseded by a much larger and handsomer building, to be constructed under the powers of an Act of Parliament passed in the session of 1866.

Other public edifices worthy of notice are the Town Hall, erected on the model of the temple of Erectheus, at Athens; the Royal Institution, an edifice of the Ionic order; the Free Trade Hall, built in the Lombardo-Venetian style, to commemorate the success of the free-trade movement, large enough to hold 7000 persons; the Theatre Royal; the splendid New Assize Courts, in decorated Gothic, the best building of the kind in the kingdom; the Chetham College Blue Coat School, founded 1651; Bishop Oldham's Grammar-school, founded 1520, endowed with twelve scholarships; Owen's College in Quay Street; with ten professorships attached; Lancashire Independent College, at Withington; Wesleyan Theological Institution, at Didsbury; Royal Infirmary and Dispensary, founded 1753, with statues of Wellington, Sir R. Peel, and Dr. Dalton; School for Deaf and Dumb, and Henshaw's Blind Asylum, at Stretford; School for Infant Deaf and Dumb, at Old Trafford; Industrial School, at Swinton, in the Tudor style; and the New City Gaol. There are in the boroughs of Salford and Manchester altogether about seventy churches belonging to the establishment; ten Roman Catholic, and upwards of one hundred Dissenting chapels, some of which, such as the Catholic Cathedral and the Cavendish Independent Chapel, are very beautiful specimens of architecture. There are also two Jewish synagogues, two German and a Greek church. The more noticeable churches are—St. Ann's and St. Paul's, handsome Grecian structures; St. John's, in the later English style; St. Matthew's, designed by the late Sir Charles Barry; and in Salford, Trinity Church—a good specimen of Perpendicular—and St. Simon's, an Early English edifice with a tower and spire 153 feet high.

Among the educational establishments in Man-

chester, perhaps the most remarkable is the celebrated Free School for 350 boys, which was established in 1854 in order to prove that the children of every sect could be advantageously taught together. It has since been sustained by voluntary subscriptions for the benefit of children whose parents are utterly unable to afford them any education, and is generally considered to have proved thoroughly successful in its aim.

Manchester was the first borough to take advantage of the Free Libraries Act, which allows a local assessment of a penny in the pound for libraries and museums. It now possesses four free public libraries, containing nearly 100,000 volumes, of which over 2000 are changed daily. In the town-hall is the corporation library, an exceedingly valuable collection of books, parliamentary papers, &c. The Mechanics' Institution and the Athenæum are large handsome buildings, each having an excellent library.

There are several private banks and also branches of the Bank of England, and National Provincial Bank of England. Two daily and several weekly papers are published. This city is amply supplied with water from extensive reservoirs constructed in the valley of the river Etherow, and along its course for about 5 miles, and conveyed thence in large pipes a distance of about 17 miles. These works are perhaps the most extensive of the kind in Europe. Altogether about 1,500,000*l.* have been invested in them. They as well as the gas-works and the market and manorial rights, which have cost 700,000*l.*, belong to the corporation, who devote the immense profits accruing from them to city improvements.

In the year 1846 some spirited inhabitants determined to provide several public parks for the accommodation of the people. A very large subscription was entered into for this purpose, and three parks, named the Queen's, the Peel, from the late Sir Robert Peel, who was one of the warmest and most liberal supporters of the plan, and the Phillip's Park, were constructed in the townships of Salford, Bradford, and Harpurhey. Victoria Park, to the south of Manchester, has handsome villas around it. Botanical and zoological gardens have also been laid out in the vicinity of the city, and there are several extensive cemeteries in which much taste has been displayed.

The diocese comprises the archdeaconries of Manchester and Lancaster. It was so constituted in 1848, but the title of a city was not conferred till 1853, prior to which the Cathedral was a Collegiate Church. The bishop's income is 4200*l.*; and his seat is at Mauldeth Hall, near Manchester. He has the patronage of thirty-six livings (most of them alternate with the Crown). The dean's income is 2000*l.* The dean and chapter have the patronage of eighteen livings.

Manchester was the first inland place in England that obtained the privilege of warehousing in bond articles liable to customs duties. The amount of public revenue derived from this source in 1865, was 128,458*l.*

The city of Manchester is a place of great antiquity: having existed from the time of the Roman occupation of Britain, when it was called Mancunium, evidently from the name which it bore as a settlement of the Brigantes, *Mancenion*. It was a borough in the time of the Anglo-Saxon kings. The conversion

of its inhabitants is said to have been accomplished by St. Paulinus about 627. It was occupied by the Danes in the ninth century, but they were expelled in 920 by Edward, king of Mercia. It began to be a manufacturing town in the reigns of Edward I. and Edward II., and was the most active inland trading place in the north of England in the reign of Henry VIII. Manchester cotton is spoken of as early as 1352, but the fabric so designated was really a coarse woollen cloth. At that time, and considerably later, the woollen manufacture was the principal branch of industry carried on. For this it was admirably suited, owing to the abundant supplies of water and of water-power furnished by the three rivers, the Irwell, the Irk, and the Medlock, which unite at or flow through the city, and which bring together at that point a greater amount of water-power than is to be found at any other place in Lancashire. Soon after the woollen manufacture had been established, that of linen was introduced, the chief supplies of yarn being obtained from Ireland, by way of Liverpool. Somewhat later the cotton manufacture was commenced, which gradually took the lead of all the rest.

MANCHESTER, a city of New Hampshire, United States of America, is pleasantly situated on the east bank of the river Merrimac, at the falls of Amoskeag, 18 miles S. of Concord, 59 miles N.W. of Boston. The town is laid out in broad elm-shaded streets, with five spacious public squares. A considerable trade is carried on in manufacturing cotton, prints, starch, paper, and locomotives. There are fourteen churches and seven banks. Population in 1866, 24,000. The Falls, or Rapids, which descend 50 feet in a mile, are economized by numerous factories.

MANCHINEEL TREE. [HIPPOMANE.]

MANCHOORIA, an extensive but comparatively unknown district of China, which comprises all the easternmost portion of the great Asiatic central tableland, from lat. $41^{\circ} 30'$ to 56° N., to long. $116^{\circ} 30'$ to $141^{\circ} 15'$ E. The Yablounoi mountains, which separate it from the Russian government of Yakutsk, form its northern boundary; on the E. it is bounded by the Sea of Okhotsk, the Sea of Japan, and the Gulf of Tartary; on the S. by Corea and the Gulf of Pe-che-lu; and on the W. by Mongolia and the Russian government of Irkutsk. Its area is estimated at 700,000 square miles, and its coast-line extends about 1200 statute miles. Though forming on the whole a tableland of great elevation, its surface is relieved by several important mountain chains, of which the Yablounoi, as already described, bounds it on the north, and the Khirgan mountains in the west traverse it from north to south. These mountains are densely covered with vast forests of pine, which afford asylum to numerous kinds of wild beasts, while in the warmer localities flourish several varieties of the rose and the azalea, besides buckthorns and honeysuckles. The climate in the south is by no means severe, and the soil is generally fertile; but in the north a Siberian rigour prevails, and the inhabitants are compelled to maintain themselves by the chase.

Manchooria is divided into the three provinces of Shing-king, south; Kirin, east of the river Songari; and Tsi-tsi-har in the west. The chief town is Moukden, lat. $41^{\circ} 53' 30''$ N., long. $123^{\circ} 7'$ E. The principal river is the Amoor or Sagalin, which flows into the Gulf of Sagalin, in long. 140° E.,

and receives the tributary waters of the Songari, the Oussuri, the Thiukiri, and the Silimpti. There are three considerable lakes—the Hurur, 200 miles in circuit; the Kiuka, 50 miles long and 25 miles broad; and the Pir.

The Manchos are a Tungusian race. They invaded China in the seventeenth century, and placed their leader's son on the throne of the Celestial Empire, which is still possessed by the Manchoo dynasty. Population, about 4,000,000.

MANCIPIUM, in Roman law, signifies the right of property and of dominion which only Roman citizens could enjoy over their children, slaves, lands, and animals tamed for the service of man. The same word is used to designate the nature, character, and form of the sale by which such property could be transferred. It could take place only between Roman citizens, required the presence of five witnesses and a balance holder (*libripens*), and the use of certain prescribed formulæ. The property which formed the subjects of mancipium was *res mancipi*, and consisted of such things as would naturally form the wealth of an early agricultural people. All other things were *res non mancipi* and property in these passed by mere *traditio* or delivery. The distinction between *res mancipi* and *non mancipi* was abolished by Justinian.

MANDAMUS (Lat. 'we enjoin'), is a writ by which the Court of Queen's Bench, in the name of the reigning sovereign, commands the party to whom it is addressed to do some act in the performance of which the prosecutor, or person who applies for or sues out the writ, has a legal interest, that is, not merely such an interest as would be recognized in a court of equity or in a court of ecclesiastical jurisdiction, but an interest cognizable in a court of common law; the right must also be one for the enforcing of which the prosecutor has no other specific legal remedy. Thus, a copyholder can transfer or alien his customary tenement or estate in no other manner than by surrendering it into the hands of the lord of the manor to the use of the purchaser or surrenderee. The courts of common law formerly took no notice of the right of the surrenderee to call upon the lord for a grant or admittance, and the Court of Queen's Bench therefore left the party to seek his remedy in a court of equity, and would not interfere by granting a mandamus. But the obligation on the part of the lord to admit the surrenderee is not merely an equitable liability, because this mode of transferring property of this nature is founded upon ancient custom, and rights dependent upon custom are matters of common law cognizance. Of late years the Court of Queen's Bench appears to have taken this view of the subject, and has awarded writs of mandamus in all cases where the lord has refused to admit the party to whose use a surrender of the copyhold has been made.

The term 'mandamus' (we enjoin) is found in a great variety of writs, and those usually distinguished by this name by the old law writers are totally different from the modern writ of mandamus, which appears to be nothing more than the ancient 'writ of restitution' enlarged to embrace a great variety of objects, that writ being adapted merely to the purpose of restoring a party to an office from which he has been unjustly removed.

The writ of mandamus is now granted not only to restore a man to an office from which he has been wrongfully removed, but also to admit to an office to which he has been duly elected or appointed.

In order to obtain a mandamus, the applicant lays before the court the affidavit of himself or of others, presenting the facts upon which his right and interest in the thing to be done, and his claim or title to the remedy, are founded. Upon this application, the court can grant a rule calling upon the party against whom the writ is prayed to show cause why such writ should not be awarded. At the appointed time the party so called upon either does not appear, in which case the rule is made absolute, and the mandamus is awarded as prayed, or he appears and resists the rule, either by insisting upon the insufficiency of the facts disclosed by the affidavits upon which the rule was obtained, or by producing other affidavits which give a different aspect to the transaction. If the resistance be effectual, the rule is discharged; if not, the mandamus is awarded.

The writ in the first instance issues in an alternative form, requiring the party to do the act, or to show why he has not done it. The party may make a return to the writ by saying that he has not done the act for such and such reasons. Where the reasons returned are insufficient in law, the court quashes the return, and awards a peremptory mandamus requiring the party absolutely, and without allowing him any alternative, to do the act. Where the answer is apparently sufficient, the mandamus is at an end; and if the statements are untrue, the remedy is by action on the case for a false return, though in order to avoid expense and delay the party is allowed, in some cases, by the Statute 9 Anne, c. 20, and now in all cases, by 1 Will. IV. c. 21, to engraft an action upon the mandamus itself by traversing the return, that is, by putting in a plea contradicting the allegations contained in such return.

By the Common Law Procedure Act, 1854, it is enacted that in any action except replevin and ejectment, the plaintiff may endorse on his writ that he intends to claim a writ of mandamus, and thereupon he may in his declaration claim one, together with any other demand for which the action is brought. It has been held, however, that a party cannot be compelled under this Act to perform a contract entered into by him, but he can compel a company to register him as a shareholder. This Act does not do away with the prerogative writ of the Court of Queen's Bench before alluded to.

MANDARIN, a Portuguese term (from Port. *mandar*, Lat. *mandare*, 'to command') for a member of the Chinese official order of nobility. Mandarins are either civil or military: of the former there are nine classes, of the latter five. They are inferior in rank to the higher class of nobility, whose dignity more nearly resembles in character the British peerage, but form the ministry and magistracy of the country. The Chinese term corresponding to mandarin is *kwan*, which literally means, 'a public character.'

MANDATE, in Roman law, was a consensual contract in which one either by agreement or by tacit assent, undertook to perform some act gratuitously for another. When the service was remunerated the contract was one of *locatio conductio*; when no authority had been given to undertake the manage-

ment of the other's affairs, the act was only one of quasi-contract, and fell under the head of *negotiorum gestio*. A mandatory was responsible for even *levissima culpa*, and was only exonerated when the injury had arisen by *casus fortuitus*. Mandate was terminated either by revocation or by the death of either the mandant or mandatory.

In England mandate is a department of the law of Bailment. In Scotland mandate if accepted by the mandatory is still recognized as a binding contract, and, as in the Roman law, may be constituted either by writing or tacitly. But it has now been almost superseded by agency or factory, which is the employment of another for hire to manage any business as factor for the employer.

In judicial proceedings, when either the pursuer or defender is resident out of Scotland, his opponent is entitled to insist that a mandatory should be sisted in his place, who will be liable for the expenses of the suit if the result is unfavourable to his principal.

MANDELIC ACID (Germ. *Mandel*, 'an almond') is a white crystalline acid produced by the action of hydrochloric acid on oil of bitter almonds. Its formula is $C_{10}H_7O_5 + H_2O$, and it contains the elements of prussic acid and hydruet of benzoyle.

MANDEVILLE, SIR JOHN DE, was born at St. Albans about the year 1300. In 1327 he went to Palestine, where he joined the army of the infidels. He afterwards served in Egypt under the sultan, and in southern China under the khan of Cathay. He resided for three years at Peking, and appears to have travelled over a large part of Asia. After an absence of about thirty-three years, he returned to England, and wrote a narrative of his travels, which he dedicated to Edward III. From the extraordinary character of some of its incidents its author has obtained a proverbial reputation for mendacity. He wrote it first in Latin, then in French, and finally in English. He died November 17, 1371, at Liège, where he was buried. A MS. of his travels, contemporary with the author, is preserved in the Cottonian Library. The first edition printed in England is that of Wynkyn de Worde, at Westminster, 1499. An edition, with introduction and notes by J. O. Halliwell, was published in 1639.

MANDEVILLE, BERNARD DE, was born at Dort, in Holland, about 1670. He took the degree of Doctor of Medicine in Holland, and afterwards practised his profession in London. He does not appear to have had much success as a physician. His first work, 'The Virgin Unmasked, or Female Dialogues betwixt an elderly maiden Lady and her Niece,' was published in 1709. In 1714 he published a short poem, called 'The Grumbling Hive, or Knaves turned Honest,' to which he afterwards added long explanatory notes, recast it in prose, and then published the whole under the new title of 'The Fable of the Bees.' This work, which, however erroneous may be its views of morals and of society, bears all the marks of an honest and sincere inquiry into an important subject, exposed its author to much obloquy; as did also some other works which he wrote. He died January 21, 1733, aged sixty-three.

MANDIBLE (Lat. *Mandibula*, 'a jaw') is applied in Zoology to the lower jaw of mammals, to the upper or anterior pair of jaws of insects, and to both jaws of birds.

MANDIBULATA, the name given by several systematists to a group of insects, the structure of whose mouth is characterized by well-marked jaws or mandibles, and thus distinct from the *Haustellata*, or those with suckers. In the scheme of Stephens, the former includes the beetles, dragon flies, wasps, bees, &c., and the latter, the butterflies, moths, fleas, &c.; these words, however, are now seldom used in Entomology.

MANDINGOES. [SENEGAMBIA.]

MANDIOC, the American name of the Cassava plant, which furnishes the inhabitants of tropical America with a farinaceous food. There are two varieties: one called the sweet, the other the bitter. From the starch of the latter tapioca is prepared by elutriation and granulating on hot plates. This shrub, also known as *Jamipha manihot* (the *Manihot utilisima* of botanists) grows to a height of six feet. It belongs to the natural order of the Euphorbiaceæ, and in its raw state is poisonous.

MANDOLINE, a musical instrument of the lute kind, but smaller, having four strings, which are tuned in the same manner as those of the violin. The mandoline is still met with occasionally in Italy, but has fallen into disuse in most other parts of Europe.

MANDRAGORA, MANDRAKE. [ATROPA.]

MANDRILL. [BABOON.]

MANES, the name given by the Latins to souls separated from the body. The etymology of the word is uncertain; it is generally derived by ancient grammarians from an old word, *manus*, signifying 'good,' probably in the same sense as the Furies were called Eumenides by the Greeks. They were usually identified with the Lares, and so received the name Dii Manes. Public rites in their honour took place in the month of February.

The stones in the Roman burial-places, and their funeral urns, were generally inscribed with the letter D.M.S., that is, *Dis Manibus Sacrum* ('sacred to the Manes Gods'). There are many specimens of such funeral inscriptions in the Townley Gallery, British Museum.

MANETHO, an Egyptian writer, a native of Dióspolis, who is said to have lived in the time of Ptolemæus Philadelphus at Mende or Heliópolis, and to have been a man of great learning. He was a priest, and interpreter or recorder of religious usages, and of the religious and probably also historical writings. It is supposed that there was more than one person of the name of Manetho.

The only work of Manetho which has come down to us complete is a poem, in six books, in hexameter verse, on the influence of the stars (*ἁποτίλισματικὴ*), which was first published by Gronovius, Leyden, 1698, and has also been edited by Axtius and Rigler, Cologne, 1832. There are considerable fragments of a work of Manetho on the history of the ancient kings of Egypt, which was probably written by the Manetho who lived under Ptolemæus Philadelphus. It comprised the period from the earliest times to the death of the last Persian Darius. These are preserved in the treatise of Josephus against Apion. Manetho derived his history of the kings of Egypt, whom he divides into thirty classes, called dynasties, from the sacred records in the temple at Heliópolis.

MANFRED, natural son of the Emperor Frederic VOL. VIII.

II., was appointed by his father at his death, in 1250, regent of the kingdom of the Two Sicilies, until the arrival of his brother Conrad, the legitimate son and heir of Frederic. Upon the death of Conrad, and the reported death of Conradin, his son, Manfred was invited to assume the crown, which he retained by general consent, even after it was discovered that Conradin was still alive. But Manfred had to contend against the see of Rome, by which he was excommunicated. Urban IV. treated Manfred as a usurper, and bestowed the crown upon Charles, count of Anjou, brother of Louis IX. of France. Charles marched an army into the dominions of Manfred, who was killed under the walls of Benevento, 26th February, 1266. Manfred was a warm and enlightened patron of letters, was himself a poet, and is praised by the Neapolitan chroniclers for many great and noble qualities.

MANFREDONIA. [CAPITANATA.]

MANGALORE. [CANARA.]

MANGANESE, a metal first discovered by Scheele and Gahn, about 1774. Its natural compounds are very numerous, and the metal is easily separated from them. Manganese has a grayish colour, and resembles white cast iron in appearance; it is hard, brittle, and has a fasciculated crystalline structure; its specific gravity is 8.013; it is inodorous and tasteless, but when breathed upon emits a smell of hydrogen gas. By exposure to the air, manganese readily tarnishes by oxidizement, and even in a very short time attracts sufficient oxygen to lose its metallic lustre, and falls to a reddish brown powder; hence the necessity for preserving it immersed in naphtha. Even at common temperatures it slowly decomposes water; and at a red heat the decomposition is rapidly effected, and in both cases hydrogen gas is evolved, and oxide of manganese formed.

The ores of manganese are chiefly oxides. The principal among them are—*Hausmannite*, *Braunite*, *Manganite*, *Varvicite*, *Pyrolucite*, *Black Wad*, or *Hydrated Binoxide of Manganese*, *Pailomelane*, *Kobellite*, or *Manganese Blende*, *Arsenüret of Manganese*, *Cupreous Manganese*, *Kohlerite*, or *Carbonate of Manganese*, *Silicate of Manganese*, *Knebelite*, or *Silicate of Manganese and Iron*, *Ullmannite*, or *Phosphate of Manganese and Iron*. Many of these are crystalline; the rest massive.

Oxygen and Manganese combine in five proportions. The protoxide ($O^1 M^1$) is of a light green colour. It undergoes no change by exposure to the air. It is insoluble in water. When heated to 600° , it acquires oxygen, and is converted into red oxide; and sometimes, by exposure to a strong heat, it undergoes combustion as well as oxidation. It combines readily with acids, and dissolves in them, even when dilute and cold, without effervescence; and the solutions are colourless. It is this oxide which is the base of all the common salts of manganese. The red oxide ($O^4 M^3$) suffers no change by exposure to the air, is insoluble in water, and has a reddish colour. The nitric, sulphuric, and hydrochloric acids all decompose it, the two first separating it into protoxide and binoxide; and they dissolve the first and leave the second insoluble. The sesquioxide ($O^3 M^2$) is brown, except when obtained from the nitrate, and then it is nearly black. It is insoluble in water, suffers no change by exposure to the air,

is decomposed by dilute nitric and sulphuric acids, being separated by them into protoxide, which they dissolve, and peroxide, which remains insoluble. The *peroxide* ($O^2 M^1$) is black, or brownish black, unalterable in the air, insoluble in water, decomposed by heat into red oxide and oxygen gas, insoluble in alkalies, unacted upon by nitric acid or dilute sulphuric. Its equivalent is 44. There is a fifth oxide ($O^7 M^4$) forming the mineral *varvicite*.

There are two acids of manganese which are entirely artificial compounds, namely, the manganic acid and per-, or, more properly, the hyper-manganic acid. *Manganic acid* ($O^3 M^1$) has not hitherto been obtained in a separate state; but manganate of potash is easily prepared. It is of a green colour, and has long been known by the name of *mineral chameleon*, on account of the change of colour which the solution undergoes during the process. *Permanganic acid* ($O^7 M^2$) has a fine red colour, and is rapidly decomposed by organic matter, as paper or linen. It bleaches coloured matter; the aqueous solution begins to decompose when heated to 86° , and is totally decomposed at 212° ; oxygen is given out, and binoxide of manganese is precipitated. Its salts are more permanent than the acid, and when heated they yield oxygen gas, deflagrate when thrown on burning charcoal, and detonate violently with phosphorus.

Chlorine and Manganese form two compounds. The *protochloride* ($Chl.^1 M^1$) is a pink-coloured lamellated mass, which attracts moisture readily from the air, and is very soluble in water, forming a solution which is nearly or quite colourless. The *perchloride* ($Chl.^7 M^2$) is a greenish-coloured vapour, which, by cooling to 4° , condenses into a greenish brown-coloured fluid. *Sulphur and Manganese* may be combined by heating a mixture of sulphur and the binoxide, from which results a *sulphuret* ($S^1 M^1$).

According to Berzelius, manganese combines with several other metals, as gold, silver, copper, tin, and iron; with the last-mentioned, combination takes place readily, and the iron is rendered harder, whiter, and more brittle by it; and it is stated that iron which contains manganese is best adapted for making steel. A small quantity of iron causes manganese to obey the magnet, and renders it less oxidable.

The salts of manganese are compounds of very little importance.

Oxide of manganese tinges glass an amethystine colour.

The oxides of manganese, and especially the binoxide, as containing most oxygen, are largely employed in the preparation of chlorine, for the manufacture of bleaching powder, or chloride of lime. The latter is employed in glass-making to correct the yellow colour which oxide of iron is apt to impart to the glass, and in making the black enamel of pottery. Sulphate of manganese is also used to give a brown colour in calico-printing.

Action of Manganese on the Body.—The extensive employment of black oxide of manganese in the preparation of bleaching powder produces in some of the workmen a form of paralysis which should be early noticed, inasmuch as, after it is thoroughly established, it seems altogether incurable, and the only chance of escape is the complete abandoning of the occupation. It is limited to paralysis of the

lower extremities, affecting the motor nerves only, for the sensibility is unimpaired.

Binoxide of manganese has been used internally in pills, and also as a gargle; externally as an ointment in some obstinate cutaneous affections. It does not appear entitled to much attention. Hydrochlorate, and still more sulphate of manganese, deserve attention as chologogue cathartics, or promoters of the secretion of bile. The latter salt has a cooling and bitter taste, resembling that of Glauber salt. It is useful in gout.

MANGANITE, a mineral of a grayish-black colour, which occurs crystallized or massive, with a metallic lustre. It is the hydrated sesquioxide of manganese; and its constituents are manganese, 62.93; oxygen, 20.97; and water, 10.10. Specific gravity, 4.328.

MANGE (Fr. *démanger*, 'to itch'), an eruptive disease to which many domestic animals, and particularly dogs, are subject. It usually occurs as the result of dirt and confinement, bad or deficient food, or some other circumstances producing a generally unhealthy condition.

MANGIFERA, a genus of trees of the natural family of *Terebinthaceæ*, tribe *Anacardiæ*. Three or four species of this genus are enumerated: as *M. fetida* of Loureiro, a native of Cochinchina and the Moluccas; *M. laziflora*, indigenous in Mauritius; and *M. sylvatica*, of Roxburgh, a native of the hilly districts bordering on Silhet, where it grows to a great size. However, the Mango Tree, *Mangifera Indica*, is alone of any consequence, and this as forming one of the most grateful fruits of the tropical parts of Asia. The trees grow to a great size, with an erect trunk and dark-coloured cracked bark. The wood is of a whitish or a dull gray colour, porous, yet pretty durable if kept dry.

MANGLE. [CALENDERING.]

MANGO. [MANGIFERA.]

MANGOLD WURZEL, or **MANGEL WURZEL**, the root of the *Beta vulgaris macroshiza*, is cultivated for the food of cattle, and for its saccharine juice. [BEET.]

MANGOSTEEN, the fruit of the *Garcinia mangostana*, which flourishes in Java and the Molucca Islands, is of the size of an orange, and of a luscious flavour. [GARCINIA.]

MANGROVE. [RHIZOPHORA.]

MANHEIM, or **MANNHEIM**, the capital of the circle of Unter-Rhein, in the grand duchy of Baden, is situated in $49^\circ 29'$ N. lat., $8^\circ 28'$ E. long., in a very fertile plain, at the junction of the Neckar with the Rhine, and had, in 1861, 27,172 inhabitants. Over both rivers there are bridges of boats. Mannheim is built with great regularity; it consists of several squares and of broad straight streets that cross each other at right angles. The town has quite a modern air, having been almost entirely reconstructed since the close of the last century, when the French were obliged to surrender it to the Austrians after a bombardment which laid the greater part of it in ruins. The principal street leads from the Neckar Gate to the palace of the grand duke, built in 1720, which is a very magnificent edifice, and one of the finest of the kind in Germany. The right wing contains a gallery of pictures, a cabinet of natural history, a collection of plaster casts of the

most celebrated antiques, and a library of 60,000 volumes. Manheim has also several Lutheran and Roman Catholic churches, an observatory, and a botanic garden. The fortifications having been entirely demolished by the French, and the site subsequently converted into gardens, the inhabitants enjoy the benefit of beautiful promenades, besides the fine park of the palace, which is nearly 200 acres in extent. There are manufactories of tobacco, shawls, linen, and playing cards, besides bleaching-grounds and tanneries. There is an active trade by the rivers and railways; the latter connecting it with the chief towns of Germany.

MANICHÆANS, an heretical Christian sect, who derived their name from Mani, as he is called by the Persians and Arabians, or Manes or Manichæus, according to the Greek and Roman writers. This sect arose about the end of the third, or the beginning of the fourth century of the Christian era. The Manichæans believed, like the Magi, in two eternal principles, from which all things proceed; namely, light and darkness, which are respectively subject to the dominion of two beings, one the god of good, and the other the god of evil; and also that those souls which obeyed the laws delivered by Christ, as explained by himself the Comforter, and which struggled against the lusts of a corrupt nature, would, on their death, be delivered from their sinful bodies, and ascend to the regions of light; but that those souls which neglected to struggle against their corrupt natures would pass after death into the bodies of animals or other beings, until they had expiated their guilt. The doctrines of the sect were contained in four works, said to have been written by Mani himself, which were entitled respectively 'Mysteries,' 'Chapters,' 'Gospel,' and 'Treasury;' but we know little or nothing of their contents.

The Manichæans never appear to have been very numerous, but were spread over almost all parts of the Christian world. Much valuable information concerning this sect may be found in the writings of Augustine, who was for nine years a zealous supporter of their doctrines.

The Paulicians are generally considered to be a branch of the sect, and are supposed to have first appeared in the seventh century in Armenia. They continued to exist till a very late period in ecclesiastical history. In the eleventh and twelfth centuries the doctrines of the Paulicians were introduced into Italy and France, with considerable success.

MANIFESTO. The name given to documents issued by kings or governments on very special occasions, such as the declaration of war; in which case it generally sets forth the reasons which have induced a government to decide on such a course.

MANIFOLD WRITER. [COPYING MACHINE.]

MANILIUS, MARCUS or CAIUS, a Latin poet, who wrote a work on astronomy, called 'Astronomicon,' in five books. It is the opinion of Bentley that he was born in Asia, and lived in the time of Augustus Cæsar.

The 'Astronomicon' does not appear to be complete. The five books which are extant treat principally of the fixed stars; but the poet promises in many parts of his work to give an account of the planets. The 'Astronomicon' contains several passages which are not unworthy to be compared

with some of the best writings of the Augustan age; but the subject gave the author little opportunity for the exercise of his poetical powers. The best editions are by Bentley, London, 1739, and Stoeber, 1767. It has been translated into English verse by Creech, London, 1700.

MANILLA. [PHILIPPINES.]

MANIOC or MANDIOC. [CASSAVA.]

MANIPULATION, in Chemistry, embraces every part of the subject which is of a mechanical nature, such as the operations of weighing, measuring, the application of heat and electricity, the various modes of effecting solution, precipitation, distillation, and sublimation, and, in fact, every step in chemical research includes manipulation. The whole subject is treated in Faraday's 'Chemical Manipulation.'

MAN'LII, the name of one of the most illustrious patrician *gentes* of ancient Rome. Those most worthy of notice are:—

1. *Marcus Manlius Capitolinus*, who was consul B.C. 392 (Liv. v. 31), and was the means of preserving the capitol when it was nearly captured by the Gauls (Liv. v. 47), from which he obtained his surname. He afterwards became a warm supporter of the popular party against his own order, in consequence of which he was accused of aiming at the kingly power. The circumstances attending his trial and death are involved in much obscurity. It would appear that he was accused before the centuries and was acquitted; and that afterwards, seeing that the patrician party were determined on his destruction, he seized upon the capitol, and prepared to defend it by arms. In consequence Camillus, his personal enemy, was appointed dictator, and the *curiæ* (i.e., the patrician assembly) condemned him to death. (Niebuhr, 'Roman History,' vol. ii., p. 610, 611, Engl. transl.; Liv. vi. 11, 14, 20.) Manlius was thrown from the Tarpeian rock, B.C. 384.

2. *Titus Manlius Capitolinus Torquatus*, son of L. Manlius, surnamed Imperiosus, who was dictator B.C. 361. In the following year Manlius distinguished himself by slaying in single combat a Gaul of gigantic size on the banks of the Anio. In consequence of his taking a chain (*torques*) from the dead body of his enemy, he received the surname of Torquatus, by which he is best known.

Manlius filled the office of dictator twice, and he was consul at least three times. In his third consulship he defeated the Latins. In the same campaign he put his own son to death for having engaged in single combat with one of the enemy, contrary to his orders.

3. *Titus Manlius Torquatus* was consul B.C. 235, and obtained a triumph on account of his victories in Sardinia. In his second consulship, B.C. 224, he conquered the Gauls. The temple of Janus was closed during his first consulship, one of the few occasions in Roman history.

4. *Cneius Manlius Vulso* was consul B.C. 189, and appointed to the command of the war against the Gauls in Galatia, whom he entirely subdued. An account of this war is given by Livy (xxxviii. 12–17), and Polybius (xxii. 16–22).

MANNA, the concrete juice of the *Ornus Europæa* and *Ornus rotundifolia*, two species of ash which are natives of the south of Europe, growing abundantly in Sicily, Calabria, Apulia, &c. The juice

exudes spontaneously in warm dry weather, and concretes upon the bark of the tree; the finest manna is, however, procured by making longitudinal incisions of about three inches long. The manna flows at first in the form of a thick juice, which gradually concretes. The finest kind is called Calabrian or flake manna; it is in pieces of a pale yellowish white colour, is light, rather dry, and brittle, and it bears frequently the impression of the branch on which it concretes. It has a slight peculiar odour, and a sweetish taste, mixed with a slight degree of bitterness, and altogether leaves a disagreeable impression. Although it has a composition not unlike sugar, it is not fermentable.

Manna is employed as a gentle laxative, for children or persons of weak habits. It is, however, seldom exhibited alone, but as an adjunct to more active medicines, as senna, rhubarb, &c.

Besides the genuine manna above described, sweetish secretions are exuded by some other plants, chiefly tropical, which are usually considered to be kinds of manna. Manna belongs to the same series of vegetable bodies as sugar, and like that compound is widely distributed in the vegetable kingdom. The quantity of manna imported into the United Kingdom in 1864 was 25,144 lbs.; value, 29377.

MANNA CROUP, or MANNA GROATS, a preparation made in Russia from the hard wheats of Odessa and Taganrog. It is much used for puddings, and is precisely similar to the Italian macolina. [MACARONI.]

MANNYNG, ROBERT, is more usually called Robert de Brunne. He owes this name to his having been a Gilbertine canon in the monastery of Brunne or Bourne in Lincolnshire. He lived in the reigns of Edward I. and his successor, and was the writer of one of the earliest of the Metrical Chronicles whose language can be called English. His work, however, is merely a translation from the French. It is in two parts: the first translated from the 'Brut d'Angleterre' and 'Roman de Rou' of Wace and Gaimar, begins with Æneas and ends with Cadwallader; the second, from Cadwallader to Edward I., is translated from the Chronicle of Peter Langtoft. The entire work was completed about 1388.

MANOMETER (from two Greek words signifying 'thin' or 'rare,' and 'a measure') is the name given to instruments which measure the rarity of the atmosphere, or other gases. The most convenient manometer, and consequently that in most general use, consists of a siphon barometer, the basin of which is inclosed air-tight in a globular or other conveniently shaped vessel, furnished with a number of cocks, by means of which, and the pneumatic pump, the contained gas may be removed, and other gases successively substituted in its place. If equal parts by weight of different gases be thus successively introduced, they will not be affected by any change which may take place in the surrounding atmosphere except in so far as such change may affect their temperature; so that, providing the temperature remain constant, the relative tensions of these gases will be accurately measured by the weight of the mercurial column suspended in the longer arm of the barometer above the level of the mercury in the basin, care being taken to allow for any variation in the capacity of the receiver, arising from alteration in the level of

the mercury in the basin, and likewise for the small tension always indicated by the barometer immediately previous to the introduction of a fresh gas, arising from the impossibility of forming a perfect vacuum.

MANOR (*Manerium*). At the time of the Norman Conquest *manerius* or *manerium* (from *manere*, 'to dwell') denoted a large mansion or dwelling. The modern English manor derives its origin from subinfeudation, as it existed before the modifications of the system of tenures introduced in 1225 by Magna Charta, and the still more important alterations made in 1290 by the statute 'Quia Emptores,' and in 1324 by the statute 'De Prærogativâ Regis,' by which statutes the granting land in fee simple, to be held by the grantee as a tenant or vassal to the grantor, was stopped.

Where a subinfeudation made by A to B extended to the whole of A's land, nothing remained in A but a seigniorship with the ordinary feudal incidents of tenure, and such rents or other services as were reserved. This interest in A was a seigniorship in gross; that is, a seigniorship held by itself, unattached to any land, an incorporeal seigniorship, termed by the French feudists '*un fief en l'air*.' But in the case of subinfeudation of part of the land, the ordinary mode of proceeding was this:—A, a large proprietor, having a mansion and land at Dale, created a subtenure in a portion of his land by granting such portion to B and his heirs, to hold of A and his heirs, as of A's *manerium* (mansion) of Dale, which words created an implied condition that B should perform the service of attending, with the other tenants of A holding by virtue of similar subinfeudations, at A's halmote of Dale, that is, at A's court-meeting in the hall of A's mansion at Dale (afterwards called A's court-baron of his manor of Dale), for the purpose of deciding judicially all disputes among A's free tenants holding of him by the same tenure as B, in respect of their lands so holden, and also all actions brought by persons claiming such lands.

Upon this subinfeudation being effected, A would continue to be the owner of the mansion of Dale, and of that part of the land of Dale of which he had made no subinfeudation in *demesne* (in *dominio suo*), as his own immediate property; and he would have the seigniorship of lands of which B and others had been subinfeoffed, as a seigniorship appendant or legally annexed to the mansion of Dale, and to the *demesnes* of Dale, of which the mansion formed part.

This conjoint or complex estate, taking its denomination from the mansion (*manerium*), which was considered as its head, by degrees acquired the name of *Manerium* or *Manor*.

A Manor then *originally* consisted of lands in *demesne*, upon which the lord had a mansion, and to which lands and mansion, and more especially to the mansion, there was appendant a seigniorship over freeholders qualified in respect of quantity of estate (i.e., by a tenancy for life at the least, if not a tenancy in fee-simple), and sufficient in point of number to constitute a court-baron. These freeholders were called *vasavors*, and their lands '*tenemental lands*,' i.e., lands granted out in tenure, to distinguish them from the lord's *demesnes*. These *tenemental* lands, anciently known by the denomination of *vasavories*, though held of the manor and within

the seigniori (or, as it was usually termed, within the fee) of the lord, were not considered as part of the manor; but the services issuing from such tenemental lands were part of the manor and essential to its existence.

Afterwards it was sufficient if the site of a mansion, at which the services had been reserved, formed part of the demesnes; and at last, this vestige of the origin of the name of the estate was dispensed with, and if the lord retained any portion of the land, so that there would be some demesnes to which the seigniori over the freehold tenants of the manor, and the services rendered by them, might continue to be appendant, the compound estate called a manor was not dissolved, whether it could be shown that a mansion had ever stood on the part of the demesnes or lands retained or not, and even if the lord had aliened and severed from his demesnes the spot on which the mansion had once stood.

A Manor is commonly said to consist of demesnes and services, which have been called the 'material causes;' but other things may also be members and parcel of a manor.

Manors in Ancient Demesne are those manors which, though now mostly in the hands of subjects, formed part of the royal domain at the time of the Conquest, and are designated in Domesday as 'terra regis.'

MANOR-HAMILTON. [LEITRIM.]

MANOSQUE. [ALPES, BASSES.]

MANRESA. [CATALUÑA.]

MANS, LE, the capital formerly of the province of Maine, now of the department of Sarthe in France, stands on the right bank of the Sarthe, here crossed by three bridges, in 48° 0' N. lat., 0° 11' E. long., at a distance of 132 miles S.W. from Paris, and has 37,209 inhabitants. The cathedral of St.-Julien, famous for its choir and painted windows, and dating from the thirteenth century, contains the tomb of Berengaria, Cœur-de-Lion's queen. The church De-la-Couture, which dates from the twelfth century, and that of Notre-Dame-du-Pré, from the eleventh century, are very remarkable buildings. Le-Mans is partly inclosed by Roman walls. It has a town-hall, prefecture, theatre, two hospitals, museum, communal college, and a public library of 45,000 volumes. It gives title to a bishop. The manufactures consist of coarse woollens, lace, honey, wax candles, linen, soap, hosiery, blankets, woollen yarn, paper, and leather. There are also marble works and bleach mills. The town is noted for its poultry, of which it sends a large supply to the metropolis.

Le-Mans was the birth-place of Henry II., the first of the Plantagenet kings of England. The last struggle between the French republicans and the Vendean forces took place here in 1793. (*Dictionnaire de la France*.)

MANSARD, FRANÇOIS, was born at Paris in 1598. At the age of twenty-two he distinguished himself as an architect by his restoration of the Hôtel Toulouse; and a short time afterwards he was commissioned to execute the portal of the church of the Feuillans, in the Rue St. Honoré. From this time he was much employed. The Château des Maisons is considered his *chef-d'œuvre* among his mansions, and of his churches the most noted is that of the Val de Grace at Paris, but none of his works

are in a pure style of architecture. He died in 1666. He is said to have been the inventor of the curb roof, called after him a *Mansard*, which consists of two planes on each side, a steeper one below and a flatter one above, and admits of an attic being lodged in it.

MANSARD, JULES HARDOUIN, a nephew of the preceding, was born in 1645. He was brought up by François to his own profession, in which he afterwards became very celebrated. He was the architect of Versailles, which Sir C. Wren has described as 'mere heaps of littleness.' After Versailles, the work which has chiefly contributed to his reputation is the dome of the church of the Invalides at Paris. He died in 1708. His somewhat partial biographer, Quatremère de Quincy, admits that he had 'une certaine médiocrité de goût.'

MANSE, in Scottish law, originally meant a determinate quantity of ground, the extent of which is not known, fit either for pasture or tillage, set apart for the use of the clergyman of every rural parish. The term is now applied to the dwelling house, including stable, byre, barn, and other offices to which he is entitled by law; the portion of land with which he is also provided being called his glebe. Ministers of parishes within the bounds of royal burghs are not entitled to manses; but where the parish is partly rural and partly burgh royal, the heritors are bound to provide him with a manse. The burden of erecting and supporting the manse lies upon the heritors who are the proprietors of lands within the parish. By the Act 1663, c. 21, the expense of building the manse is limited to a maximum of 1000*l.* Scots (83*l.* 6*s.* 8*d.* sterling), but this statute is no longer in observance. On the completion of the building the heritors may apply to the presbytery of the parish, who upon visitation will pronounce the manse a free manse, the effect of which is to oblige the minister to keep the manse in tenantable condition during his incumbency. When a manse stands in need of additions and repairs, or when a new manse is required, the minister may petition the presbytery to have the same examined; and after consideration of plan and estimates, the presbytery will grant decree against the heritors for the sum necessary for the required alterations.

Over and above their proper stipend clergymen of rural parishes are entitled to four acres of arable land in name of glebe, and to grass for a horse and two cows as grass glebe.

MANSFIELD. [NOTTINGHAMSHIRE.]

MANSFIELD, WILLIAM MURRAY, EARL OF, was born in the ancient palace of Scone, on the 2nd of March, 1705. He was the fourth son of Andrew Viscount Stormont. At the age of three he was removed to London, and in 1719 he was admitted a king's scholar at Westminster school. On the 18th of June, 1723, he was entered at Christ Church, Oxford, where, as before at Westminster, he distinguished himself by his classical attainments, Having taken his degree of M.A. he left the university in 1730, and after travelling some time abroad he was called to the bar in Michaelmas Term, 1731. It appears that he got into some practice soon after being called to the bar. In 1743 he was appointed solicitor-general, and obtained a seat in the House of Commons, where his eloquence and legal knowledge soon acquired considerable influence. Murray

and Pitt (Lord Chatham) were opposed to each other as the best speakers of their respective parties.

In 1754 Mr. Murray was made attorney-general, and in 1756 received the appointment of chief-justice of the King's Bench, and was immediately created a peer, by the title of Baron Mansfield, of Mansfield in the county of Nottingham. On his elevation to the seat of chief-justice, Lord Mansfield, contrary to the general usage, became a member of the Cabinet.

In the riots of 1780 Lord Mansfield's house in Bloomsbury Square was attacked and set fire to by the populace. His library of books and MSS., his private papers, pictures, furniture, and other valuables were all consumed. Though the Treasury, in pursuance of a vote of the House of Commons, applied for the particulars and the amount of his loss, with a view to compensation, his lordship declined returning any account of it, lest, he said in his letter to the Treasury, 'it might seem a claim or expectation of being indemnified.'

After having presided for upwards of thirty years in the Court of King's Bench, he retired in 1788. He died on the 20th of March, 1793, in the eighty-ninth year of his age. The last words he was heard to utter were: 'Let me sleep, let me sleep.' He left no issue. The earldom of Mansfield, which was granted to him in 1776, descended to his nephew, Viscount Stormont. A monument by Flaxman was erected to his memory in Westminster Abbey.

Lord Mansfield's acute and powerful intellect enabled him to take a clear and comprehensive view of every case. The depth of his legal learning has been questioned; probably not without reason. He showed the greatest ability in improving by his judicial decisions various branches of commercial law. In matters of religion he was tolerable both in Parliament and on the bench. He was undoubtedly a man of great abilities and enlarged views, and for this very reason less adapted than some judges to expound those technicalities which mark the deviation of English law from the standard of general jurisprudence.

MANSLAUGHTER. [MURDER.]

MANTEGNA, ANDREA, was born at Padua in 1431. His parents were in humble life. He was a pupil of Francesco Squarcione. His chief residence and his school were at Mantua, where he settled under the patronage of the Marquis Lodovico Gonzaga, but worked occasionally at other places, especially Rome. 'The Triumph of Julius Cæsar' was purchased by King Charles I. from the Gonzaga family among other pictures. This, his greatest and most esteemed work, consisting of nine tempera pictures, each 9 feet high and 9 feet wide, is now at Hampton Court. Unhappily it was coarsely painted over by Laguerre, in the time of William III. Mantegna died at Mantua on the 13th of September, 1506.

MANTES. [SEINE-ET-OISE.]

MANTIDÆ, a family of orthopterous insects, the principal genera of which are, *Heteronytarsus*, *Eremiophila*, and *Mantis*.

The Mantidæ are found in all warm countries, are exceedingly numerous, and remarkable for the grotesque forms which they usually assume. Their resemblance to a portion of a plant is often so great, that it is only by their motions they can be discovered. The names *religiosa*, *precaria*, *sancta*, &c., have been

applied to certain species on account of a peculiarity in their habits—that of erecting the thorax at an angle with the body, and placing together the large fore-legs, like the hands of a person when at prayer; in this position they will sometimes remain perfectly motionless for several hours. Their food consists of flies and other insects, which they are exceedingly dexterous in catching by means of their fore-legs; the prey is held by the fore-leg by bending back the tibia against the femur; the opposing surfaces of these two portions of the legs being covered with spines, enables them to retain their prey in this manner, and to convey it to the mouth.

The eggs, deposited by the female *Mantis* upon plants, are covered by a glutinous substance, which soon hardens into a kind of case, where they are arranged in a symmetrical manner. The form of the case varies according to the species. The young, when hatched, resemble the parents, except in size and in being destitute of wings.

MANTINEIA was situated in the east part of Arcadia, in an elevated plain of considerable extent, which was bounded on the north by the plain of Orchómenus, and on the south by that of Tégea. The Mantineans had a democratical form of government, and were closely connected with Argos.

In B.C. 385 the Spartans took Mantinea and destroyed the city. After the battle of Leuctra, the Mantineans rebuilt their city; and it was in the vicinity of their town that the battle was fought, B.C. 362, between the Spartans and Thebans, in which Epaminondas fell. Mantinea, in later times, joined the Achæan league. Pausanias, who visited this city in the second century, describes it as a large and flourishing place, and has devoted a considerable part of his eighth book to a description of its works of art.

The ruins of Mantinea, now called *Paleopoli*, are still considerable. The walls are nearly entire.

MANTLET, a temporary fortification to protect gunners from the bullets of the enemy. It is made so that it may be hoisted while aim is being taken, and then lowered so as to cover the whole opening in the embrasure, casemate, or port-hole, except a small aperture for the muzzle of the gun. They are generally made of solid planks of wood or iron plates; but during the late Crimean war the Russians constructed some very skilful ones of plaited rope. Mantlets have become more used than ever of late years, in consequence of the precision and length of range of the modern rifles.

MANTUA (or MANTOVA), a city of great historic importance in northern Italy, twenty-two miles S.S.W. of Verona, stands on an island about five miles in circumference, in the middle of a lagoon formed by the Mincio, and is joined to the mainland by causeways, the shortest of which is about 1000 feet in length. The town is regularly and very strongly fortified. It is well built, with wide streets and squares, and contains many handsome structures. The principal buildings are—the cathedral, one of the finest in Italy; the church of Sant-Andrea; the churches of San-Maurizio and San-Sebastiano; the house of Giulio Romano, whose works as a painter and an architect form the greatest glory of the city; the church of Santa-Barbara, rich in paintings; the public library of 80,000 volumes, and the museum,

in which is a valuable sculpture gallery; the ducal palace, an old vast irregular structure, partly rebuilt and decorated by Giulio Romano, which contains some good paintings; the *Palazzo Vecchio*, in which Napoleon I. held his court; several convents, a Jew's synagogue, civil hospital, two orphan and one Jew's asylums; arsenal, cavalry barracks, theatre, sculpture gallery, and the gates and bridges of Mantua, especially the gate dei Mulini, by Giulio Romano. A palace outside of the town, called Palazzo del Tè, was originally intended for stables for the dukes Gonzaga, but under the direction of Giulio Romano it grew into a vast palace. There is a good fresco there. The town of Mantua contained in 1862, 29,884 inhabitants, 2500 of whom are Jews, whose commercial intercourse and social privileges are more extensive in this city than in any other in Italy.

Mantua has a lyceum, gymnasium, academy of fine arts, several scientific and literary institutions, botanic garden, and numerous collections in science and art. From its situation, the place is extremely unhealthy. The manufactures comprise silk, linen, and woollen fabrics, paper, cordage, leather, and parchment. Virgil was born at Andes, (now Pietole,) 3 miles S.E. of this city.

After the conquest of Italy by Charlemagne in the eighth century, Mantua became the capital of a republic. It then came into the possession of the dukes of Gonzaga, to whom it belonged till it fell to Austria in 1708. It was taken by Napoleon I. in 1797, and was the capital of the French department of the Mincio till 1814. The greater part of the province of Mantua was given over to Italy in 1859; and the city itself will, as one result of the recent war, now form a part of the Italian kingdom (August, 1866).

MANTUA'NO, the common name of a family of artists of Mantua, of the sixteenth century. The proper name appears to have been *Ghisi*, but few particulars regarding the lives of its members are known. *Giovanni Battista*, called *Giovanni Mantuano*, and also Bertano, was painter, sculptor, engraver, and architect. He wrote a commentary on Vitruvius, which is dated 1558. *Giorgio Ghisi*, called *Giorgio Mantuano*, was born at Mantua about 1520. He was a painter and an engraver, and was still living in 1578. Bartsch describes 129 prints by *Adamo Ghisi*, called also *Mantuano*; and 46 by *Diana Ghisi*, called *Mantuana*. Those of the former are dated from 1566 to 1576, and those of Diana from 1575 to 1588.

MANUAL ALPHABET. [DACTYLOLOGY.]

MANUEL, NICOLAUS, was born at Berne in 1484. He is the Emanuel Tedesco who studied under Titian at Venice about 1511, and he became celebrated for a series of forty-six pictures (probably in distemper) of the Dance of Death, *Totentanz*, painted in fresco between 1514 and 1522, in the cloister of the Dominican convent at Berne, destroyed long since, but of which the compositions have been preserved in prints and copies. He also produced various popular poems and songs in the Swiss dialect, full of humour and satire. His 'Fastnachtspiele,' or Dramatic Moralities and Mysteries, which he began to compose about 1522, are marked by the same qualities. He died in 1530. An elaborate memoir of him was published in 1837 by Dr. Grüneisen.

MANUEL, FRANCISCO, was born at Lisbon

in 1734. His first study was music, but he afterwards devoted himself entirely to literature, and more especially to poetry. His odes to D'Albuquerque and Washington are deservedly admired. His liberal opinions brought upon him the hostility of the Inquisition, but he saved himself by flying to Paris in 1788; in which city he resided till February 25, 1819, when he died.

MANUMISSION. [LIBERTINUS.]

MANURA, or MENU'RA, Dr. Shaw's and Dr. Latham's name for a single genus of birds, whose place in the system has occasioned some differences of opinion among ornithologists.

Two species only are known, viz., *Manura superba*, *M. lyra*, or *lyrata*, Shaw, Latham; *M. paradisea*, Vieill.; *M. Novæ Hollandiæ*; and *Manura Alberti*, discovered in 1850, and named by Mr. Gould in honour of the late prince consort. The *Manura*, or Lyre-bird of Australia, is, it must be confessed, a remarkable species; and we cannot wonder that some have placed it in the Insectorial order, near the Thrushes and Orioles (Temminck, Cuvier), while others have regarded it as a rasorial or gallinaceous bird (Vieillot, Vigors, Swainson, and others).



Lyre-bird (*Manura superba*).

The *Manura* is decidedly not rasorial. It is a song-bird, in some respects, notwithstanding its size, allied to the wrens; in other respects to the thrushes, or Brèves (*Pitta*). Mr. Gould makes the *Menurinae* a sub-family of the *Sylviadæ*, and we believe him to be correct in his opinion.

Speaking of the genus *Manura*, Mr. Gould says, 'It might have been expected that the various explorations which have of late years been made into the previously unknown regions of Australia would have led to the discovery of some additional species of this genus, or of some new form more nearly allied to it, than those with which it is associated; but nothing of the kind has occurred. This remarkable bird is not only confined to Australia,

but exclusively to the south-eastern part of the country. I regret to say that I have not been able to gain any further information respecting its nitrification, although I have urged many persons in Australia to pay particular attention to the subject.

MANURES. Under this name we include every substance used to amend the soil, or to restore to it some particular principle or ingredient which has been exhausted in the course of cultivation. According to their respective modes of action manures may be divided into mechanical, chemical, and physiological, though many rank at once under all these heads. A mechanical manure, or 'amender,' serves merely to improve the texture of the soil, so as to render it more compact, or if needful, more permeable to moisture, air, and the root-fibres of the plants. Thus sand or coal ashes added to a stiff clay, and clay or marl mixed with a soil of loose sand or of peat, are instances of mechanical manures. Their value when judiciously applied is extremely great, since no matter what may be the chemical constitution of the soil, it cannot be fruitful if so light as to allow moisture to escape too rapidly, and permit the roots of the plants to be loosened by the wind; or if, on the other hand, it allows water to stagnate in its texture. When a soil is in fine mechanical condition it will not bake together after being wet, and when dried will rapidly gain weight by condensing watery vapour and gases in its pores.

Chemical manures supply to the soil some necessary ingredient or ingredients, either naturally wanting or which may have been removed by the crops cultivated. Upon the use of this class of manures great light has been thrown by two principles established by Liebig, Boussingault, and other modern inquirers:—firstly, that the food of plants, like that of animals, is *specific*, one kind preferring what another rejects; and secondly, that all the substances removed annually from a field by the crops should be restored to it by the manures applied. In illustration of the specific character of the food of plants we may mention the fondness of the onion, lily, tulip, &c., for compounds of soda; lime, which is indispensable to the rose, the carnation, clover, &c., is poison to rhododendrons, azaleas, heaths, &c.

In compensating a field for the losses caused by any particular crops, the attention of the agriculturist is mainly turned to those substances in which soils are ordinarily poorest, *i.e.*, to phosphoric acid, to combined nitrogen (salts of ammonia, or of nitric acid, or organic nitrogenous matter capable of conversion into the former), and in a less degree to soluble silica, and the salts of potash. Not that these substances are more essential to vegetable life than carbonic acid, water, salts of soda, lime, magnesia, iron, &c., but being less plentiful they are most readily exhausted.

Physiological manures—a class as yet little understood—neither amend the texture of the soil nor supply any ingredient which would otherwise be wanting, but yet exercise a distinct beneficial influence upon vegetation. Thus turnips experimentally treated with oil have grown to an enormous size. Yet oils contain merely carbon, hydrogen, and oxygen—substances of which plants have an unlimited supply. We can only, therefore, conclude that manures of this class enable vegetables to assimilate nutriment

to a greater extent than is possible without their help.

Amongst manures the first place belongs to **GUANO**. The mixtures known as superphosphates, and prepared chiefly from **BOXES**, coprolites, &c., are also of great importance. Their value depends mainly upon the soluble biphosphate of lime, along with neutral phosphate in a fine state of division. Excellent manures are also prepared from blood, refuse fish, glue-maker's waste, hair, horn-shavings, and leather scraps, rendered soluble by means of sulphuric or hydrochloric acid. The crude sulphate of ammonia and the nitrate of soda are valuable sources of nitrogen, as are also, in a lower degree, oil-cake and soot.

The dung and urine of domestic animals, though of far less value than most of the above, must always play an important part in agriculture. Unfortunately they are often collected and stored in such a negligent manner that their best constituents are wasted. Their soluble parts are allowed to be washed away, whilst the ammonia escapes in vapours. Dung heaps should always be screened as much as possible from the sun and wind, as also from rain, and should be placed where their drainage may be secured for use. If sprinkled from time to time with sulphuric acid diluted with 100 times its weight of water, much waste will be prevented. So large a proportion of farm-yard manure consists of water and other comparatively useless matter, that 100 tons are only equal in efficiency to from seven to eight tons of good guano. Night-soil is a more powerful manure, when not mixed with cinders and similar rubbish. As a top-dressing for pastures it is objectionable, as it gives to the grass a flavour offensive to cattle. As prepared and dried in France under the name of *poudrette*, it has about ten times the value of ordinary farm-yard manure. The sewage of towns contains a vast quantity of fertilizing matter, such as urine, soap-suds, and many other kinds of refuse, domestic and manufacturing. The whole, however, is so largely diluted with water that its agricultural application is a yet unsolved problem, except where lands lie below the town in a situation adapted for irrigation. Charcoal, whether of bones, wood, or peat, is a valuable addition to manures, on account of its property of absorbing and retaining in its pores gases and vapours. Unburned peat possesses a similar property, and where accessible, is a valuable manure for sandy and calcareous soils, to which it imparts an increased power of retaining moisture. Ashes are often useful. Those of wood, peat, and weeds, yield a considerable amount of the salts of potash. Sea-weeds form a useful manure for many crops, especially flax and hemp. One load of sea-weed is considered equivalent to about four of farm-yard manure. Lime acts in various modes. It yields direct nourishment to vegetation; it promotes the decomposition of organic matter; it liberates silica from some of its combinations; and decomposes and renders insoluble any salts of iron. Wherever the drainage of the land deposits, on exposure to the air, a yellowish-brown ochreous scum, a very liberal application of lime is requisite. It should never be used along with or shortly after guano, blood manures, soot, or ammoniacal salts. Lime is rendered more valuable if slaked with brine

instead of water. Common salt and sulphate of soda in moderate doses are beneficial to rape, colza, cabbages, turnips, and also to the potato. The amount should not exceed $1\frac{1}{2}$ cwt. per acre. Granite roasted in a reverberatory furnace with lime is a valuable dressing for vineyards and tobacco grounds, on account of the potash which it yields. Sulphate of iron, commonly called copperas, ordinarily renders lands barren, but under peculiar circumstances it has had, in small quantities, a salutary effect upon vegetation.

Manures, like the food and medicines given to animals, require to be administered with judgment. Those intended to ameliorate the texture of the soil and effect any kind of decomposition in its ingredients should be added a considerable time before the ground is planted, in order that they may have full scope to perform their function. Rich nitrogenous manures, especially if volatile, should be given only when moisture is plentiful, and when a vigorous vegetation can at once appropriate the nourishment placed at its disposal. To dress the land with guano, sulphate of ammonia, or soot, in dry windy weather is utter folly. The richer manures when administered to growing crops are best given in a state of solution. They are thus presented at once in an available form to the fibrils of the roots, and are secured against lying useless upon the soil. In no other method can grass lands be so efficiently top-dressed. It must, however, be admitted that the use of liquid manures is better adapted to a dry climate than to Britain, where in ordinary seasons the amount of rain bears an excessive proportion to the temperature.

The prepossession of agriculturists in favour of manures which benefit the land for several successive seasons, is, commercially speaking, a mistake. The sooner the farmer gets back a return for his outlay upon manure the better. Instead of spending a large sum upon some manure the returns from which will be spread over a period of three or four years, it is surely better for him to spend annually a smaller sum, and receive his total return thereupon in the same season.

It is a matter of national reproach that even in the present day an immense quantity of the elements of fertility are allowed to go to waste, and even to become nuisances. The Chinese, whom we despise, are so careful of everything capable of acting as manure that they even collect the cuttings of their hair and beards. It may startle the unreflecting to find that the hair-cuttings and nail-parings of our population, which are generally burned, are equal in annual agricultural value to more than 200,000 tons of farm-yard manure.

MANURING, in Horticulture, requires to be viewed in a different light from the same process as applied to agricultural purposes. The species which the farmer cultivates are few in number, whilst the gardener has to deal with many hundreds from the most different climates. Many of the kinds he plants, besides, are perennial, so that he cannot take advantage of the principle of rotation. Hence, from the greater complication of the subject, the application of chemistry to gardening is incomparably more difficult, and brilliant results are obtained apparently in defiance of theory. Thus though the division of plants into classes in accordance with the specific

character of the nourishment they require must hold good in the garden as well as in the field, yet we find composts recommended for different flowers by florists of skill and eminence, in which these distinctions are totally ignored. In fact, the mechanical texture, rather than the chemical composition of the soil, is the main object of the gardener. Porosity, the power of condensing air and watery vapour, together with the inability to retain stagnant water and to bake into a stiff mass, are the properties at which he aims. This he effects in a majority of cases by a liberal use of *loam*. This substance is not the mixture of sand and clay which the farmer understands by the same name. It consists of sods from an old pasture, piled up in heaps, and allowed to remain until the more active phase of putrefaction is over. Of course it contains a large amount of matter in a merorganic, or semi-organized state. Other ingredients used along with, or instead of loam, are the mould resulting from the decay of leaves, heath mould, peat, and cocoa fibre. It can scarcely, however, be doubted that if the florist were, in addition to his care for the texture of the soil, to attend to its chemical composition, he would achieve results still more splendid. This to some extent is already done. We have heard of cultivators of roses who find great advantage from supplying their favourites with lime. The success of the Dutch as cultivators of bulbs arises in part, doubtless, from the fact that their soils are impregnated with salts of soda, resulting from the reaction of sea-water upon the matter brought down by the rivers.

Guano, soot, soap-suds, the sulphate and nitrate of ammonia, soda-ash, and other chemicals, are not unfrequently used in the garden with satisfactory results. Occasionally, however, failures of an unexpected nature occur. Thus the superphosphate of lime, so beneficial to the turnips as a field crop, is found totally useless if applied to early turnips in the garden. Stone-fruits and conifers are injuriously affected by animal manures, or in fact by any kind except decayed leaves. Lime in every form is most pernicious to heaths, rhododendrons, azaleas, &c. The orchidaceous plants, which derive a great part of their support from the atmosphere, seem totally indifferent to all manures that have yet been tried.

Horse-dung mixed with straw is still a favourite manure for many crops, but it is generally used in a very advanced state of decay. For plants which require the maintenance of moisture about their roots, such as the pansy, cow-dung is preferred. From its very fine state of subdivision, like all organic matter when similarly comminuted, it has great powers of retaining and absorbing moisture. The excrements of swine are not recommended as manure. They impart an offensive flavour to fruits and to certain of the choicer vegetables, and in some manner not thoroughly understood, they favour the multiplication of noxious insects. Common salt, ammoniacal salts, and lime, have the opposite effect. Guano and blood manures cannot be safely used except in a walled garden, as the smell attracts dogs, which do great damage by scratching in search of supposed carrion.

It is commonly supposed that the object of the gardener should be, by skilful manuring, to furnish every plant with a soil resembling that in which it naturally grows. This principle, as shown by Dean

Herbert, is in some cases fallacious. Certain species may grow in a poor soil, not from preference, but from necessity, having been driven from more genial localities by rampant and vigorous rivals.

MANUSCRIPTS (Lat. *manu scriptus*, 'hand-written'), literally, writings of any kind and on any material, but generally restricted, in a literary sense, to the books written on vellum before the introduction of the art of printing. Of Latin MSS. those prior to the age of Charlemagne (800) are considered ancient. *Illuminated Manuscripts* are those which are decorated with colours, ornaments, and emblematical figures; a practice introduced at a very early period, but chiefly employed in the missals, breviaries, and other books of devotion of the early Christian church. Among the last examples of illuminated manuscripts executed in this country was Cardinal Wolsey's Lectionary, at Christ Church, Oxford.

MANUZIO, THEOBALDO (Aldus Manutius), born in 1447 at Bassiano in the Papal State, studied at Rome and at Ferrara. He became intimate with Pico, count of Mirandola, and with Alberto Pio, lord of Carpi, with whose assistance he established a printing press at Venice. Manutius surpassed all other printers of his time in the correctness of his books. Being a man of learning as well as a printer, and having an extraordinary zeal for his profession, he procured the most correct MSS., and established an academy in his house, with the view of obtaining assistance in the superintendence of his publications. Bembo and Navagero were among the members of that society. The first publications of Manutius appeared about 1490; the first with a date in 1494. He invented a new sort of type, which was light and resembled writing, called by the Italians 'corsivi,' and known to other nations by the name of 'Italic.' In this type he printed the Latin classics. He was the author of a Latin and Greek Grammar, a Greek and Latin Dictionary (the first of its kind), and several other works. His son Paolo, a man of learning, an author, and a critic, succeeded him in the direction of his printing establishment.

MANZANARES. [CASTILLA-LA-NUEVA.]

MANZANILLA. [MEXICO.]

MAORIS, or MAORIES, the aboriginal inhabitants of New Zealand. The name is derived from a native word signifying 'native' or 'indigenous,' and was first used by themselves. They belong to the Malay race, and have a tradition that their progenitors migrated from the island of Hawaiki, supposed to be the modern Hawaii, in the fourteenth century of our era. But as this island is 4000 miles distant from New Zealand, and the canoes which they used must have been of a rude description, some persons have thought that the tradition alludes to Savaii, one of the Navigators' Islands, a much nearer group. Although the native tradition makes no mention of any previous inhabitants in New Zealand, it is generally believed that the original natives were a darker race, similar to the Papuas of New Guinea, and that in process of time the two races intermingled.

The Maoris are altogether different from the aborigines of the Australian continent, being a fine, well-formed, tall, and muscular people, with a complexion which varies in shade from an olive, or copper-coloured hue, to a dark brown. Their countenances,

especially those of the higher orders, are often very pleasing, and nearly always striking, animated, and intelligent; their hair glossy, black, and curling; and their general cast of features not materially different from the European standard. Few of them have beards or whiskers, as a very old custom exists amongst them of plucking out the hair on their face with shells. The women are of less stature, and altogether inferior to the men. They marry early—some have become mothers at eleven years of age—and perform a large amount of field labour, and thus become bent and old at forty, and weird and witch-like at sixty.

The New Zealanders possess many qualities superior to those of savage nations in general. They have considerable forethought and vigour of mind, and are hospitable, frank, generous, and keenly sensitive upon points of honour. They have, however, the vices as well as the better qualities of the savage; their passions are easily roused, and in the pursuit of revenge their bearing is marked by ferocity and cruelty. When first visited by Europeans, and even until within a comparatively recent period, they were addicted to cannibalism, drinking the blood of their enemies, and feasting with avidity on their remains, baked in ovens scooped in the earth. The last known act of the kind took place in 1843, and the Maoris are now for the most part converted to Christianity. They readily adopt such of the habits and pursuits of the European settlers as appear conducive to their own immediate advantage. In some districts they have considerable tracts of land under cultivation, and bring their produce to the market as regularly as the peasants of other lands. They also make good sailors and fishermen, but, as a rule, will not work very hard; and many still preserve the habits of barbarous life, and continue to reside in wretched hovels, glo clothed in blankets full of vermin, help themselves to food with their fingers, and in short, retain many of the most repulsive features of a savage race. They are divided into tribes, each under its own head or chief, and its members are bound together by a sort of clannish attachment. Their native paha, or villages, are extensive collections of huts, often strongly fortified with palisades.

Formerly the practice of tattooing the body was almost universal, but it has been abandoned since their conversion to Christianity. It was a very painful operation, performed with a hammer and saw-like chisel. The patterns represented ornamental scrolls and figures, to denote the rank of the individual wearing them. The punctures were stained with indelible vegetable dyes, and made the face present a most hideous appearance, although it was supposed to make the Maori youth more prepossessing in the eyes of his mistress.

Infanticide was also formerly prevalent, but is now entirely abolished. The natives are, however, rapidly decreasing in numbers, and are almost entirely confined to the northern island. Altogether they now comprise only about 50,000, their recent contests with the colonists having had the effect of materially decreasing their numbers. In their former wars they used spears and clubs, but of late have become very expert in the use of fire-arms.

Their language belongs to the Malay family, and

seven different dialects are spoken. It is rich and sonorous, and well adapted for poetical expression, especially of the lyrical kind. They have many proverbs, legends, and traditions, and a collection of them was made by Sir George Grey, recently governor of New Zealand.

MAP (in Latin, *mappa*, 'a cloth;' in French, *mappemonde*, 'a map of the world.')

A map is the representation of the surface of a sphere, or a portion of a sphere on a plane. The name however is commonly applied to those plane drawings which represent the form, extent, position, and other particulars of the various countries of the earth.

Maps, being plane representations of the surface of a sphere, may be obviously applied to various purposes; hence we not only have terrestrial maps to represent the surface of the earth, but celestial or astronomical maps to represent the sphere of the heavens; and these general distinctions have again their subdivisions.

There are two kinds of terrestrial maps—geographic or land maps, and hydrographic or sea maps: the latter are usually called CHARTS.

The methods adopted in the construction of maps are as various as the taste and judgment of geographers themselves, but they may all be referred to two principles, viz. *Projection* and *Development*.

By *Projection* is meant the representation of the surface of a sphere on a plane, according to the laws of perspective. By *Development* is to be understood the unfolding or spreading out of the spherical surface on a plane. This, however, first supposes the sphere to be converted into a cone or a cylinder; these being the forms, portions of which most resemble portions of a sphere, and which, at the same time, are susceptible of the required development.

There are three methods of spheric projection in general use, the *Gnomonic* or *Central*, the *Orthographic*, and the *Stereographic*, distinguished from each other by the different positions of the projecting point in which the eye is supposed to be placed.

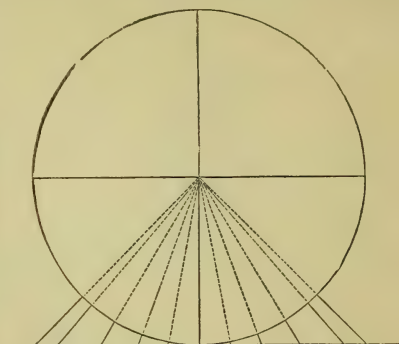
Projection.

The *Gnomonic* or *Central Projection* supposes the eye to be placed in the centre of the sphere, and that the various objects to be delineated are transferred from a sphere to a plane, which is a tangent to its surface. The entire hemisphere can never be represented by this projection, since the circumference which terminates it is on a level with the eye, and is therefore parallel to the plane of projection. This method is chiefly used in dialling, but may be advantageously applied to maps of a limited extent, more especially if they are maps of the polar regions of the globe. In this case the meridians will be straight lines radiating from the centre, and the parallels of latitude concentric circles, whose distances from the centre will respectively be equal to the cotangents of their latitudes.

In the other cases of this projection, where the perspective plane is parallel to the horizon, or to any meridian, the construction is rendered troublesome on account of the parallels of latitude becoming curves of difficult delineation: these cases therefore are seldom brought into use.

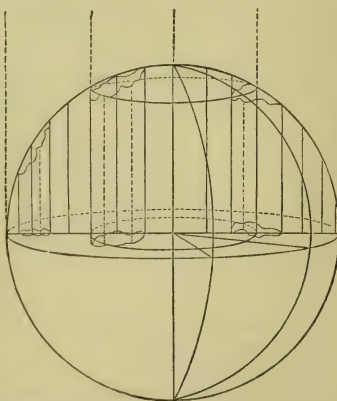
Orthographic Projection.—In this projection the

eye is supposed to be at an infinite distance, so that the visual rays leave the sphere in parallel lines. The perspective plane on which a hemisphere is supposed to be delineated is the plane of that diameter which is perpendicular to the visual rays—hence



every point of the hemisphere is transferred to this plane by perpendiculars let fall upon it. It will be immediately seen from the figure, that the representation will decrease in accuracy with the increase of distance from the centre; the parts near the circumference being much foreshortened and distorted.

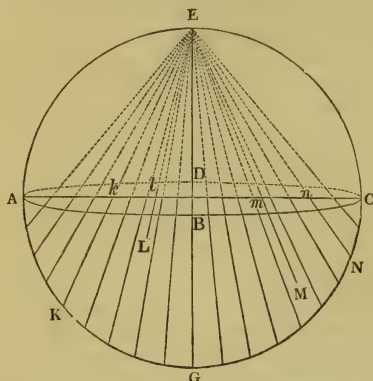
In a *Polar Map* of this projection, the meridians, as in the *Gnomonic* maps, will be radii, and the parallels concentric circles; these circles, however, will have their distance from the centre equal to the cosines, and not to the cotangents of their respective latitudes.



In an *Equatorial Map*, or one in which the equatorial regions of the globe are made to occupy the centre of the map, the plane of projection coincides with the plane of one of the meridians. In this case the latitude circles will be projected in straight lines parallel to the equator, which is also a straight line, and will vary in distance from it according to the sines of their respective latitudes. The meridians will be portions of ellipses intersecting the equator in points similar in position to the intersecting points of the parallels on the polar diameter, and having

their transverse axes coincident with this diameter and equal to it.

Stereographic Projection.—In this projection the eye is supposed to be placed at the surface of the sphere, and to view the concave of the opposite hemisphere through the plane of that circle, in the pole of which the eye is placed.



If E be the eye, and A, G, C, the hemisphere to be represented, A, B, C, D, will be the plane of projection; and the position on this plane of any point of the spherical surface will be indicated by a line drawn from that point through the plane to the eye. Thus the points K, L, M, N, on the sphere, will be transferred to the plane at k, l, m, n.

The advantages offered by this method of projection have brought it more into use than the methods before mentioned. It is especially calculated for maps of the world, as usually made in two hemispheres, from the circumstance of the representation being less distorted, and also on account of the meridians and parallels intersecting each other at right angles, as they do on the globe. Its construction also is less difficult than others, since all the great circles of the sphere are either circles or straight lines in the projection. The meridian of 20° W. is the one usually selected by English geographers for the plane of projection in these maps of the world, because this meridian passes very nearly between the eastern and western continents, which therefore occupy their respective hemispheres.

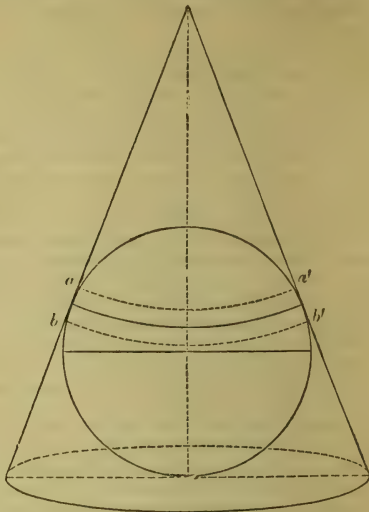
Projection by Development.

The developments to be mentioned are two—the *Conical* and *Cylindrical*.

Conical Projection.—In this projection the sphere is supposed to be circumscribed by a cone, which touches the sphere at the circle intended to represent the middle parallel of the map. If the points on the sphere be now projected on the cone, by lines drawn from the centre, it is clear that in a zone extending but a short distance on each side the middle parallel, as the zone $a' a' b' b'$, the points on the cone would very nearly coincide in position with the corresponding ones on the sphere. All the delineations having been thus made, the cone is then conceived to be unrolled or developed on a plane surface.

Should the map be made to extend much above or

below the middle parallel, the distant parts will be very much distorted. To remedy the defects of this projection, various modifications have been suggested,



among which those of Flamsteed are generally held in the highest estimation.

Cylindrical Projection.—From what has been said of the cone, it will be easily understood that a cylinder may be applied to the sphere in a similar manner, and that a zone of a very limited extent in latitude may, without very material error, be developed on a cylinder. The peculiarity of this method is, that the meridians, as well as the latitude circles, are projected in parallel straight lines; a condition of the map which makes it very applicable to nautical purposes, and on which is partly founded the very ingenious method called *Mercator's Projection*, now universally adopted in our charts, and to which, in conclusion, we will briefly allude.

Mercator's Projection.—The line on which a ship sails, when directing her course obliquely to the meridian, is on the globe a spiral, since it cuts all the meridians through which it passes at equal angles. This circumstance, combined with others, rendered a map constructed on the principles of the spherical projections very inadequate to the wants of the navigator. Mercator considered, very justly, that mariners do not employ maps to know the true figures of countries, so much as to determine the course they shall steer, and the bearing and distance of those points or places which lie near their track; and this projection is the result of his efforts to secure to the seamen these desirable ends. The merit of this most useful method is thought by many to be more justly due to Wright; for although Mercator published his first chart in 1556, he omitted to declare the principles on which he proceeded, and his degrees of latitude did not preserve a just proportion in their increase towards the poles. Wright in 1599 corrected these errors, and explained the principles of his improved construction, in which the degrees of latitude on the chart were made to

increase towards the poles, in the same ratio as they decrease on the globe; so that the course a ship steers by the mariner's compass becomes on the chart a straight line; the various regions of the map, however distorted, preserve their true relative bearing, and the distances between them can be accurately measured. (Consult Jamieson, *On Maps*; Malte Brun, *Géographie Universelle*; and De Morgan, *Explanation of the Gnomonic Projection of the Sphere*.)

MAPLE. [ACER.]

MAPLE SUGAR. Sugar obtained by evaporation from the juice of the sugar maple (*Acer Saccharinum*).

MARABOU (*Leptoptilos Marabou*), a species of bird belonging to the order *Grallatores*, or Waders, and family *Ardeidae*, or Herons. It is a native of Senegal, and is chiefly noted for its beautiful light plumes, known as *Marabou feathers*. Its popular name is the Adjutant.

MARACAYBO. [VENEZUELA.]

MARANHAM, SAN LUIZ DO, or MARANHAO, a town and port on the northern coast of Brazil, stands on the north-western coast of the island of Maranhão, in 2° 30' 40" S. lat., and 48° 50' W. long., and has 36,000 inhabitants. The city is the fourth in rank and importance, and the best-built in the Brazilian empire. It is remarkably clean, hospitable, and prosperous. An episcopal palace, college, governor's residence, theatre, hospital, and numerous convents, form the principal public buildings. There are also a lyceum, and schools of navigation and commerce. The city has a remarkable rainfall, amounting to an annual average of 280 inches. The harbour is defended by two forts, and is of easy access for small vessels. The imports consist of wine, brandy, oil, flour, fruits, silk, cotton and linen goods, hardware and metals, spices, drugs, &c. The exports are cotton, rice, tanned and raw hides, sarsaparilla, &c. The annual value of the imports and exports is each about 300,000*l*.

MARANON. [AMAZON.]

MARANS. [CHARENTE INFÉRIEURE.]

MARANTA'CEÆ, a natural order of endogenous plants, distinguished by a single stamen, whose anther has only one lobe; named after B. Maranti, a Venetian botanist and physician. With the exception of the genus *Calathea*, and of *Canna*, which is commonly cultivated under the name of Indian Shot, because of its beautiful flowers, the species included in this order are of small size, and by no means attractive, but the fleshy tubers of some of them abound in starchy matter, which renders them nutritious. All the species are found wild in tropical countries only. About 160 are known to be in existence.

Maranta arundinacea is generally referred to as the plant from which the arrow-root of commerce is obtained, but it is also procured in large quantities from a variety of closely allied plants. Thus the Surinam and Bermuda arrow-root is the produce of the *M. arundinacea*, while the Jamaica arrow-root is obtained from the *M. indica*, which plant, along with several curcumas, yields also the East Indian arrow-root. The West Indian arrow-root has mostly a pure white colour, the East Indian a yellow tinge.

The tubers, root-stocks, or offsets, are grated or bruised, and repeatedly washed with water, which is

passed through a fine hair-sieve so long as it runs off with a milky appearance. It is allowed to subside, the supernatant water drained off, and the powder dried. Arrow-root consists essentially of starch, and potato-starch is frequently used to adulterate it, or as a substitute for it. The grains of the different kinds of arrow-root starch may be distinguished from those of the potato by their form under the microscope.

Arrow-root dissolved in water, milk, or any other appropriate vehicle, constitutes, from its easy digestibility, a most excellent article of diet for delicate persons and young children. It may be given plain, or with wine or spices, according to circumstances. Potato starch may be prepared at a very cheap rate, but is not so easy of digestion as arrow-root.

MARASMUS (emaciation, from Gr. *maraino*, 'I waste away') is a term often used by the older medical writers to designate those cases in which no particular cause for the atrophy of the body was discovered.

MARATEA. [BASILICATA.]

MARATHON, a small plain in the north-east part of Attica, about five miles in length and two in breadth, which is chiefly memorable for the victory which the Athenians under Miltiades gained over the Persians here, B.C. 490. The Athenians who fell in the battle were buried in the plain; and also, but apart from the Athenians, the Plateæans, Boeotians, and slaves. A large tumulus of earth still rises from the centre of the plain; and near the sea there are two others, much lower than the former. The modern Vrana stands on the site of the ancient village of Marathon.

MARATTI, CARLO, was born at Camurano, in the March of Ancona, in the year 1625. He was a highly esteemed painter of the Roman school. He painted for Louis XIV. his celebrated picture of 'Daphne.' Fuseli considers 'Bathsheba viewed by David,' his greatest work. He died at Rome in 1713.

MARAZION. [CORNWALL.]

MARBLE (Lat. *marmor*). A strict definition of this term is perhaps impracticable, unless, with Da Costa, we limit it to the calcareous rocks, 'of very lively colours, and of a constitution so fine that they will readily take a good polish.' A limestone which will admit of being worked equally in all directions, and is capable of taking a good polish, deserves the title of marble; when it is granular and of a white colour, it may be useful in statuary.

The following are brief notices of some of the best known and most useful marbles:—

Division I. Marbles of One Plain Colour.

Section 1. Black marbles. Most of these contain bitumen, and are fetid when bruised. Examples. The Namur marble, the marble of Ashford in Derbyshire, Dent in Yorkshire, near Crickhowell, Tenby, Kilkenny, &c.; the marble anciently called Marmor Luculleum, and now Nero Antico.

Section 2. White marbles. Examples. The marble of Paros; the Carrara marble, of finer grain, much used in modern sculpture; the Skye marble, that of Inverary, Assynt, Blair-Athol, &c.

Section 3. Ash and gray marbles. Example. A beautiful marble, of compact oolitic texture, at Orleton, near the Cleve Hills in Shropshire.

Section 4. Brown and red marbles. Examples. The Rosso Antico; a marble on the estate of the duke of Devonshire, near Buxton. The mottled brown marble of Betham Fell, near Milnthorpe, is of good quality. Mandelato, light-red, veined, and clouded.

Section 5. Yellow marbles. Examples. The Giallo Antico; Siena marble. That used in ancient Rome is said to have been from Numidia.

Section 6. Blue marbles. Example near St. Pons in Languedoc.

Section 7. Green marbles. Examples. The Marmor Lacedæmonicum of Pliny; it is dug near Verona. Irish green marble.

Division II. Marbles of Two Colours.

Section 1. Black marbles variegated with other colours. Examples. Near Ashburton and Torbay, in Devonshire; Bianco e Nero Antico, the African Breccia of the ancients; Giallo e Nero Antico.

Section 2. White marbles variegated with other colours. Example. Marble imported from Italy. Marbles of this general character occur at Plymouth, at Killarney, in Sweden, &c.

Section 3. Ash and gray marbles variegated with other colours. These are very numerous, and occur in various parts of Europe.

Section 4. Brown and red marbles variegated with other colours.

Section 5. Yellow marbles variegated with other colours.

Section 6. Green marbles variegated with other colours. Examples. Egyptian marbles—the Marmor Tiberium and Augustum of Pliny; some Verde Antico, as that dug near Susa in Piedmont; the beautiful marble of Anglesey (called Mona marble).

Division III. Marbles variegated with Many Colours.

Examples. Some of the Plymouth marble; the beautiful Brocatello or Brocade marble of Italy and Spain.

Marbles containing Shells, Corals, and other extraneous Bodies.

In this division of marbles the British Islands are rich. Some of the Plymouth, Ashburton, and other Devonian limestones are extremely beautiful, from the abundance of fine corals exquisitely preserved in them; the Crinoidal marbles of Flintshire, Derbyshire, and Garsdale in Yorkshire, are elegant examples of the carboniferous limestone; the shell marbles of Buckingham, Whichwood Forest, Stamford, Yeovil, may be noticed, from the oolitic rocks. That of Petworth and Purbeck, from the Wealdon strata, has been extensively used by the architects of the middle ages.

MARBLEHEAD. [MASSACHUSETTS.]

MARBURG, the capital of the province of Upper Hesse, in the electorate of Hesse-Cassel, is most beautifully situated in 50° 50' N. lat., 8° 47' E. long., on the Lahn, and on the railway to Frankfort, 48 miles S.W. of Cassel. Population in 1861, 7689. The town, which is partly surrounded with a wall pierced by five gates, has a university, with a library of 100,000 volumes, an anatomical theatre, a chemical laboratory, a botanical garden, &c. The university was founded in 1527, and has had among

its students Patrick Hamilton and William Tyndale, translator of the English Bible; it has now forty professors, and an average of 300 students. The church of St. Elizabeth, in the Pointed Gothic style, deserves notice; and there are besides many hospitals. Manufactures of linens, stockings, and leather, are carried on, and there are also extensive potteries and tanneries.

MARCA D'ANCONA, an old denomination of a geographical division of the kingdom of Italy. It has been called La Marca, 'the March,' since the time of the Carolingian emperors and kings of Italy, from being governed by marchiones or marquises. *March* meant originally a frontier district, but the term was afterwards applied rather capriciously. Cæsar Borgia subdued the country, and it became from his time annexed to the papal territories. It was then generally called Marca d'Ancona, from its principal town; but the south-east part of it was also sometimes called Marco di Fermo, and the two together were often designated Le Marche or the Marches.

MARCELLINUS. [AMMIANUS MARCELLINUS.]

MARCELLINUS was bishop of Rome in the reign of the Emperor Diocletian. He died in 304.

MARCELLO, BENEDETTO, a patrician of Venice, son of Agostino Marcello, a senator, was born in 1686. He studied music under Gasparini and Lotti, and in 1716 a serenata from his pen on the birth of the first son of the Emperor Charles VI. was performed at Vienna. His great work, published in eight volumes, folio, in 1724 and 1726, was 'Estro Poetico-Armonico, Parafrasi sopra i 50 primi Salmi. Poesia di G. A. Giustiniani, Musica di B. Marcello, Patrizi Veneti.' It is of high excellence, and the music was adapted to our translation of the Psalms by Mr. Garth, organist of Durham. Marcello composed many other works, but few have survived. He died in 1789.

MARCELLUS, MARCUS CLAUDIUS, born of a Roman consular family, after passing through the offices of ædile and quæstor, was made consul, B.C. 222. At the beginning of the second Punic war, Marcellus was sent to Sicily as prætor to administer the Roman part of the island, and to keep the Syracusans firm to their alliance with Rome. After the battle of Cannæ he was recalled to Italy, to oppose Hannibal. He took the command of the relics of the Roman forces in Apulia, kept Hannibal in check, and defended Nola. In the year 214 B.C., being again consul, he took Casilinum by surprise. He was next sent to Sicily, where Syracuse had declared against Rome. After a siege of nearly three years, the town was taken in the year 212 B.C., when Archimedes, the great mathematician, lost his life on the occasion of this taking of Syracuse. In the year 210 B.C. he was again chosen consul, and had the direction of the war against Hannibal in Apulia, in this and in the following year. In B.C. 208 Marcellus was elected consul for the fifth time. He continued to carry on the war against Hannibal, when being encamped near Venusia, he fell into an ambuscade and was killed. Hannibal caused his body to be buried with honours. He was one of the most distinguished Roman commanders during the second Punic war, and had the honourable reputation of being a disinterested man.

MARCELLUS I. II. [POPE.]

MARCGRAVACEÆ, a natural order of Petaloid exogens, having an imbricated calyx, numerous hypogenous stamens, and a superior ovary with a discoid stigma and many polyspermous cells. They are all inhabitants of the tropical parts of America, and are usually scrambling shrubs, which are sometimes true parasites. The order is of no known use, and of but little interest, except in a systematical point of view; unless for the sake of its very curious bracts, which vary in form in different species, but which are more or less usually pitcher-shaped.

MARCH, the third month of the year according to modern computation, containing thirty-one days. The Roman year originally began with March; and in England, before the alteration of the style, the legal year commenced on March 25. The name of the month is said to be derived from that of Mars, the god of war.

MARCH, in Music, is, properly speaking, an air in double time, played by martial instruments, to mark the steps of the infantry, as well as to amuse and cheer troops of all kinds. It has, however, long since gained admission into sacred as well as into operatic musical compositions, as, for instance, the marches in Handel's oratorios; the religious marches in Gluck's 'Alceste,' and Mozart's 'Zauberflöte;' the two funeral marches of Beethoven, &c.

MARCH. [CAMBRIDGESHIRE.]

MARCHANTIACEÆ, a small natural order of Acrogens or cryptogamic plants, forming part of the old group called *Hepaticæ*. They are plants of a low organization, in most instances having no distinction of leaves and stem, but a thin, leafy, lobed thallus in their room, in which respect they resemble lichens; but are furnished with breathing pores and an approach to spiral vessels in the form of elaters, which latter circumstances elevate them to the level of *Lycopodiaceæ* and *Marsiliaceæ*.

Marchantiaceæ differ from *Jungermanniaceæ*, with which they were formerly combined under the old name of *Hepaticæ*, in not having a distinct stem, and in their fruit not being four-valved. *Marchantia* itself, a common plant under the north side of old walls and hedges, upon damp ground, forms deep green patches with a lobed lichenoid thallus, and has reproductive organs of two kinds arranged separately below mushroom-shaped heads.

MARCHE, LA, one of the old provinces into which France was divided before the Revolution, was bounded N. by Berri, E. by Auvergne, S. by Limousin, and W. by Poitou and Angoumois. It now forms the department of Creuse, and parts of Indre, &c.

MARCHES (Anglo-Saxon, *mearc*, 'a boundary'). *Mark* is a word common to almost all the languages of Teutonic origin, in sense scarcely varying from the word as at present used, a *mark*. But from denoting a mark in general, it came to denote in a specific and peculiar sense those important marks by which the boundaries of wide domains were indicated, and in this sense it is found in Anglo-Saxon writings. Hence the words *The Marches*, that is, the country lying near and about the *marks* which indicated the limits of two kingdoms, dukedoms, or other extensive jurisdictions.

The word is used in Germany, and upon it is founded one of their titles of honour, the *markgraf* (*margrave*), or lord of the marches; and our own

marquis is of the same origin. The Marches of Wales and of Scotland was a term in use in our history until the union of those countries with England.

MARCIANUS, born in Thrace, of obscure parents, towards the end of the fourth century, entered the army, rose gradually by his merit to high rank, and was made a senator by Theodosius II. When Theodosius died in 450, his sister Pulcheria, then fifty-two years old, offered her hand to Marcianus, who was near sixty, because she thought him capable of bearing the crown with dignity and advantage to the state. Marcianus married her, and was proclaimed emperor. His reign, which lasted little more than six years, was peaceful, and his administration was equitable and firm. He died in 457.

MARCIENNES. [NORD.]

MARCIONITES, a religious sect of the second and third centuries, so called from their teacher Marcion, who adopted the old Oriental belief of two independent, eternal, co-existing principles, one evil and the other good. He endeavoured to apply this doctrine to Christianity. The Marcionites spread far in the East, and especially in Persia. The chief opponent of Marcion was Tertullian, who wrote a book to refute his doctrines.

MARDIN, a town of Northern Mesopotamia, built on a steep hill forming part of the chain that divides the basin of the Upper Tigris, or country of Diarbekr, from the plains of Sinjar, which are watered by the affluents of the Euphrates. Mardin is a considerable though poor town; two-thirds of the inhabitants are Moslems, and the rest Christians, with some Jews. Mardin has eight mosques, several bazaars, and some public baths. The castle, on the summit of the hill above the town, is strong by its situation. The town of Mardin is nearly half-way between Diarbekr and Mozul, and on the road from Constantinople to Bagdad.

MAREMMA, the name given to the unwholesome lowlands which extend along the Mediterranean coast in Tuscany and the Papal States. The Tuscan Maremma begin N. of Lucca, and extend, with but few interruptions, from the approach of the highlands to the sea, as far as the mouth of the Pescia, which river divides Tuscany from the Papal States. They stretch inland generally from 10 to 12 miles. The Roman Maremma begin at the Pescia, and extend as far as Terracina on the Neapolitan frontier, a length of above 120 miles, with a very unequal breadth inland, owing to the approach of various offsets of the Apennines to the sea. The whole of this tract is low and unimproved, and whether the surface be marshy or dry, it is unwholesome, especially in summer. Of late years special attention has been directed to the drainage and amelioration of the Tuscan Maremma, and considerable success has attended their being largely planted, as trees are a corrective of their malarious effects.

MARENGO, or **MARENGO-SPINETTA**, a village in Piedmont, on the right bank of the Bormida, and in the immediate vicinity of Alessandria. Here was fought the great battle, June 14, 1800, between the French, under Napoleon, and the Austrians, under General Melas, ending in the total defeat of the latter, with immense loss. At one time the victory was in the hands of the Austrian commander, but, aged and fatigued, he neglected to pursue his advantage, and

gave Napoleon time to bring up his reserve, under Desaix, whose splendid and vigorous charge decided the fortune of the day. Desaix, shot through the head, fell at the first fire, but the French pushed on and literally drove the Austrians into the Bormida. A museum, and a monument to the memory of Napoleon, were erected on the battle-field in 1847, by M. Giovanni Delavo.

MARENNES. [CHARENTE INFÉRIEURE.]

MARENZIO, LUCA, a voluminous and excellent composer of madrigals, was born at Concaglia in Brescia about the middle of the sixteenth century, and died at Rome in 1599. Handel and Purcell, as Dr. Burney remarks, did not disdain to become his debtors.

MAREOTIS, Lake. [ALEXANDRIA; EGYPT.]

MARGARET OF ANJOU. [HENRY VI.]

MARGARIC ACID, a fatty acid, so called by Chevreul, who discovered it, from *margaron*, (*μαργαρον*), 'a pearl,' on account of its peculiar lustre. It is prepared from soap made with olive oil and potash. It crystallizes in pearly needles; it is insoluble in water. It has an acid reaction; and its salts, except those of the alkalis, are very sparingly soluble in water. Its saline compounds are termed *margarates*. According to Berzelius, it consists of O^3 , H^{33} , C^{35} . Melts at 140° .

Margarate of potash presents the varied forms of brilliant scales, a solution, and a jelly, according to its mode of preparation. The *Bimargarate of potash*, and the *Margarates of soda and of lead*, bear a good deal of resemblance to it.

MARGARIN, a peculiar fatty matter contained in vegetable oils, and also in animal fats, as mutton suet and hog's lard. This substance is very soluble in cold ether, which distinguishes it from stearin.

MARGARITIC ACID, a solid compound of oxygen, hydrogen, and carbon, which, together with *ricinic* and *elaiodic acid*, results from the formation of a soap of castor oil and hydrate of potash.

MARGARITONE D'AREZZO was born at Arezzo about 1215. He was a painter of the Byzantine school, and of great reputation in his day. Most of his works have now perished; but one of his masterpieces, namely, San Francisco, painted for a convent in Sargiano, still exists.

In sculpture, says Vasari, Margaritone was more successful than in painting. There is still by him, in the cathedral of Arezzo, a reclining marble statue of Gregory X. on a monument, which, according to Vasari, is his chef d'œuvre. As an architect, he superintended the building of the cathedral of Arezzo, where he died, aged seventy-seven, and was buried.

MARGARON, a solid white fatty matter which crystallizes in pearly scales, and is obtained by dissolving margaric acid with excess of lime.

MARGATE. [KENT.]

MARIA THEREZA, Archduchess of Austria, Queen of Hungary and Bohemia, and Empress of Germany, born in 1717, was the eldest daughter of Charles VI. of Austria, emperor of Germany. [CHARLES VI.] In 1724, Charles, by the Pragmatic Sanction, regulated the order of succession in the family of Austria, declaring that, in default of male issue, his eldest daughter should be heiress of all the Austrian dominions, and her children after her.

In 1736 Maria Theresa married Francis of Lorraine,

grand duke of Tuscany. Upon the death of Charles VI. in 1740, the king of Prussia, the elector of Bavaria, the elector of Saxony, and the kings of France, Spain, and Sardinia, agreed to dismember the Austrian monarchy, to parts of which each of those powers laid claim. Maria Theresa, in spite of the threatened encroachments of those powers, supported by the enthusiastic efforts of the Hungarians, to whom she appealed, made good her claim as empress. She drove the French and Bavarians out of her kingdom. Her political acts are worthy of record. She abolished the torture, commuted the services which the Bohemian peasants owed to their feudal superiors, put a stop to literary piracy, established a national system of education, and made several important reforms in the temporalities of the clergy. She will ever rank among illustrious women and the benefactors of mankind. She died at Vienna, November 29, 1780.

MARIANA, JUAN, was born at Talavera in 1536. At the age of seventeen he joined the Jesuits, and devoted much study to theological subjects; but is best known for his 'History of Spain,' which has been translated into English by Stevens. The profound erudition of Mariana is also displayed in his 'Tractatus Septem,' Cologne, 1609. At the age of eighty-three he published his 'Scholia' on the Old and New Testaments, availing himself of the best Hebrew commentaries, and some valuable and very early MSS. which dated from the age of the ancient Gothic dominion in Spain. He died at Toledo, February 6, 1623.

MARIE ANTOINETTE, born at Vienna, November 2, 1755, was the daughter of Francis of Lorraine, emperor of Germany, and of Maria Theresa of Austria. In May, 1770, she married Louis, the dauphin, grandson of Louis XV., who in 1774 became king of France, under the name of Louis XVI. When the Revolution began, Marie Antoinette was on the side of the more resolute aristocratic leaders, and would have opposed it vigorously. She was one of the advisers of the attempted flight of the king, which proved unsuccessful, and only served to excite the public animosity against her and her husband. During the various attacks made against the royal family, she showed great courage. Her demeanour under the most trying circumstances never lost its dignity. After the death of her husband, she seemed for a time forgotten in the prison of the Temple; but she was brought to trial before the revolutionary tribunal October 14, 1793, found guilty, and condemned to death. In the presence of her judges, the burst of indignant maternal feeling with which she appealed to any mothers present, when an infamous and absurd charge was brought against her, overawed even her accusers.

On October 16, 1793, she was removed in a common cart from the prison of the Conciergerie to the place of execution. On her way she was reviled and abused by the ferocious mob in the most unfeeling manner, but appeared heedless of their vociferations, and suffered death with firmness and composure. She was thirty-eight years of age, but owing to her sufferings she bore a much older appearance. She left one son, who died in prison (Louis XVII.), and a daughter, the late duchess of Angoulême.

MARIE-AUX-MINES. [RHIN, HAUTE.]

MARIE DE' ME'DICI, the daughter of Francis I., grand duke of Tuscany, and of the archduchess Joan of Austria, was born in Florence in 1573, and was married in 1600 to Henry IV. of France. Her unhappy temper led her to quarrel with her husband, and subsequently with her son. She was at last exiled for her political intrigues, and died at Cologne, in 1642, almost destitute.

MARIE-GALANTE, an island in the Caribbean Sea, about 15 miles south of Guadeloupe, of circular form and about 14 miles in diameter, was discovered by Columbus in 1493, and first settled by the French in 1647. The surface is of moderate elevation, and rises gradually towards the north; the western coast is low. The soil is productive, and yields abundantly the several West-Indian products. The population in 1861 was 12,000.

MARIENBURG. [DANZIG.]

MARIENWERDER, one of the governments into which the province of West Prussia is divided, is bounded N. by the government of Danzig, E. by that of Königsberg, S. by Poland and Posen, and W. by Brandenburg. Its area is 6759 square miles, and the population in 1862 was 712,831. The government is divided into thirteen circles.

Marienwerder, the capital, situated on the Liebe and the Little Nogat, 2 miles from the Vistula, over which there is a pontoon bridge 2700 feet in length, has 6607 inhabitants. It has a cathedral, with a steeple 170 feet in height; schools of art and agriculture, and an hospital for blind soldiers. It is the seat of the provincial courts and the government offices. There are manufactories of woollens, hats, soap, and leather. The breweries and distilleries are very considerable. The town is one of the most beautiful and prosperous in West Prussia. The other towns are—*Thorn*, the birthplace of Kepler and Copernicus, which is a fortified town on the Vistula, here crossed by a long bridge, and has 10,000 inhabitants. The extensive fortifications of this place have been greatly improved since 1815. *Culm*, or *Kulm*, also on the right bank of the Vistula, with a population of 6300, and some cloth factories. *Graudenz*, which also stands on the right bank of the Vistula, here crossed by a bridge of boats, and has, including the military, 10,100 inhabitants, who manufacture woollen cloths and tobacco, and trade in corn. The town is surrounded by a wall, and defended by a strong fortress which commands the course of the Vistula.

MARIGOLD. [CALENDULA.]

MARINE FORTIFICATIONS. In the article FORTIFICATION the different kinds of land fortifications have already been described. Those constructed to repel the attacks of vessels are somewhat different in principle, as there are generally no intervening obstacles to overcome, and the struggle is chiefly a question of strength. The principle generally adopted is to construct the fortress with as little exposed surface as possible, as it is so much the less likely to be struck from the vessel. The walls are generally perpendicular, and wherever it can be done, the structure is made bomb-proof. The most simple sea fortresses are mere parapets in the side of a hill, and if possible, concealed from the observation of vessels at sea. These fortifications are numerous all round the British coast, as are also the MARTELLO

TOWERS, which latter, however, are not now considered of much use. But the most important sea fortresses are the beach forts at Portsmouth, sweeping the very surface of the water, and especially the exceedingly strong isolated forts, with perpendicular faces and several tiers of guns, as at Spithead, Plymouth, and Cronstadt. The construction of iron-plated ships has rendered it necessary to mount sea fortresses with the very heaviest and most powerful guns, and even then those vessels can sometimes pass them with impunity.

MARINE INSURANCE. [SHIPS.]

MARINER'S COMPASS. [COMPASS, MARINER'S.]

MARINES, men embodied to serve as soldiers on board of ships of war in naval engagements; and on shore, in the event of a descent being made upon an enemy's coast. In the British service they also assist occasionally in performing some of the operations connected with the working of the ship; they cannot, however, be sent aloft at the command of a naval officer.

During the reign of William III. the soldiers placed on the establishment of the navy seem to have been retained as persons in training to become good seamen; and as soon as they became qualified they were discharged from the regiment, and entered on the ship's books as foremast men. In 1775, on the recommendation of Lord Anson, the existing regiments having been disbanded, 130 companies of marines were raised, consisting in all of above 5000 men, and placed under the immediate command of the Lords of the Admiralty. The corps of marines, as it was then called, was subsequently much increased; and during the war at the beginning of this century, its strength amounted to above 20,000 men, exclusive of two companies of marine artillery. At present there are four divisions of royal marine light infantry, and one division of royal marine artillery. The total strength is about 18,000 men. They are commanded by a deputy adjutant-general, who is assisted by an assistant adjutant-general. There are also five colonels-commandant of divisions, and five colonels second commandants. The entire government of the corps rests with the Admiralty. In rank the officers correspond with army officers of similar grades according to seniority. No commissions in the corps are obtained by purchase, and the officers of marines rise by seniority, as high only, however, as the rank of colonels-commandant. The marines are now clothed and armed in the same manner as the infantry of the line. In an engagement at sea, they annoy the enemy by a fire of musketry from the tops and deck; and they repel with the bayonet any attempt made to board the ship. Every man-of-war on being commissioned has her complement of marines drafted into her.

MARINO, SAN. [SAN MARINO.]

MARIONETTES are little figures of men and women, made of either wood or cardboard, and moved by means of cords or springs on the stage of what are called marionette theatres. The person who moves them is concealed from the audience, and alters his voice to suit the different figures, thereby producing a mimic dramatic entertainment. The amusement was known to the ancient Greeks and Romans, and in France and Italy is still practised.

MARIOTTE, EDMÉ. Little is known of his life. He was a Burgundian born, a priest by profession, and resided in the earlier part of his philosophical career at Dijon. He was afterwards prior of Saint Martin, near Beaune, and died May 12, 1684, having been one of the first members of the Academy of Sciences.

MARIOTTE'S LAW, so called from its discoverer, Edmé Mariotte, who died in 1684. It may be defined, in pneumatics, as a general property of elastic fluids viz., that the elastic force is inversely proportional to the space which the fluid occupies. This principle, however, had been previously set forth by our own countryman, Boyle, in 1668, but it does not appear that the work in which he enounced it was known to Mariotte, nor does Boyle express it with the same lucidity and certainty.

MARITIME LAW. [SHIPS.]

MARITZA. [BALKAN; THRACE.]

MARIUS, CAIUS, was born of humble parents at Arpinum, about B.C. 157. He served at the siege of Numantia, B.C. 134, under Scipio Africanus, together with Jugurtha, where he highly distinguished himself. In B.C. 119 he was elected tribune of the plebeians, in which office he showed himself a most determined enemy to the patrician order. He obtained the prætorship with difficulty, in consequence of the opposition of the patricians, who accused him of having used bribery. Marius married Julia, an aunt of Julius Cæsar.

In B.C. 109 he accompanied Metellus into Africa in the capacity of *legatus* (second in command); and by his prudence and courage in the war with Jugurtha he added greatly to his military reputation. His friends at Rome persuaded the people that the war with Jugurtha would never be concluded until the command was given to Marius. Metellus with some difficulty allowed his lieutenant leave of absence to go to Rome in order to stand for the consulship. Marius obtained that dignity (B.C. 107) and the direction of the Jugurthine war. In the following year (B.C. 106) he obtained possession of Jugurtha, who was treacherously given up by Bocchus to his quæstor Sulla. [JUGURTHA.] The news of the defeat of the Consul Manilius, and the Proconsul Cæpio, by the Teutones and Cimbri (B.C. 105), caused the greatest consternation at Rome; and Marius was elected consul during his absence in Africa.

He entered upon his second consulship B.C. 104, and was again chosen consul in the two following years (B.C. 103, 102). In his fourth consulship (B.C. 102), he defeated the Teutones and Ambrones, near Aquæ Sextiæ (*Aix*) in Gaul; and in the following year, B.C. 101, having been re-elected for the fifth time, joined his forces with those of Catullus, and entirely defeated the Cimbri in the plain of Vercellæ (Vercelli) situated to the north of the Po.

Marius was once more a candidate for the consulship for the following year; but the fear of the Gallic invasion was removed, and he was opposed by the patrician party. He nevertheless obtained the dignity, in great part owing to the exertions of Saturninus, the tribune. At the expiration of his consulship he left Rome; but in B.C. 90 the Marsian or Social war broke out, in which Marius and Sulla were engaged as legati to the two consuls.

But disgusted, it is said, with the increasing reputation of Sulla, Marius resigned his command before the conclusion of hostilities.

The Marsian struggle had scarcely been brought to an end, before a war broke out between these two great rivals. The conduct of the Mithridatic campaign had been assigned to Sulla, who was now consul (B.C. 88); but his opponent used every effort to wrest it from him. He was warmly supported by P. Sulpicius, the tribune, and a law was passed that the command should be taken from Sulla and given to Marius. Sulla was with the army at the time besieging Nola; but as soon as he heard of the law, he marched to Rome; and Marius and his adherents were obliged to quit the city. Marius escaped with the greatest difficulty to Africa; but in the following year (B.C. 87), when Sulla had gone to Greece to oppose Archelaus, he returned to Italy, and joined the Consul Cinna, who had been driven from Rome by his colleague Octavius, supported by the patrician party. Marius and Cinna, with the assistance of Carbo, blockaded the city, and as soon as they got possession of it, a general massacre of the opposite party ensued. All the leaders of the patrician party who were unable to escape from Rome were put to death.

Marius and Cinna declared themselves consuls for B.C. 86, without holding the comitia; but Marius died in the beginning of the year. His life has been written by Plutarch.

MARIVAUX, PIERRE CARLET DE CHAMBLAIN DE, was born at Paris, in 1688. He wrote some dramas, but his celebrity rests upon his clever romances. He died at Paris in 1763.

MARJORAM, an aromatic potherb used in cookery, especially among the French. It is the *Origanum majorana* of Linnæus, or *Majorana hortensis* of Moench, a native of Barbary and the Himalaya mountains. In gardens it is little better than an annual; in a wild state it is a suffruticose perennial.

MARK. [MONEY.]

MARK, ST., the Evangelist, is supposed to be the same person as John Mark, who is mentioned in the Acts of the Apostles (xii. 12, 25; xiii. 5, 13; xv. 37). He was the son of Mary, a pious woman at Jerusalem, in whose house the disciples were wont to meet (Acts xii. 12), and the nephew of Barnabas (Col. iv. 10). He left Jerusalem with Paul and Barnabas, about A.D. 44 (Acts xii. 25), and accompanied them in their journey to Antioch, and thence in their mission (Acts xiii. 5), as far as Perga in Pamphylia, where he parted from them and returned to Jerusalem (Acts xiii. 13). About A.D. 53 we find him again at Antioch, when Paul proposed to Barnabas to visit the Asiatic churches. Mark accompanied Barnabas alone to Cyprus (Acts xv. 37-39). There appears to have been some disagreement between Mark and Paul, but they were afterwards reconciled, for we find him at Rome with the apostle during his imprisonment. That Mark was also at Rome with Peter (1 Peter v. 13), is the only other particular concerning him which the scriptures contain. According to Eusebius, Epiphanius, and Jerome, he afterwards went to Egypt, and founded a church at Alexandria, where he died and was buried, according to Jerome, in the eighth year of Nero's reign, A.D. 62. According to an old tradition, he sealed with

his blood his testimony to the truth of the Gospel, and his body was afterwards removed to Venice, of which city he is recognized as the patron saint. But this date appears to fix his death earlier than other circumstances in his history warrant.

The genuineness and authenticity of the 'Gospel according to St. Mark' are attested by the unanimous voice of ecclesiastical writers. Michaelis has indeed objected to its canonical authority, in common with that of Luke, but on no good ground. The time when it was written is uncertain, probably about A.D. 64 or 66.

According to the unanimous testimony of the early ecclesiastical authors, the gospel of Mark was written in Greek, at Rome, and under the instructions of St. Peter.

MARKET, a public place and fixed time for the meeting of buyers and sellers. A legal market can exist only by virtue of a charter from the crown or by immemorial usage, from which it will be presumed that a royal charter once existed, although it can be no longer produced. A market is usually granted to the owner of the soil in which it is appointed to be held, who, as such grantee, becomes the owner, or lord, of the market. In upland towns, that is, towns which, not being walled, had not attained the dignity of boroughs, markets were frequently granted to lords of manors; but in walled towns or boroughs, particularly in such as were incorporated, the ownership of the soil having usually, by grant from the crown, or other lords of whom the borough was originally holden, been vested in the incorporated burgesses, the practice has commonly been to grant markets to the municipal body.

Formerly markets were held chiefly on Sundays and holidays, for the convenience of dealers and customers, who were brought together for the purpose of hearing divine service. But in 1285, by 13 Edward I. c. 5, fairs and markets were forbidden to be held in churchyards; and in 1448, by 27 Henry VI. c. 5, all showing of goods and merchandise, except necessary victuals, in fairs and markets, was to cease on the great festivals of the church, and on all Sundays except the four Sundays in harvest. The holding of fairs and markets for any purpose on any Sunday was prohibited in 1677, by 29 Charles II. c. 7.

It is a rule of the common law (subject to some exceptions) that every sale in market-overt (open market) transfers to the buyer a complete property in the thing sold; so that however defective the title of the vendor may be, that acquired by the vendee is perfect, even where the property belongs to a person who is under legal disability, as an infant, a married woman, an idiot, or a person in prison or beyond sea. In the city of London every shop is market-overt for goods usually sold there. The privilege of market-overt is unknown in the law of Scotland. When, therefore, goods have been sold in open market by one who has stolen them, or by a person to whom they have been lent, the owner may recover them from the purchaser. But corn subject to the landlord's hypothec, if sold in bulk in market-overt, is secured to the purchaser against the operation of the hypothec.

A market is generally appointed to be held once, twice, or three times in a week, for the current sup-

ply of commodities, mostly of provisions. A large market held once or twice a year is called a fair; and, according to Lord Coke, a large fair held once a year is a mart.

Fairs have all the legal incidents of markets, and are subjected to further regulations by 2 Edward III. c. 15, one of which requires, that at the opening of the fair, proclamation be made of the time that it is to continue.

MARKET - HARBOROUGH. [LEICESTERSHIRE.]

MARKLAND, JEREMIAH, was born the 29th of October, 1693, at Childwall, in Lancashire. He was sent to St. Peter's College, Cambridge, in 1710, and became a fellow and tutor of his college. During the latter part of his life he resided in retirement at a small village near Dorking, where he died on the 7th of July, 1776.

Markland devoted a long life to the diligent study of the Greek and Roman writers. He was one of the best English scholars and critics of the last century.

MARL (Dutch, *marghel*, from *margh*, 'marrow,' i.e., to fatten or enrich land), an earthy substance found at various depths under the soil, and extensively used for the improvement of land. It consists of calcareous and argillaceous earth in various proportions, and as the former or the latter prevails, so it is beneficially employed on clays or sands. There are several distinct sorts of marl—clay marl, shell marl, slate marl, and stone marl. The effect of marl is the same as that of clay and chalk upon sandy soils; on heavy soils its effect is proportioned to the quantity of calcareous earth which it contains. The peculiar advantage of marl is its readily crumbling to powder by the effect of air and moisture.

Marl is often found very near the surface, so as to mix with the soil in ploughing; but unless there be a sufficient depth of soil above, its presence does not indicate great fertility. It is generally best when found at a moderate depth, so as to be readily dug out and carted on the adjacent lands. Marl, when put fresh upon the land, requires some time in order to become effective. It should therefore be laid on the surface and spread before winter, leaving it there for a considerable time before it is ploughed in. It is most advantageous to put it on the land when it is in grass, and to roll and harrow it repeatedly, in order to expose it to the effect of the air and rains. Alternate frosts and thaws greatly assist its pulverization.

An excellent use of marl is in forming composts with dung and peat earth. It is laid in layers with the dung and peat, and if the heap is well soaked with urine or the washings of stable-yards, it will in a short time become a most valuable manure for all kinds of soils.

Marl was in common use in England as a manure as early as the thirteenth century, and an Act passed in 1225 gave every man a right to sink a marl pit on his own land. Of late years lime has been often used instead of marl, as, owing to its bulkiness, the latter can only be used in the neighbourhood in which it is found.

MARLBOROUGH. [WILTSHIRE.]

MARLBOROUGH, JOHN CHURCHILL, DUKE OF, was born at Ashe, in Devonshire, on the 5th of July, 1650, of an old cavalier family which had

suffered much in the civil war for its attachment to the royal cause. After receiving the rudiments of education from a Devonshire clergyman, and a brief course of tuition at St. Paul's School, London, he procured, through the influence of his sister Arabella, a favourite of James, duke of York, a pair of colours in a regiment of foot-guards at the early age of sixteen. The charm of his address and his handsome person soon attracted notice in the gay court of Charles II., and insured him a rapid promotion, which, however, was justified by his courage and military capacity. At Tangier, in 1666, he greatly distinguished himself; but his eminent abilities were more fully displayed in the campaigns of 1672-77, in Holland, where he commanded a company in the duke of Monmouth's division of the allied army, and studied the art of war under Condé, Vauban, and Turenne. The latter, struck by his conduct at the siege of Niméguen, styled him his 'handsome Englishman,' and strongly recommended him to the notice of his superiors. At Maestricht he saved the life of the duke of Monmouth, and for his eminent gallantry received the public thanks of Louis XIV., as well as promotion to a lieutenant-colonelcy from his own sovereign.

He returned to England in 1677, after five years' experience in military affairs on the grandest scale, and under the most consummate leaders; an experience which, as Alison observes, undoubtedly fitted him for the brilliant part he was destined to play in the history of his time.

Early in 1678 he was married to Sarah Jennings, the confidential attendant of the Princess Anne, a woman of great beauty and considerable mental powers, whose influence over her husband remained unimpaired to the last. He was now attached to the service of the duke of York; was created Baron Churchill, of Eymouth, in Scotland; and, in 1683, appointed colonel of a newly raised regiment of dragoons. On the accession of James to the throne the fortunate soldier was loaded with additional favours; he was made an English peer, promoted to the rank of brigadier-general, and despatched to Paris to notify the accession of the new monarch.

When Monmouth commenced his abortive rebellion, Churchill was created major-general, and appointed second in command to the earl of Feversham. His skill and energy saved the royal army from a surprise on the eve of the battle of Sedgemoor, and largely contributed to the victory won upon that sanguinary field. For these services he received the colonelcy of the 3rd regiment of Horse Guards.

Churchill was therefore bound to James II. by the strongest ties of personal gratitude; but that monarch's designs against the Protestant religion and the freedom of England excited his disapprobation, and he secretly joined the powerful party which invited William of Orange to seize upon the English crown. But he did not do what, as an honest man, he should have done, retire from the service of the sovereign whose conduct he disapproved. While he carried on a clandestine correspondence with the Dutch prince, he accepted the command of a corps of 5000 men destined by James II. to oppose his progress, and accepted a lieutenant-generalship in the army which he intended to deliver up to his rival. And not only did he desert his generous master, but his influence and that of his wife secured the desertion

of that master's daughter; so that the heaviest blows inflicted upon James fell from the hand of the man whom he had loaded with the greatest favours. Such treachery can hardly be palliated by the fact, that in this respect Churchill was neither better nor worse than most of his contemporaries.

William III. duly rewarded Churchill for these important services. He received the earldom of Marlborough, and was named lieutenant-general of the army. Soon afterwards he was appointed to the command of the British auxiliary force in the Netherlands, and earned a warm eulogium from King William. 'I am very happy,' wrote the king, 'that my troops behaved so well in the affair of Walcourt. It is to you that this advantage is principally owing.'

He served in Ireland in 1699 with equal distinction. In thirty-seven days he reduced Cork and Kinsale, and confined the war to the province of Ulster. But from motives which it is unnecessary to elucidate—partly, perhaps, from his jealousy of the confidence which the king bestowed on his Dutch favourites; partly from a fear that some new revolution might recall James II. to the throne—he kept up a clandestine correspondence with the exiled monarch, and betrayed the secrets of his sovereign's councils. His treachery becoming known to William, he was deprived of all his commands, and thrown into the Tower. But so great was his influence that he soon obtained his release, and the king did not dare to bring him to trial. After living for some years in privacy he gradually recovered his place in the royal favour, was restored to his seat in the privy council, and named preceptor of the young duke of Gloucester, the son of the Princess Anne, and heir-presumptive to the throne. 'My lord,' said the king, 'make my nephew to resemble yourself, and he will be everything which I can desire.'

In 1701 broke out the War of Succession, which soon involved all Europe in the flames of battle. Marlborough was now summoned to a scene peculiarly adapted for the display of his consummate genius, and called upon to play a part in which the severest critic can but regard him with admiration. On the 1st of June, 1701, he was named ambassador-extraordinary to the Hague, and commander-in-chief of the allied forces in Flanders; an appointment which, as far as England was concerned, virtually invested him with the general direction of affairs, both civil and military, and strikingly showed the high estimate which William had formed of his ability as a diplomatist and his genius as a soldier. But while vigorously urging on preparations for the conduct of the war, William's career was suddenly terminated, and the Princess Anne succeeded to the throne. She immediately confirmed the appointments of her predecessor, and showered additional favours on her favourite and her favourite's husband. The earl received the Order of the Garter, and the countess was made Mistress of the Robes and Keeper of the Privy Purse. Thus distinguished by special marks of his sovereign's confidence, Marlborough repaired to the Continent, and entered upon that career of glory which has secured him a place among England's foremost worthies. In the English Valhalla few statues are placed higher than that of England's greatest general.

In judging Marlborough's military career, the reader

must remember that he was constantly hampered by the jealous interference and parsimony of the Dutch government, alive only to its own interests, and incapable of comprehending any grand scheme of European policy; and that he was frequently fettered by the intrigues of political parties at home. Over every obstacle, however, his genius triumphed, and to Marlborough alone is due the glory of having rescued Europe from French supremacy.

The campaign of 1703 was illustrated by numerous successes, and Varbor, Stevenswaert, Ruremond, and Liège fell before the allied armies. In the following year, by a succession of masterly movements, Marlborough, who had been elevated to a dukedom, diverted the war from the borders of Holland to the valley of the Danube, and prevented the combination, designed by Louis XIV., of three great French armies to overwhelm at one blow the inferior forces of the allies. After forcing the passage of the Danube beneath the guns of Schullenberg, a feat of the most brilliant daring, he encountered Marshal Tallard and the Elector of Bavaria near the village of Blindheim, or Blenheim, on the 13th of August, 1704, and inflicted upon them a crushing defeat. The allied forces, under Marlborough and Prince Eugene, numbered 56,000 men, with 52 guns; the French and Bavarians composed 60,000 men, with 90 guns. This disparity of numbers was increased by various circumstances. 'Four-fifths of the French army,' says Alison, 'were national troops, speaking the same language, animated by the same feelings, accustomed to the same discipline, and the most of whom had been accustomed to act together. The allies, on the other hand, were a motley assemblage, like Hannibal's at Cannæ, or Wellington's at Waterloo, composed of the troops of many different nations, speaking different languages, trained to different discipline, but recently assembled together, and under the orders of a stranger general. English, Prussians, Danes, Wurtembergers, Dutch, Hanoverians, and Hessians, were blended in such nearly equal proportions, that the army of no one state could be said by its numerical preponderance to be entitled to the precedence. But the consummate address, splendid talents, and conciliatory manners of Marlborough, as well as the brilliant valour which the English auxiliary force had displayed on many occasions, had won for them the lead, as they had formerly done when in no greater force among the Confederates, under Richard Cœur-de-Lion, in the Holy War.'

The immediate result of the victory of Blenheim was the capture of 13,000 prisoners, 34 guns, 25 standards, and 90 colours. The total loss of the enemy was not less than 40,000 men. The allied army had 4500 killed and 7500 wounded. The ultimate result was the destruction of that vast fabric of power which Louis XIV., aided by the talents of Turenne and Vauban, had laboured so long to construct.

Marlborough, on his return to England, was received with an enthusiastic welcome, and an Act of Parliament bestowed upon him the royal demesnes of Wootton and Woodstock, and decreed the erection of a splendid palace at the national expense. He opened the campaign of 1705 by the capture of Sluys, a success which he followed up by forcing the French entrenchments on the Meuse, though Villeroy had

exhausted all the resources of his skill upon their construction, and posted behind them an army of 70,000 men.

It is impossible in our narrow limits even to catalogue all the brilliant operations conducted by the genius of Marlborough. We must content ourselves with dwelling upon the more important. Thus, the campaign of 1706 was distinguished by the great victory of Ramilies (May 23), fought on a tract of elevated table-land which lies between the river Meuse and the Great Ghut. The two armies were nearly equal: the allies mustering 60,000, and the French, under Villeroy, 62,000. A brilliant charge, headed by Marlborough in person, decided the fortune of the day, and the French fled in complete disorder, with a loss of 6000 prisoners and 7000 killed and wounded. This victory delivered almost the whole of Austrian Flanders from the hard gripe of France. Brussels, Louvain, Mechlin, Alost, Sensi, Ghent, Bruges, Daun, Oudenarde, joyfully opened their gates to the victor. Only Dunkirk and Nieuport, Ostend and Antwerp, remained in the hands of the French, and these were reduced before the end of the campaign.

In 1707 Marlborough visited Charles XII. of Sweden, to secure his co-operation on the side of the allies. He was received by the northern warrior with the most marked distinction, and was completely successful in his mission.

The year 1708 was rendered famous by the victory of Oudenarde (July 11th), which crushed the army of Vendôme. The French numbered 85,000, and the allies 80,000 men. The action on both sides was fought with determined courage, but the genius of Marlborough and the persistent valour of his troops eventually prevailed. The French had 6000 killed and wounded, and 9000 made prisoners. 'If we had been so happy,' wrote Marlborough, 'as to have had two more hours of daylight, I believe we should have made an end of this war.'

Meanwhile, the strife of political parties in England had risen to a furious height, and the Tory faction did not hesitate to accuse Marlborough of prolonging the war for his own personal gain. Undeterred by their calumnies, the great general pursued his triumphant career, captured Lille, Ghent, and Brussels, and foiled the designs of the French marshal at every point. In the following year, on the 11th of August, he fought the sanguinary battle of Malplaquet, the last of his great victories, and in some respects the most extraordinary of his achievements. The French numbered 95,000 men, with 80 guns, under their two greatest generals, Villars and Boufflers. The allies counted 93,000 men, and 105 guns. But the position occupied by the French was one of extraordinary strength: they were posted on the summit of a steep acclivity, between two woods, and only accessible by two narrow and difficult defiles; and this acclivity bristled with redoubts and palisades, stockades and abatis, mounted with heavy guns, and defended by the finest troops of France. Yet against this apparently impregnable stronghold, which was really a masterpiece of engineering science, Marlborough dared to lead his soldiers. Charge upon charge was made with splendid impetuosity, and repulsed with steady valour. The fortune of the day seemed to waver in the balance, when Marlborough's

eagle eye detecting a weak point in the enemy's centre, hurled upon it a heavy force of infantry, supported by several columns of cavalry, and crushed through the hostile lines. The battle was won, but at such terrible cost that Marlborough could not pursue the retreating French, and its only substantial results, except that it proved, what the world already knew, the surpassing genius of the English commander, was the capture of Mons.

In this sanguinary fight the allies lost 5544 killed, and 12,706 wounded or missing; in all, 18,250. The total loss of the French was computed at 14,000, a difference due to the immense strength of their position.

On his return to England, Marlborough was received by the nation with indifference, by the queen with studied neglect. He found the reins of power slipping from his grasp, and his fall accelerated by the ungovernable temper of his wife, who had completely alienated the queen's affections. The Tory faction was daily increasing in favour at court and parliamentary influence, and the great general, disgusted with party intrigues, gladly returned to the Continent to resume the conduct of the war.

The campaigns of 1710 and 1711 were in themselves sufficient to have secured the renown of any other commander, but they could do little to increase the glory of the victor of Blenheim. His career, however, was cut short by the Treaty of Utrecht, somewhat hastily concluded under the auspices of a Tory ministry, and whose preliminaries were signed on the 27th of November, 1712. Marlborough immediately dismissed his army into winter quarters, and returned to England, where a storm of obloquy broke upon his devoted head. He was accused of fraud and peculation, and dismissed from all his appointments. The charges brought against him he rebutted with his usual serene composure, and then withdrew from the calumnies of an ungrateful people, to receive from foreign countries the honours which he so justly deserved. Wherever he passed, it is said, crowds of all ranks were waiting to see him, were it only to get a glimpse of the hero who had saved the empire, and filled the world with his renown. All were struck with his noble air and demeanour, softened, though not weakened, by the approach of age. They declared that his appearance was not less overpowering than his sword. His manner was so courteous and yet animated, his conversation so simple and yet cheerful, that it was commonly said at the time, 'that the only things he had forgotten were his own deeds, and the only things he remembered were the misfortunes of others.'

Marlborough warmly supported the Elector of Hanover's right of succession to the English throne. On the death of Queen Anne he returned to England (August, 1714), and received from George I. the appointments of Captain-general of the Army and Master of the Ordnance. His last professional service was to plan the details of the campaign of 1715-16 against the rebels in Scotland, but he did not in person take the field. The deaths of two of his daughters at short intervals were severe blows to his already weakened frame. On the 28th of May, 1716, he was seized with a severe paralytic fit, and the attack was repeated in November of the same year. He partially recovered from their effects, and

occasionally attended in his place in the House of Lords up to the 17th of November, 1721. In the following June he was prostrated by paralysis for the third time, and after lingering a few days, expired in peace, on the 16th of June, 1722.

(The reader may consult the following authorities in reference to the life and military career of this illustrious commander, who, we may add, was scarcely less able as a statesman and skilful as a diplomatist, while he was one of the greatest masters of the art of war the world has ever seen:—Coxe, *Life of Marlborough*; Lediard's *Life*; Alison's *Military Life*; Sir G. Murray's *Letters and Despatches*; Lord Macaulay, *History of England*; Dumont's *Military History*; Milner's *Journal of Marlborough's Campaigns*; Kausler, *Vie du Prince Eugène*; and Cunningham's *History of the Reign of Queen Anne*.)

MARLOW, GREAT. [BUCKINGHAMSHIRE.]

MARLOWE, CHRISTOPHER, was born, according to Malone, in 1565. He was entered of Corpus Christi College, Cambridge, took his bachelor of arts degree in 1583, and that of master of arts in 1587. On leaving the university he became a dramatic writer and perhaps an actor. His moral character appears to have been bad, and he was slain in a quarrel in a house of ill fame.

The following plays are attributed to him:—'Dr. Faustus,' 'Edward the Second,' 'The Jew of Malta,' 'Tamburlaine the Great,' 'Lust's Dominion,' 'The Massacre at Paris,' and 'Dido, Queen of Carthage.' The prevailing opinion, however, is that the first three only are his sole productions.

To Marlowe we are indebted for the first regular form of the English drama cleared of rhymes; and he may be considered as the link between the Moralities and Shakspeare. His style has been aptly characterized as 'Marlowe's mighty line,' and he frequently attains a high standard of poetical expression. 'Faustus' is nearly a 'morality,' 'Edward the Second' is a regularly formed 'history.' Besides his plays, Marlowe translated Ovid's 'Art of Love,' and some other classical works.

MARLSTONE, in Geology. Sandy, calcareous, and irony strata, which divide the upper from the lower lias clays, are thus designated. This mass of rocks is nowhere so well developed as in Yorkshire and Leicestershire. The term is also employed to designate species of coarse limestone of different ages.

MARMALADE, a sort of preserve made with sugar and the Seville or bitter orange, a variety of the fruit of the *Citrus Bigaradia*. It is more wholesome when properly made, i.e., when the rind is soft, than most other sweet preserves, as the bitter communicates tonic and stomachic properties to it.

MARMANDE. [LOT-ET-GARONNE.]

MARMARA, or MARMORA, SEA OF, the *Propontis* of the ancients, is situated between the Grecian Archipelago and the Black Sea, communicating with the former by the Dardanelles, the ancient Hellespont, and with the latter by the Strait of Constantinople, the ancient Bósporus. Its extreme length from W. to E., including the Gulf of Ismid, is 172 miles; and its greatest breadth is 55 miles. The sea is very deep. There are no tides, but a current sets in from the Bosphorus.

MARMONT, MARSHAL, DUKE OF RAGUSA (Augustus Frederic Louis Viesse de Marmont), one

of the most distinguished of Napoleon's generals, was born of a noble family at Chatillon-sur-Seine, on the 20th July, 1774. After receiving a good education he entered the army at the age of fifteen, as sub-lieutenant of infantry, but in 1792 he quitted the line for the artillery. At the siege of Toulon his skill and enthusiasm attracted Bonaparte's attention, and in 1796 he accompanied the young conqueror to Italy. At the battle of Lodi he carried away, at the head of a cavalry detachment, the first gun captured from the enemy; he also distinguished himself in the hot fight at Castiglione, and at the desperate battle of St. George largely contributed to the success of the day.

After the peace of Campo Formio in 1797, he returned to Paris and married the daughter of M. Perregaud, the wealthy banker. Matrimonial joys, however, could not turn him aside from the path of glory, and he followed Napoleon to Egypt, where he was intrusted with the defence of Alexandria. Constantly attached to Napoleon's person, he returned with him to Europe, and after the revolution of the 18th Brumaire was appointed a councillor of state, and promoted to the chief command of the artillery of reserve. At the great battle of Marengo he directed the artillery, and moved it within musket shot of the Austrian lines. At the end of this brilliant campaign he returned to Paris, and received as the reward of his services the inspector-generalship of artillery.

In the war of 1803 he effected the conquest of Styria, and being afterwards ordered to Dalmatia, he gained, with only six thousand troops worn with fatigue and disease, the victory of Castel-Nuovo, over 7000 Russians and 10,000 Montenegrins.

In the campaign of 1810 he was present at the decisive battle of Wagram, and for his gallant conduct at Znaim received a marshal's baton on the field. He was shortly afterwards created Duke of Ragusa, and appointed governor of the Illyrian provinces. From thence he was called, in 1811, to replace Marshal Massena in the command of the army of Portugal, which he found deplorably disorganized, but soon rehabilitated by his skill and firmness. Having effected a junction with the army of Soult, he forced Wellington, by superiority of numbers, to raise the siege of Badajoz, and then followed him up towards Salamanca. Here the two armies confronted each other in an attitude of expectancy, till a false movement of Marmont's placed him in the power of his wary antagonist, who inflicted upon him a crushing defeat. Marmont, severely wounded in the action, was obliged to have his arm amputated, and did not re-enter active service until the campaign of 1813.

After the fall of Napoleon, Marmont gave in his adhesion to Louis XVIII., and remained faithful to the Bourbons during the Hundred Days. In 1817, as the king's lieutenant, he suppressed a violent insurrection at Lyons, without bloodshed, by his sagacity and discretion.

When the Revolution of 1830 broke out, Marmont accompanied Charles X. to England, where he lived in retirement for several years. His name was expunged from the list of marshals by Louis Philippe, an act unworthy of the monarch, as the private character of Marmont was free from all reproach.

He died in 1852, in the seventy-eighth year of his age.

MARMONTEL, JEAN FRANÇOIS, was born at Bort in Limousin, in 1723. At an early age he became professor of philosophy at a seminary of the Bernardins at Toulouse, and supported his widowed mother and her family. An acquaintance with Voltaire brought him to Paris in 1745. Voltaire introduced him to several persons of distinction, and the success of his first tragedy, 'Denys le Tyran,' stamped him as a dramatic poet of no mean merit. His celebrated 'Contes Moraux' gained him great reputation. On the death of Duclos he became historiographer of France; and in 1783 secretary to the Académie in the place of D'Alembert. He lost his appointments and his property on the breaking out of the Revolution, and he removed some distance from Paris in a state of destitution. In 1796 he became a member of the National Institute, and in 1797 was elected into the council of the ancients, but this election having been reversed after the 18th Fructidor (September 4) in the same year, he retired to Abbeville, where he died in 1799, and was buried in his own garden by Catholic priests.

MARMORA, SEA OF. [MARMARA, SEA OF.]

MARMOSET (*Uapale*), a genus of *Platyrrhinae*, or American monkeys. They are small and elegant forms, and much sought after as pets. The marmosets are chiefly insect feeders, though they also take fruits and small birds. They inhabit the forests of Brazil. Above thirty species have been described. They are very nimble little creatures, and exceedingly graceful in their movements.

MARMOT. [MURIDE.]

MARNE, a department in France, formed out of a portion of the province of Champagne, is bounded N. by the departments of Aisne and Ardennes, E. by those of Meuse and Haute-Marne, S. by that of Aube, and W. by Seine-et-Marne and Aisne. Its greatest length from N.E. to S.W. is 81 miles, from N.W. to S.E. 74 miles. The area is 3154 square miles, and the population in 1861 was 385,498.

Surface, Soil, and Aspect.—From the centre to the north of the department the arid and almost barren soil consists of a thin layer of sandy earth not two inches in depth, and resting on a chalk bottom. These sandy plains, formerly destitute of all vegetation, have been lately planted with Scotch pines. Between Rheims and Fismes the land is good, and along the western border, and in the valley of the Marne, there is some strong deep land. Again in the Perthois district, in the south-east of the department, along a considerable margin from Vitry to Sainte-Ménéould, and in the valley of the Aisne, the soil is in general rich and productive.

Rivers.—The department takes its name from the river *Marne* (the *Matrona* of Julius Cæsar), which rises in the department of Haute-Marne, about 3 miles S. from Langres, and flowing nearly N. past St.-Dizier, then sweeps round to the west, and enters the department of Marne: here its course is N.W. past Vitry and as far as Châlons, whence it flows W., and continues in this general direction across the south of the department of Aisne, the north of Seine-et-Marne, and to its junction with the Seine at Charenton, in the department of Seine-et-Oise. Its whole length is 217 miles, of which 147, from

St.-Dizier to its mouth, are navigable. Its principal feeders on the right bank are the Rognon, the Saulx (which receives the Ornain), and the Ourcq; on the left bank the Blaise, the Collé, the Some-Soude, the Grand-Morin, and the Petit-Morin. The Marne is connected with the Rhine by a canal. The north of the department is drained by the AISNE.

Climate and Produce.—The climate is temperate and the air pure, except along the eastern and western borders of the department, where in the low, rich, and sometimes marshy bottoms fogs are not unfrequent at certain seasons of the year.

The vine for the production of the famous Champagne wines is the chief object of the landholder's care all through the department, more especially in the arrondissement of Rheims and Épernay, wherein the white wines of Sillery, Aï, Mareuil, Pierry, Épernay, and Dizy, and the pink wines of Verzenay, Verzy, Bouzy, Taissy, Cumières, Aï, Hautvilliers, Mareuil, Dizy, and Pierry (all of the first class, differing and distinguishable from one another by certain inexpressible elements of excellence), are produced from the hungry chalky soil on which little else than the vine bush will grow. The excellent qualities of the Champagne wines are owing, however, not wholly to the peculiarity of the soil, but in a great degree also to the unremitting care of the growers in the selection and management of their vines, and in the manipulation of the wines, which experience teaches them to make so as to suit the different palates of the lovers of Champagne in the various countries of the world. A curious fact is that the best white Champagne wines are made from black grapes. These are suffered to remain on the vine till they attain perfect maturity; when gathered they are put in the wine press, and the first pressings are set apart for wine of the first quality. The juice thus obtained is put into a tun, where it remains from twenty to thirty hours, after which time it is put into sulphured casks, and these are deposited in cool cellars. During the frosty weather the wine is transferred into other casks, and clarified by means of isinglass; this process is repeated once or twice (if necessary) after an interval of a fortnight each time. From the 20th to the 30th of March the bottling process for the effervescing wine begins, but this is sometimes delayed even to the end of May, as the greatest attention must be paid to the temperature of the air, otherwise the delicacy of the wine and its effervescence would be materially injured. The bottles are placed in deep cellars, so as to have the most equable temperature possible, in order to diminish the chance of loss by breakage, which, however, when the wines become brisk in the autumn, often amounts to 20 per cent. Some of the largest dealers have cellars excavated in the chalk-rock, with compartments and passages extending for several miles. They are furnished with tramways, ventilated and lighted with shafts, and usually contain thousands of pipes and millions of bottles in stock. One merchant, for example, has ordinarily about 5,000,000 bottles in stock, and his corks alone cost 6000*l.* a year.

A fine breed of sheep is reared in the department; game is abundant; deer and wild boars are met with in the forests; the rivers and ponds yield abundance of fish; poultry is plentiful; bees are carefully tended.

Chalk, flint, millstone of the best quality, building stone, potter's and brick clay, and turf, are the chief mineral productions.

The manufactures are woollen stuffs of all kinds, bonnets, and cotton hosiery, which centre chiefly at Rheims. There are also several tan-yards, dye-houses, paper-mills, glass-works, potteries, rope-walks, oil-mills, soaperies, and establishments for the making of Spanish white.

The most important article of commerce is Champagne wine, the great marts for which are Rheims and Épernay. Other articles of trade are corn, flour, and brandy.

Divisions and Chief Towns.—The department contains 2,019,015 acres, and is divided into five arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1861.
Châlons-sur-Marne, . .	5	105	58,007
Épernay, . .	9	177	95,740
Rheims, . .	10	181	147,025
Sainte-Ménéhould, . .	3	80	34,074
Vitry-le-François, . .	5	124	50,652
Total, . .	32	667	385,498

In the arrondissement of Châlons-sur-Marne, the chief town is CHALONS-SUR-MARNE, which is also the capital of the department. *Suippes*, a well-built little town, of 2204 inhabitants, stands E.N.E. of Châlons, on the Suippe, a feeder of the Aisne. *Vertus*, an ill built town at the foot of a high vine-clad hill, W. by S. from Châlons, has 2469 inhabitants, and a considerable trade in wine.

Of the arrondissement of Épernay, the chief town, *Épernay*, stands in a rich vine district, near the left bank of the river Marne, which is here crossed by a bridge of seven arches. The town is well built, clean, and well paved. It has a college, and 10,598 inhabitants, who manufacture hosiery, pottery, refined sugar, and leather; and trade largely in bottles, corks, wire, champagne wines, &c. *Dormans*, a small town W. of Épernay, on the left bank of the Marne, has 2244 inhabitants. *Fère-Champenoise*, S. of Épernay, the scene of the defeat of Marshals Marmont and Mortier by the Austro-Russian army under Schwartzberg (March 25, 1814), stands on the Pleurs, and has 2042 inhabitants. *Montmirail*, situated on a hill near the right bank of the Petit-Morin, a feeder of the Marne, has a population of 2610. Napoleon defeated a large force of Russians and Prussians here, February 11, 1814. *Sézanne*, an ancient and well built town, has 4450 inhabitants, who manufacture coarse woollens, hosiery, tiles, bricks, lime, pottery, flour, oil, and leather. Sézanne was formerly fortified, and stood several sieges; the site of its defences is now laid out in gardens and public walks.

In the arrondissement of Rheims, the chief town is RHEIMS. *Ay*, or *Aï*, near the right bank of the Marne and nearly opposite to Épernay, has 3418 inhabitants, who are chiefly employed in the culture of the

vine and in the distillation of brandy. *Fismes*, in the north-west of the department, on the left bank of the Vesle, is a well built walled town, with 2787 inhabitants, who manufacture woollen cloth, and trade in flour, wine, hemp, wool, &c.

Of the arrondissement of Sainte-Ménéhould, the chief town, *Sainte-Ménéhould*, situated in a pretty, well-wooded country on the Aisne, in the east of the department, has a college, and 4300 inhabitants, who manufacture hosiery, leather, and small wares. In the environs there are several iron forges, glass-works, and potteries. This place was destroyed by fire in 1719, after which it was regularly built. It was once fortified, and taken by Louis XIV. in 1653.

The arrondissement of Vitry-le-François is named after its chief town, *Vitry-le-François*, or *Vitry-sur-Marne*, a well-built, fortified town on the right bank of the Marne, 20 miles S.E. from Châlons, and has 7622 inhabitants. The streets are wide, straight, and clean; the houses are mostly of wood; the supply of water is from twenty-seven fountains, from which also streams run through all the streets. The central square, on one side of which is a church of large dimensions, is adorned with a handsome fountain, and planted with a double row of lime trees. The manufactures are hosiery, cotton yarn, oil; the chief trade is in corn, wool, wood, and charcoal.

The department, with the exception of the arrondissement of Rheims, which, with the department of Ardennes, is included in the see of the archbishop of Rheims, forms the see of the bishop of Châlons. It is comprised in the jurisdiction of the Cour Impériale and Academy of Paris, and belongs to the fourth Military Division, of which Châlons is head-quarters. It returns three members to the Chamber of Deputies.

(*Dictionnaire de la France; Annuaire pour l'An 1866; Statistique de la France.*)

MARNE, HAUTE, a department in France formed out of the southern part of the province of Champagne, and of small portions of Bourgogne, the duchy of Bar, and Franche-Comté, is bounded N. by the departments of Marne and Meuse, E. by that of Vosges, S. by Haute-Saône and Côte-d'Or, and W. by the department of Aube. Its greatest length is 78 miles, and the average width is 37 miles. The area is 2413 square miles, and the population in 1861 was 254,413.

The department is mountainous. The plateau of Langres, which links the Cevennes to the Vosges mountains, and forms part of the watershed between the Mediterranean and the Atlantic, covers the greater part of the south of the department, and sends northwards numerous ramifications along both banks of the Marne. These mountains rise near Langres to about 2500 feet above the sea; they diminish in height as they advance northwards. The valleys extend mostly north and south. In the arrondissement of Vassy, in the north of the department, there are some fine valleys and extensive plains. Here and there all through the department, outlying hills, either singly or in groups, give variety to the surface. More than one-third of the department is covered with forests, in which oak, beech, ash, maple, birch, and poplar are the principal trees.

Rivers.—The principal rivers are the MARNE, the MEUSE, and the AUPE.

Climate.—The climate is very healthy; the air is

pure and keen in the mountains, where the winters are very cold. In many of the valleys, especially in those that open into the basin of the Saône, the temperature is warm and equable.

Products.—The vine is extensively cultivated in favourable situations, and the wine made is of ordinary quality. The milch cattle of the department are of good breed; horses and sheep are small; goats are numerous; poultry and game of all kinds are plentiful.

The department has some of the most important iron mines in France; the metal is smelted and manufactured into bars, utensils, and tools in more than 100 furnaces and foundries, in which wood charcoal is the fuel exclusively used. Building stone, marble, alabaster, gypsum, &c., are quarried. Marl, brick-earth, fuller's clay, and turf are dug. Besides ironmongery and cutlery, the industrial products include brandy, vinegar, cotton and woollen yarn, drugget, woollen stockings, leather gloves, cast-iron tubes, paper, leather, beer, &c. Timber furnishes the principal article of export.

Divisions, Chief Towns, &c.—The department contains 1,544,571 acres, and is divided into three arrondissements, which, with their sub-divisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop.in1861.
Chaumont, . .	10	195	83,386
Langres, . . .	10	210	97,414
Vassy, . . .	8	145	73,613
Total, . .	28	550	254,413

Of the arrondissement of Chaumont and of the whole department, the chief town is *Chaumont-en-Bassigny*, which stands on a hill at the junction of the Marne and Suize, in 48° 6' 47" N. lat., 5° 8' 19" E. long., 134 miles S.E. from Paris, and has a tribunal of commerce, a college, and 7140 inhabitants. The supply of water is from twelve wells and four fountains, to which last the waters of the Suize are raised by an hydraulic engine. The principal buildings are—the church of St. Jean, the college buildings, the hospital, the remains of the castle of the counts of Champagne, the public library, and the town-hall, an elegant modern structure. The manufactures are woollen stockings, gloves, serge, drugget, common woollen cloth, cotton and linen yarn, leather, beet-root sugar, &c. A good trade in iron and iron wares is also carried on. It was at this town that the allied powers concluded a treaty against Napoleon I. (contingent on his refusal to accept the terms proposed at Chatillon), on the 1st March, 1814. *Château-Villain*, 12 miles W. by S. from Chaumont, stands on the left bank of the Aujon, and has iron forges and smelting furnaces, and 1784 inhabitants. *Nogent-le-Roi*, 12 miles S. by E. from Chaumont, near the right bank of the Treire, is the centre of a considerable cutlery manufacture, and has 3443 inhabitants.

In the arrondissement of Langres, the chief town is LANGRES. *Bourbonne-les-Bains*, celebrated for its warm springs, is situated on the southern side of the plateau of Langres, and on the Apance, a feeder of the Saône. It is frequented chiefly by persons

troubled with paralysis and with gunshot wounds, and has a large military hospital. The regular season is from May to October; but the baths are frequented more or less during the whole year. The temperature of this saline spring is from 122° to 167° Fahr. Cotton, wool, and silk manufactures are carried on; there are also tanneries, foundries, and brick works. The inhabitants numbered 4080 at the last census. *Fayl-Billot*, S.E. of Langres, has 2335 inhabitants. *Montigny-le-Roi*, a small town of 1199 inhabitants, deserves notice on account of its situation near the source of the Meuse.

Of the arrondissement of Vassy, the chief town, *Vassy*, is prettily situated on the right bank of the Blaise, 28 miles N. from Chaumont, and has 2927 inhabitants, who manufacture calico, druggot, iron-mongery, pottery, and leather. There are several iron forges and smelting works near it. *Vassy* is noted in history for the massacre of its Protestant inhabitants, by order of the duke of Guise, in 1562. *Joinville*, situated on the Marne, at the foot of a hill, on the summit of which formerly stood the castle of the Sires de Joinville, has several iron works, a communal college, and 3390 inhabitants. The duke of Orléans, father of the late king of France, had the castle demolished in 1790; the church remained till 1792, when it was destroyed, with the tombs of the lords of Joinville, and all the curious relics it contained. In 1841 such of the remains as had been preserved or recovered were solemnly deposited in the cemetery of the town, and a tomb, with a suitable inscription, was erected over them at the expense of Louis Philippe. Machinery, woollen hosiery, druggot, tartan, linen, cotton, woollen yarn, and serge are manufactured in this town. *St.-Dizier*, a well built town, with wide regular streets, stands on the right bank of the Marne, which here begins to be navigable, at a distance of 9 miles N. from Vassy, and has a tribunal of commerce, a college, and 8077 inhabitants. The town-hall and the remains of an ancient castle are the most interesting structures in the town. Its chief industrial establishments are iron forges and foundries, docks for building vessels, and cotton factories. There is also a considerable export trade in iron, timber, &c. In 1544, *St.-Dizier* sustained a memorable siege by the Emperor Charles V., and in 1814 the French troops here twice defeated a portion of the allied army.

The department forms the see of the bishop of Langres, is included in the jurisdiction of the Cour Impériale and Academy of Dijon, and belongs to the seventh Military Division, of which Besançon is headquarters. It now returns two members to the Chamber of Deputies.

(*Dictionnaire de la France; Annuaire pour l'An 1866; Statistique de la France.*)

MARONITES, the name of a community of Christians belonging to the Western or Roman church, and living on Mount Lebanon. They are neighbours of, allied to, and in some places mixed with the Druses, and, like them, are partly independent of the Turkish power. [**DRUSES.**] The Maronites occupy the valleys and fastnesses of the principal ridge of Lebanon east of Beyrût and Tripoli, and they extend inland as far as the Bekaâ, or plain between the Libanus and Anti-Libanus. The town of Zhaklé, in the valley of Bekaâ, contains between

10,000 and 12,000 inhabitants, chiefly Maronites. But the tract of country in which the great bulk of the sect reside is called Kesranan. It extends along the Libanus ridge from the Nahr el Kelb, a stream which enters the sea 12 miles north of Beyrût, to the Nahr el Kebir, north of Tripoli, the ancient Aradus, on which side the Maronites border on the Nosairis, or Ansaryii, who extend to the northward towards Latakiah, and the Ismaelians, who live farther inland, near the banks of the Orontes. [**ISMAELITES.**] In their internal concerns the Maronites are governed by their own sheiks, of whom there is one in every village, from whose decision there is an appeal to the bishops, who have great authority; and in some cases to the emir of the Druses, and his divan, or council. The clergy are very numerous; the secular parish clergy are married, as in the Greek church; but the regular clergy, who are said to amount to 25,000, and are distributed among about 200 convents, follow the rule of St. Anthony, and are bound by vows of chastity and obedience. Every convent is a farm. The convents are under the jurisdiction of bishops, of whom there is one in every large village. They are under the obligation of celibacy, and collectively elect the patriarch, who is confirmed by the pope, whose residence is at the convent of Kanobin, in a valley of the Libanus, south-east of Tripoli.

The Maronites derive their name from a monk of the name of Maron, who, in the fifth century, collected a number of followers, and founded several convents in these mountains. When the Monothelite heresy prevailed in the East in the eighth century, many Christians who did not embrace its tenets took refuge in the fastnesses of Libanus, around the convents, and thus the name of Maronites was assumed by the population of the mountains. They were reconciled to the Church of Rome in the twelfth century.

The Maronite population is said to be above 200,000 individuals, and to contain between thirty and forty thousand men fit for military service. Their language is Arabic, and by their appearance and habits they belong to the Arabian race.

MAROONS (supposed to be derived from a Spanish-American word signifying *hog-hunters*), a name given in Jamaica to a peculiar race, sprung from runaway negroes, with some admixture of Spanish blood. After Jamaica was conquered from the Spaniards they occupied the mountainous districts, and in 1730 and 1795 rose in arms against the British power. They are now confined to a particular region, are noted for their hatred to the negro, and their great loyalty to the British crown. [**JAMAICA.**]

MAROT, CLÉMENT, born at Cahors in 1495, entered the service of the duchess of Alençon as page. He afterwards followed Francis I. to Italy, and was wounded and taken prisoner at the battle of Pavia. He experienced a succession of good and evil fortune, and remained attached to the French court. He is known for his 'Enfer,' a satire, his poetical version of 'the Psalms,' and his 'Roman de la Rose,' and various other works, which possess the simplicity of the age united with grace and poetical fancy. He died at Turin in 1544.

MARQUE, LETTERS OF. The system of reprisal for injuries to foreign potentates has been

legalized from the most ancient times, and the subjects of a state were armed with powers to make reprisals by the sovereign power, by an instrument called letters of marque. In pursuance of this principle it was in this country declared by the Statute 4 Henry V. c. 7, that if any subjects of the realm were oppressed in the time of truce by any foreigners, the king would grant *marque* in due form to all that felt themselves aggrieved. The sufferer first applied to the lord privy seal, who made out letters of request; and if after request of satisfaction was made the party did not make restitution to the person aggrieved, the lord chancellor then made out letters of *marque* under the great seal, and then the aggressor might be attacked. But this manner of granting letters of *marque* has long been disused, and they were only granted in time of war to merchants to fit out privateers for the purpose of preying on the commerce of any nation with whom we were at war. But this system even has been abandoned by this country.

MARQUESAS ISLANDS are situated in the Pacific, and extend about 200 miles in a N.W. and S.E. direction, between $10^{\circ} 30'$ and $7^{\circ} 50'$ S. lat., and 139° and 141° W. long. They were so called by their discoverers in honour of the marquis of Mendoza, the viceroy of Peru. A wide channel divides them into two groups, of which the south-eastern contains five, and the north-western eight islands. The former were discovered by Neyra in 1595; the latter, having been discovered by the Americans in 1797, are also called Washington's Islands.

The largest islands of the southern group are Santa Dominica, or Hiwaou, Santa Christina, or Tahuata, and Hood's Island, or Tiboia. The principal islands of the northern group are, Noukahiva, Nohiva, Uahuga, and Uapoa, or Roapoa. Noukahiva, the largest, is nearly 20 miles long from south-east to north-west, and 70 miles in circumference. Here the French have a small settlement, founded in 1842.

An elevated ridge of verdurous mountains traverses each island longitudinally, and in the larger one rises to an elevation of 2000 or 3000 feet. On both sides they throw out high offsets, which extend to the shores of the sea, and thus divide the littoral into valleys. The mountains are rugged, but the valleys fertile. The islands afford several excellent harbours, though the coast consists of a range of gloomy and precipitous cliffs. The climate is rather warm, but healthy. The inhabitants cultivate fruits and tropical plants. Land animals are few, but fish is abundant.

The population, estimated to number 13,000 altogether, belong to the same race that peopled the Society and Sandwich Islands, of which their language and bodily conformation offer undoubted proof. Their complexion is of a copper colour. They have carried the art of tattooing the body to a greater degree of perfection than any nation, those of distinguished persons being covered all over with regular figures of a very tasteful pattern. They are cannibals.

MARQUETRY and PARQUETRY are two names for grouping small pieces of wood into ornamental devices, the one for producing pictures and small decorative works, and the other for floors. Most *marquetry* work is a delicate kind of veneering. The ground-work is well-dried oak or fir, secured from

warping. The coloured woods are sawn into very thin plates, and dyed or otherwise prepared. They are then cut into the requisite shape by means of an exceedingly delicate saw, and the subsequent process is almost precisely similar to that of veneering and INLAYING. The cabinetmakers of France, Italy, Belgium, and Germany are remarkable for the beautiful *marquetry* furniture they manufacture. Sometimes the wood is inlaid with other materials, such as metal, ivory, shell, &c. *Parquetry* is a plainer kind of *marquetry*, little varied as to the different colours of the wood, and generally used as flooring. At Windsor Castle, the Royal Exchange, and other places, *parquetry* floors have been laid down in recent years.

MARQUIS, a title of honour in England, France and Italy. It ranks second in the five orders of English nobility. The younger sons of marquises are usually addressed as 'my lord.' [MARCHES.]

There were no English marquises before the reign of Richard II. In the reign of Edward III, a foreign marquis, the Marquis Juliers, was made an English peer with the title of Earl of Cambridge, and this circumstance probably suggested to King Richard the introduction of the new order of nobility. The person on whom it was conferred was his favourite Robert de Vere, earl of Oxford, created Duke of Ireland and Marquis of Dublin in 1385.

The only nobleman sitting in the House of Peers as a marquis, whose title dates before the reign of George III., is the marquis of Winchester. The other *marquisates* are all of recent creation, though most of them were old peerages under inferior titles.

The title seems not to have been known in Scotland till 1599, when the *marquisates* of Huntly and Hamilton were created.

MARRIAGE is an agreement by which a man and a woman enter into a mutual engagement, in the form prescribed by the law of the country in which they reside, to live together as husband and wife during the remainder of their lives.

Marriage is treated as a civil contract even by those Christians who regard it as a sacrament, and as typical of the union between Christ and the church. The religious character of the transaction does not arise until there has been a complete civil contract, binding according to the law of the country in which the marriage is contracted. The authority of the sovereign power in regulating and prohibiting marriages is therefore not affected by the superinduced religious character.

Among Protestants marriage has ceased to be regarded as a sacrament, yet in most Protestant countries the entrance into the marriage state is accompanied with religious observances. These are not, however, essential to a valid marriage, any further than the law may have annexed them to and incorporated them with the civil contract.

In England, marriage by mere consent of parties, until the passing of the Marriage Act in 1753, constituted a binding engagement; though if application were made to the ecclesiastical courts for letters of administration, &c., under a title derived through such irregular marriage, those courts sometimes showed their resentment of the irregularity by refusing their assistance, more especially where the non-compliance with the usual formalities could be traced

to disaffection to the Established Church. What the formalities required by the church before the Marriage Acts were, it is now immaterial to consider. Such of them as are not incorporated into any of the Marriage Acts are now of no use.

To constitute a valid marriage, as well before as since the Marriage Acts, it is necessary, 1st, that there should be two persons capable of standing in the relation of husband and wife to each other; 2ndly, that they should be willing to stand in that relation; and 3rdly, that they should have contracted with one another to stand in that relation.

1. The capacity of standing in the relation of husband and wife implies, that at the time of the contract there should be no natural or legal disability. Total and permanent disability on either side to consummate marriage will render the contract void. Temporary disability from disease does not affect the validity of a marriage. Temporary disability from defect of age does not invalidate the marriage, but it leaves the party or parties at liberty to avoid or to confirm such premature union on attaining the age of consent, which for males is fourteen, and for females twelve. A person who is already married is under a legal disability to contract a second marriage whilst the first wife or husband is alive.

Consanguinity within certain degrees, and affinity also, is a legal impediment to marriage. The degree of nearness which shall disable parties from uniting in marriage varies in different countries, and has varied at different periods in our own. [AFFINITY.]

The impediment to marriage arising out of consanguinity applies in the same degree to illegitimate as to legitimate consanguinity, and the impediment resulting from affinity is created by illicit connection as well as by marriage. The Council of Trent restricted the impediment of affinity arising out of illicit connection to the second degree.

2. Each party must have the will to contract marriage with the other. An idiot, therefore, who cannot understand the nature of the conjugal relation, is incapable of contracting marriage; and also a lunatic, except during a lucid interval. But, however absurd it may appear, children are presumed to have sufficient intelligence to understand the nature of the marriage engagement at seven; and though the contract is not absolutely binding upon them until they reach the age of consent, still the marriage of a child above the age of seven would prevent its forming a second marriage until the age of consent, as until that age it cannot dissent from the first marriage.

3. There must be an actual contract of marriage. This, at common law, might be by words of present contract, which would, without more, constitute a perfect marriage—or by words of future contract, followed by cohabitation.

The unlimited freedom of marriage was first limited in England by the Marriage Act of 1753 (26 Geo. II. c. 33), the principal provisions of which form the basis of the present law.

The restrictions upon the common law freedom of marriage are now embodied in two statutes.

The 4 Geo. IV. c. 76, contains numerous provisions:—Banns of matrimony are to be published in the church, or a public chapel in which banns are allowed to be published, of the parish or chapelry

wherein each of the parties dwells, immediately after the second lesson of morning service, or of evening service if there be no morning service, upon three Sundays preceding the solemnization (s. 2). No license of marriage (that is, dispensation from the obligation to publish banns) is to be granted to solemnize marriage in any church or chapel not belonging to the parish or chapelry within which the usual place of abode of one of the parties has been for fifteen days immediately before the granting of the licence (s. 10). A marriage must be performed between the hours of eight in the forenoon and twelve at noon. For the other provisions the Act should be consulted.

The 6 & 7 Will. IV. c. 85 (amended by 7 Will. IV. and 1 Vict. c. 22, and 3 & 4 Vict. c. 72), was passed chiefly in favour of those who scrupled at joining in the services of the Established Church; and it contains numerous provisions for this purpose.

Persons who object to marry in a registered place of worship may, after due notice and certificate issued, according to the provisions of this Act, contract and solemnize marriage at the office of the superintendent registrar, and in his presence and in that of some registrar of the district, and of two witnesses.

These statutes do not extend to marriages contracted out of England, or to marriages of the royal family, which are regulated by a particular statute, 12 Geo. III. c. 11.

In August, 1844, an Act was passed (7 & 8 Vict. c. 81) relating to marriages in Ireland, and for registering such marriages, which came into operation April 1st., 1845. It establishes a system very nearly similar to that which exists in England and Wales under 6 & 7 Will. IV. c. 85.

Generally speaking, a marriage, valid according to the law of the country in which it was contracted, is valid in every other country, but this depends upon the law of domicile of the parties: thus if the contracting parties being in the relation of husband and deceased wife's sister marry abroad where it is lawful, and they be of English domicile, then the marriage is a nullity in this country: but if the parties had been domiciled abroad, then the marriage would be lawful here also. This is the general rule of law among European nations and nations of European origin. All marriages must be registered.

In Scotch law, marriage is a consensual contract, requiring no particular solemnity, nor even written evidence, but only the consent of parties to complete it. The essential requisite of the contract is the present, deliberate, and unconditional consent of the parties contracting. When, therefore, either party is legally or physically disqualified to grant this consent, there can be no marriage. Legal disqualification may arise either (1) from the previous marriage of one or other of the parties, or (2) under the Act 1600, c. 20, from the divorce of either party on account of previous adultery between them; or (3) from their being within the forbidden degrees of relationship. Physical disqualification may proceed either from nonage, or from mental infirmity. Pupils under the age of fourteen in males, and 12 in females, are incapable of marriage; but minors after puberty may ratify by solemn consent a marriage contracted while in pupillarity. Unlike the English law, the consent of parents or curators is

not necessary to the marriage of minors in Scotland. Idiots, being incapable of consent, cannot contract marriage; so neither can madmen except in lucid intervals, nor persons while labouring under extreme intoxication. Incapacity to perform conjugal duties renders a marriage voidable at the instance of either party, but is not in itself a nullity pleadable by third parties. And when consent has been impeached through force, fear, fraud, or under essential error as to the identity of the person with whom the contract is entered into, the marriage is null.

Marriages are either *regular* or *irregular*. A regular marriage requires the publication of banns on three several Sundays before the ceremony, and must be performed by a regularly ordained clergyman in presence of at least two witnesses. Irregular marriages may be contracted (1) *per verba de praesenti*. An acknowledgment by parties of present marriage before witnesses will effectually constitute marriage; but a written declaration of marriage found in a person's repositories after death, or to be effectual only after death, will not have this effect.

(2) *By Promise subsequente Copulâ*.—A promise of marriage in writing, or admitted upon oath, on the strength of which intercourse has followed, if not in itself constituting marriage, is a good ground on which to bring a declarator of marriage. But the intercourse must be distinctly proved to be referable to the antecedent promise.

(3) *By Habit and Repute*.—Cohabitation at bed and board, along with the uniform, consistent, and general repute of the neighbourhood that the parties are husband and wife, is effectual to constitute marriage. But where the connection has begun in concubinage, a very clear proof of change of purpose will be required before such a marriage can be recognized by law.

Irregular or clandestine marriages are equally valid with regular marriages, provided one of the parties has resided in Scotland for twenty-one days preceding the date of marriage, or at the time usually resided there (19 & 20 Vict. c. 96). Their celebration, however, subjects all the parties present on the occasion to penalties, though these are seldom enforced. Formerly, all marriages not solemnized by a clergyman of the Kirk of Scotland were declared clandestine; but this has been altered by 4 & 5 Will. IV. c. 28.

Marriage, when once constituted, is irrevocable; and can be dissolved only by death or divorce. Divorce may proceed either on the ground of adultery, or of wilful desertion on the part of either spouse, persisted in for four years.

The effect of marriage on the property of the spouses is to convert the whole moveable estate of both into a *communio bonorum* or common stock. The heritable subjects belonging to either remain the property of the possessor; but the fruits, rents, and interest of those of the wife fall under and form portion of the common stock.

MARRIAGE, ROMAN. The right conception of the constitution and legal consequences of a Roman marriage is necessary to enable us to approximate to a proper understanding of the old Roman polity. Much of the obscurity that formerly attached to the subject has been cleared up by recent researches, and the essential alterations made by the Emperor Justi-

nian upon the law of the subject, have been clearly and distinctly ascertained.

By the Ante-Justinian law marriage was either *regular* (*matrimonium legitimum*) or *irregular* (*illegitimum*). The essentials of a regular marriage were right of intermarriage between the parties (*connubium*), the attainment of the ages of fourteen and twelve respectively, and the consent both of the parties themselves and of their fathers, if they still remained under their *patria potestas*. Of regular marriages there were two distinct kinds, according as the wife passed, or did not pass, into the hand (*in manum*) of her husband. A wife who passed *in manum* of her husband became at once a part of his familia. She was *tota uxor*, and *mater familiæ*. She was admitted to participate in the sacred rites of his house, and her personality was completely merged in that of her husband. In his family she held the place of his daughter, and was subject to his paternal authority equally with his children, in relation to whom she held the place of a sister. All her property passed to her husband as dowry (*dos*), and at his death she claimed a daughter's share of his inheritance. Her children were born, and remained in the power of their father, until they were liberated by emancipation or by his death. Among the Sabines marriage was always accompanied by this *conventio in manum*, and till the Etruscans were admitted to the state, a similar rule was observed at Rome. There were three modes by which a wife might pass into the hand of her husband—*Confarreatio*, *Coeemptio*, and *Usus*.

1. *Confarreatio* was a form of marriage confined to patricians, performed by the Pontifex Maximus and Flamen Dialis, and deriving its name from a corn cake employed on these occasions. It required the presence of ten witnesses, and could only be dissolved by *diffarreatio*. The offspring of such marriages were eligible for the highest sacred functions: and from them at first the various flamens and vestal virgins were exclusively selected. This form of marriage fell into disuse in the time of Gaius, and was abolished by Constantine in 394.

2. *Coeemptio* was an imaginary mutual sale (*mancipium*) in presence of five witnesses and the balance-holder.

3. A wife passed *in manum* of her husband *usu*, when she continued to live with him as his wife for a whole year uninterruptedly. If she wished to avoid the legal effects of this cohabitation, she might, according to the laws of the Twelve Tables, break the *usus* by absenting herself from her husband for three nights during the year. This form of marriage seems to have been introduced after the admission of the Etruscans to the state.

By a regular marriage *sine manu* the wife was only naturally, and not civilly, related to her children. Her property did not pass to her husband, and the patrimonial rights of the spouses were thus obliged to be defined and settled by marriage contracts. This was the form of marriage in the time of Gaius.

An irregular marriage was something more than mere concubinage. It was a valid marriage between those who had no *connubium*. There were, of course, no civil consequences, and no *patria potestas* resulting from it; and the consent of the parents of the parties was not required.

By the Justinianean legislation the complicated distinctions of the early Roman law were done away with. Marriage became a consensual contract, and a valid marriage (*justæ nuptiæ*) was constituted by the mere interchange of assent between parties, provided they were both Roman subjects, had reached the age of puberty, and, if minors, had obtained the consent of their parents.

MARROW, or MEDULLA, is the fat contained in the osseous tubes and cells of the bones. [BONE.] Spinal Marrow and Medulla Spinalis are names sometimes applied to the spinal chord.

MARRUBIUM VULGARE. [HOREHOUND.]

MARS, MAVORS, or MARSPITER (called *Mamers* in the Oscan language), the god of war among the Romans, generally considered as corresponding to the Greek *Ares*. He was worshipped in peace under the name of Quirinus (spear-bearer), and in war under that of Gradivus. As the protector of the country he was styled Mars Silvanus. According to a principle in Roman mythology, by which a male and a female deity are supposed to preside over the same object of fear or desire, the Romans had a goddess of war called BELLONA, but the name of the wife of Mars was Neria.

The first month (Martius) of the old Roman year, which consisted of ten months only, derived its name from this god.

Mars is generally represented with a beard, but in other respects like the Greek *Ares*. For the Greek god of war, see *ARES*.

MARS, the planet which comes next to the earth, in order of distance from the sun, is a brilliant star of a slightly red tint. On examination by a telescope, this colour is found to belong to parts of the surface of the planet which have been conjectured to be land; the rest, which appears somewhat green, being supposed to be sea. Certain white spots, which appear at each pole after the winter of its hemisphere, and disappear during its summer, have been ascertained to be snow. The apparent diameter of Mars varies from 3·6" to 18·28", being 6·29" when the planet is at its mean distance from the earth. The real diameter is ·517 of that of the earth, or 4113 miles. Its bulk is ·1386 of that of the earth, and its mass is ·0000003927 of that of the sun, or about the 2546000th part.

The planet revolves on its axis in 24^h 39^m 22·62, and the axis is inclined to the ecliptic 28° 51'. Its light and heat are 43 per cent. of those of the earth. The semi-axis major of its orbit is 1·5236923, that of the earth being assumed as the unit. Its distance from the sun is 142,000,000 miles.

MARSA'LA, a town at the western extremity of Sicily, which was built by the Saracens, contained, in 1862, 31,350 inhabitants, and belongs to the province of Trapani. The country around produces very good white wine, the annual yield being estimated at about 30,000 pipes, two-thirds of which are exported. This trade has entirely grown up within the present century, chiefly owing to Lord Nelson having adopted the wine for use in the British fleet in 1802. Marsala also exports corn, cattle, oil, salt, and soda, in small quantities. The city is inclosed by bastioned walls, and has a cathedral, several convents and abbeys, a gymnasium, cavalry barracks, a curious vibrating bell-tower, and a famous grotto and

well. There are salt mines and caves of white marble in the vicinity. Don John of Austria filled up the ancient port in 1580, to prevent its becoming useful to corsairs; and the new port, about a mile to the south, bounded by a mole, is adapted only for small vessels. Marsala occupies the site of Lilybæum, the ancient capital of the Carthaginian settlements in Sicily. It was chosen by Garibaldi as the landing-place of his volunteers in his famous Sicilian campaign in 1860. The port was once in possession of the Arabs, and was by them esteemed so highly that they called it 'Marsa Alla,' or 'Port of God.' Hence its present name.

MARSDEN, WILLIAM, a distinguished Oriental scholar, was born in Dublin, November 16, 1754. Early in life he entered the service of the East India Company, and was stationed at Bencoolen in Sumatra, where he remained about eight years, applying himself in the leisure afforded from his official duties to the acquisition of the native languages and knowledge of the country. He then returned to England, and in 1782 published his 'History of Sumatra.' In 1812 he published his 'Grammar and Dictionary of the Malay Language.' The two works we have mentioned have already been considered highly valuable contributions to our knowledge of the East, as is also his 'Essay on the Polynesian or East Insular Languages.' Mr. Marsden died of apoplexy in 1836. His valuable collection of coins and medals he gave prior to his death to the British Museum, and his library of books and Oriental MSS. to the newly founded King's College.

MARSEILLAISE HYMN. When Barbaroux summoned the youth of Marseilles—the 600 men 'who knew how to die!—to proceed with him to Paris during the great French Revolution, they introduced into the capital the revolutionary song which soon became so celebrated, commencing with the thrilling and fiery words, '*Aux armes! aux armes!*' and it has ever since been called the Marseillaise Hymn in their honour. It was, however, really written by Rouget de Lisle, an artillery officer, to commemorate the departure of a band of volunteers from Strasburg, both verse and music being composed in one night (1792). So magical was its effect, that it procured 400 additional volunteers in Strasburg in a single day, and soon became very popular throughout the whole army stationed in the north. Its use is now strictly forbidden throughout France.

MARSEILLES (the Roman *Massilia*), a seaport and city in France, capital of the department of Bouches-du-Rhône, is situated on the coast of the Mediterranean, 534½ miles by railway S.S.E. from Paris, in 43° 17' N. lat., 5° 22' E. long., and had 260,910 inhabitants in 1861. The mean temperature of the year at Marseilles is 57°; in winter, 45°; in summer, 72° Fahr. It is the chief port of the Mediterranean, and the steam-packet station for Italy, the Peninsula, and the East. The harbour is the most commercial in France, and capable of containing 1700 vessels; the entrance is so narrow as to admit only one ship at a time. Marseilles depends entirely upon its commerce, which is very extensive, and has rapidly increased since the conquest of Algeria by the French. This and other causes led, a few years since, to the construction of a large new port, called 'La Joliette,' and a third, 'Basin Napo-

leon,' was completed in 1864. These two ports are inclosed within an immense breakwater, 2200 metres (2406 yards) or nearly a mile and a half in length. The old natural harbour is now exclusively reserved for sailing vessels, the 'Joliette' being assigned to steamers. The number of vessels of all kinds which entered and cleared the port in 1865 was 18,000, of over 3,000,000 tons burthen. Marseilles gives title to a bishop, whose diocese comprehends the town and the arrondissement; it is also the head-quarters of the ninth Military Division.

The city of Marseilles is built round an inlet of the sea, which runs eastward into the heart of the town and forms the harbour. The old town occupies a triangular point north of the harbour. The port is defended by the cross-fire from the batteries of Fort St-Nicholas and the tower of St-Jean.

The streets of the old town are for the most part narrow, and the houses high, irregular, and massive. It contains numerous squares of vast magnitude: among others the Place-Neuve and Place-des-Grand-Carmes. The new town, which comprises two-thirds of the whole city, consists of wide handsome streets. Many elegant fountains add to their beauty, and give a relief to their monotonous regularity. The supply of water has, however, long been very deficient; and to remedy this a canal has recently been cut from the Durance. It is 60 miles in length, and is altogether a most stupendous work. Marseilles has a custom-house, an exchange, a very large lazaretto north of the town—one of the finest and best managed in the world; a mint, theatres, a tribunal of commerce, a national academy of sciences, letters, and arts; an academy of medicine, and many other learned societies; a national college, with a library of 61,000 volumes, a school of hydrography, a botanical garden, several museums, an observatory, an arsenal, and other public institutions; besides many literary, scientific, and charitable societies. The Catholic churches are thirty in number, including a new cathedral in the Italian style; there are also a Protestant church, and a synagogue; but the public buildings are of little architectural importance except the Hotel de Ville. The shops, however, rival in splendour the finest in Paris.

The chief imports are of raw cotton, wheat (chiefly from the Black Sea and the Sea of Azoff), coffee, oil seeds, silk, wool, olive oil, raw sugar, lead, iron, and coal, besides enormous quantities of ores and metals, timber, hides, spirits, dye woods, and divers articles from the Levant. Large quantities of silkworms' eggs have likewise been imported here of late from foreign parts, chiefly Japan, and great efforts are being made to revive the silk production in the south of France, but not much success has as yet been attained. The exports are wines, brandy, corn, refined sugar, dried fruits, oil, soap, hosiery, damask and other linens, woollens, silks, leather, &c. The local manufactures consist of soap, morocco and other leather, glass, porcelain, hats, gunpowder, alum, sulphur, vitriol, and cutlery. The refining of sugar and salt, calico printing, the distillation of brandy, essences, and liqueurs, cork-cutting, and the preparation of anchovies, dried fruits, olives and wine for exportation, are carried on. There are numerous flour mills, and other extensive manufactures of salt, soda, chloride of lime, cement, machinery, &c. Large quantities of

French coal are brought here, chiefly from the department of Gard. In the neighbourhood of the city are extensive lignite mines and stones quarries. An English company has just (1866) been formed for the purpose of making extensive improvements in Marseilles and its vicinity.

The town of Marseilles has undergone many changes. Founded by the Phœceans (600 B.C.) under the name Massilia, it fell into the hands of the Romans under Cæsar, but retained its original aristocratic constitution. It subsequently became the prey of Burgundians, Visigoths, and Franks. The Marseillais were active in the Crusades, and at the time carried on extensive commercial intercourse with the East. In the thirteenth century they organized themselves into a municipal republic; but they were soon after deprived of many of their privileges by Charles of Anjou. The Marseillais adhered to the house of Anjou, and their town was burned and sacked, in consequence, by the king of Arragon, in 1480. Upon the death of Charles, count of Maine, Marseilles came directly under the government of the French crown, to which it has ever since remained subject. It was ravaged by the plague in 1720.

MARSHAL (French, *maréchal*), a term which, in its origin, meant simply a groom or manager of horses, but from the importance of such an employment in a rude warlike nation, the office of marshal became invested with great military authority, which, according to the usage of the times, drew to itself a considerable civil jurisdiction, and even at present one of the principal officers of state in England is the king's marshal, which office is now held hereditarily by the duke of Norfolk, who is said to have the office of marshal of England, and also an honour in respect of which he is earl-marshal. In feudal times it was the duty of the royal constable and marshal to inspect the troops assembled before the king, and they also fixed the encampment of each noble. They likewise had the regulation of all matters connected with armorial bearings, standards, and ensigns. The constable's functions were abolished in the reign of Henry VIII., and the marshal then became the sole judge in questions of honour and arms, and he is still the president of the English College of Arms, and appoints the kings-at-arms, heralds, and pursuivants. In time of peace the office was executed in the aula regis, or king's great court. Upon the division of the aula regis the marshal appointed deputies in the new courts. In the King's Bench the marshal's deputy was called the marshal of the marshalsea of the king's court, or marshal of the King's Bench. In the Exchequer, the deputy was marshal of the Exchequer, or clerk of the marshalsea of the Exchequer. The duty of the acting marshal was regularly to attend the court, and to take all persons committed to his custody by the court.

Besides the earl-marshal, there is a knight-marshal, or marshal of the king's household. The dignity of marshal, under the title of marischal, formerly existed in Scotland and was hereditary in the Keith family, but in 1716 George, the tenth earl marischal, was attainted in consequence of his share in the rebellion, and the dignity has not since been restored. In France the highest military officers have been called marshals since the thirteenth century. [FIELD MARSHAL.]

MARSHALSEA. In the marshalsea of the king's household there are two courts of record:—1. The original court of the marshalsea is a court of record to hear and determine causes between the servants of the king's household and others within the verge, that is, within a circle of twelve miles round the king's palace, with a jurisdiction of pleas of trespass where either party is one of the king's servants. 2. The palace-court was erected by letters patent, 6 Charles I., confirmed by Charles II., and has authority to try all personal actions between party and party, though neither of them be of the king's household, provided they arise within twelve miles round Whitehall. The judges of this court are the steward of the king's household and knight-marshal; but the court is, in fact, held before a barrister deputed by the knight-marshal. The palace-court is held once a week in Scotland Yard, and causes are here brought to trial in four or five court-days, unless they are of sufficient magnitude or importance to induce either party to remove it into one of the superior courts. A writ of error lies from both courts into the court of King's Bench.

MARSHFIELD. [GLOUCESTERSHIRE.]

MARSH'S APPARATUS. [ARSENIC, DETECTION OF.]

MARSTON, JOHN, a dramatist in the reigns of Elizabeth and James I., the particulars of whose life, and even the dates of whose birth and death are, like those of many of his contemporary poets, very uncertain. Marston left several plays, of which the 'Malcontent,' printed in Dodsley's Collection, is the best; but from the title-page of the first edition (1660), it appears to have been written by Webster, and only altered by Marston. He also joined with Jonson and Chapman in 'Eastward Hoe.'

MARSUPIA'LIA, or MARSUPIATA (*Marsupium*, 'a purse' or 'bag'), an extensive group of Mammalia, differing essentially from all the others in their organization, and comprehending genera fed by every variety of nourishment. Their structure is, as a necessary consequence, modified accordingly; and we find among them an adaptation of the organs of progression, prehension, and digestion to their several wants and habits, so that we may trace in them analogies to the carnivorous, insectivorous, herbivorous, and rodent forms of the other mammiferous quadrupeds.

Cuvier, who had the advantage of knowing the great quantity of species and variety of forms discovered in New Holland, arranged the copious materials which that extraordinary country afforded in addition to the new American forms, as the fourth order of his *Mammifères*, dividing the now numerous group into several subdivisions, and placing the order between his *Carnassiers* and his *Rodentia*.

Professor Owen and many zoologists consider that the mammalia are divided into two sub-classes, viz. *Placentalia*, and *Implacentalia*. The *Implacentalia* are again divided into two orders or primary groups, *Marsupialia*, and *Monotremata*.

According to Professor Owen's arrangement five tribes come under the head of *Marsupialia*, namely, *Sarcophaga*, *Entomophaga*, *Carpophaga*, *Poephaga*, and *Rhizophaga*. These tribes are divided into several families, and these families into genera and sub-genera.

The order *Monotremata* comprises two genera, namely, *Echidna* and *Ornithorhynchus*.

Mr. Waterhouse, in his 'Natural History of the Mammalia,' appears to consider the *Marsupialia* as an order comprising two sections, *Monotremata*, and the true *Marsupialia*.

The *Marsupialia* or *Marsupialia*, says Mr. Waterhouse, 'are implacental mammalia, whose young are brought forth prematurely, and received in most instances into a peculiar pouch situated on the lower part of the abdomen in the female; both sexes are furnished with two bones called marsupial bones, which are attached to the anterior margin of the pelvis. The brain is deficient of both corpus callosum and septum lucidum; the cerebrum is small in proportion to the animal, and contracted in front, and its surface is smooth, and presents but few convolutions; the cerebellum is entirely exposed, and has the vermiform process large in proportion to the lateral lobes; the olfactory lobes are large. Two venæ cavae enter the heart.'

The quadrupeds which range themselves under the order *Marsupialia* are familiarly known as Opossums, Phalangiers, Kangaroos, &c. 'At the present period the great metropolis of the order is Australia. Certain species of the group, however, are found in the Molucca Islands, and one genus (*Didelphys*), containing many species, is peculiar to the New World, and although chiefly confined to the tropical portions, is met with as far north as the United States (where, however, one species only, *D. Virginiana*, is found), and extends in the southern direction to Buenos Ayres, on the east side of the Andes, and Valparaiso on the west. The species found in the islands north of Australia (if we except New Guinea), all belong to one genus, *Phalangista*, which occurs likewise in Australia, but they agree amongst each other in having the fur short, dense, and crisp, and the tail with the apical portion naked, and studded with fleshy warts—characters which, in the opinion of some naturalists, entitle them to the rank of a sub-genus, to which the name *Cuscus* is applied. No Phalangiers presenting these peculiarities have been found in Australia. In New Guinea the *Marsupialia* increase in numbers, since, notwithstanding its coast line is barely completed on our charts, and the interior is partially unknown, seven species of marsupial animals have been discovered in that island, and these appertain to six distinct genera, one of which only, it must be observed, is peculiar to New Guinea (viz. *Dendrolagus*). Of the species five are peculiar; one is said to be identical with a species found in New South Wales.'—Waterhouse.

The *Marsupialia* are divided by this eminent naturalist into the following families:—

1. *Macropodidae*. Locality, Australia and islands. Examples—The Great Kangaroo (*Macropus giganteus*); the Tree Kangaroos of New Guinea (*Dendrolagus*); the Rat Kangaroos, or Potoros of Australia and Van Diemen's Land. Examples—*Hypsiprymnus murinus*; *Macropus minor*, Shaw; Kangaroo Rat.

2. *Phascolomyidae*. Locality, Australia, Van Diemen's Land, and some of the islands of Bass' Straits. Example—The Wombat (*Phascolomys Wombat*).

3. *Phalangistidae*. Examples—The Koala (*Phascogale cinereus*). Locality, New South Wales.

The Vulpine Phalanger (*Phalangista vulpina*). Locality, Australia. The Spotted Phalanger (*Cuscus maculatus*). Locality, Amboyna, New Guinea, &c. The Flying-squirrel (*Petaurus sciureus*). Locality, New South Wales.

4. *Peramelidæ*. Example—The Long-nosed Perameles (*Perameles nasuta*). Locality, Norfolk Island and New South Wales.

5. *Dasyuridæ*. Examples—The Banded Myrmecobius (*Myrmecobius fasciatus*). Locality, Western



Great Kangaroo (*Macropus giganteus*.)

Australia. The Pencilled Phascogale (*Phascogale penicillata*). Locality, Australia. The Spotted Dasyurus (*Dasyurus viverrinus*). Locality, Australia. The Ursine Dasyurus (*Dasyurus ursinus*). The Dog-headed Thylacinus (*Thylacinus cynocephalus*). Locality, Van Diemen's Land.

6. *Didelphydæ*. Examples—The Virginian Opossum (*Didelphys Virginiana*). Locality, the southern portion of North America. The Water-Opossum (*Cheironectes variegatus*). Locality, Guiana, and Brazil.

At a former period, the marsupial animals were much more widely diffused than at present, as is proved by the discovery of their fossil remains, which occur not only in Australia and South America, but also in Europe.

'In the caverns which occur in the calcareous rocks in the interior highlands of Brazil, the bones of small opossums are very numerous; but these are for the most part very nearly allied to if not identical with species still living in Brazil. In Europe the most authentic remains of marsupial animals are those found in the gypsum quarries of Montmartre. The greater portion of a skeleton in which the marsupial bones remain in their natural position with regard to the pelvis, in which the lower jaw presents the angular portion curved inwards, and in which the molar teeth correspond precisely with those of *Didelphys*, leaves no doubt as to the existence of marsupial animals in Europe in the Eocene geological period. Besides this opossum-like animal, a lower jaw found in the same quarries has been referred to the marsupial group; it forms the genus *Pterodon* of De Blainville. In formations considerably lower in the series than the Eocene, in the Stonesfield oolite, have been found

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several rami of lower jaws of small insectivorous mammalia, some of which in their general form, and in the dentition which they present, approximate very closely to the insectivorous marsupialia. These, however, cannot be arranged in any known recent group of *Marsupialia*: they form the genera *Thylacotherium*, or *Phascolotherium*, of Professor Owen.



Virginian Opossum (*Didelphys Virginiana*).

To the latter genus belongs the *Didelphys Bucklandi* of Mr. Broderip, founded upon a very perfect ramus of the lower jaw, presented by that gentleman to the British Museum.

'The marsupial remains found in Australia are chiefly from the caverns of Wellington Valley, New South Wales. A considerable collection of these remains was found by the late Sir T. L. Mitchell, and are described in that gentleman's work, "Three Expeditions into the Interior of Eastern Australia," &c. It appears from the remains of these and other fossil remains from Australia, that they are referable for the most part to genera still presenting living species in the same country; there are some, however, which exhibit some very remarkable modifications of the marsupial structure, and form the types of new genera.'—Waterhouse.

Dr. Buckland observes, that 'the discovery of the *Marsupialia*, both in the secondary and tertiary formations, shows that this order, so far from being of more recent introduction than other orders of Mammalia, is in reality the first and most ancient condition under which animals of this class appeared upon our planet; that, as far as we know, it was their only form during the secondary period; that it was co-existent with many other orders in the early parts of the tertiary period; and that its geographical distribution in the present creation is limited to North and South America, and to New Holland, with the adjacent islands.'

MARTEL. [Lot.]

MARTEL, CHARLES. [CHARLES MARTEL.]

MARTELO TOWER, a circular building of masonry, generally two stories high. The lower story is divided into chambers for the reception of stores, and the upper serves as a casemate for troops. The roofs are vaulted, and that of the upper story is shell-proof. On the terreplein of the roof are placed pieces of artillery, which rest on platforms of timber traversing on pivots, so that the guns are capable of being fired in any direction. The whole work is generally surrounded by a ditch and glacis. They

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are generally built on the beach for coast defence, and occur in many parts of the United Kingdom, but especially opposite the French coast. They are generally considered to have been failures, and in nearly every case their armaments have been removed, and their garrisons replaced by coast-guardsmen.

Several Martello towers line the southern coast of England, having been erected during the war with France in 1804. They were suggested by, and derive their name from, a Corsican fort in Martella Bay, which had vigorously resisted a British expedition in 1794.

MARTEN. [WEASELS.]

MARTIAL LAW is a series of regulations made to preserve order and discipline in the army, and enforced by the prompt decisions of courts-martial: this is generally, however, called military law. During the existence of a rebellion, when, in consequence of the ordinary processes of law becoming ineffectual for the security of life and property in any province or state, the legislature has appointed that a military force shall be employed to suppress the disorders and secure the offenders; and when the trial of the latter takes place according to the practice of military courts, that province or state is said to be subject to martial law.

On the occurrence of such an event in any part of the British dominions, the two Houses of Parliament, jointly with the Crown, determine that a temporary suspension of the Habeas Corpus Act shall take place. This measure is adopted only in cases of great emergency; and the necessity of it and the time of its duration are always stated in the provisions of the Act. The Act by which martial law was declared in Ireland during the Rebellion in 1798, may be seen in Tytler's 'Essay on Military Law,' Appendix, No. 6. Martial law in this country is to be found in the articles of war made by the Crown under the authority of the annual statute called the Mutiny Act.

In merely local tumults the military commander is called upon to act with his troops only when the civil authorities have failed in preserving peace; and the responsibility of employing soldiers on such occasions falls entirely upon the magistrate.

The constitution of this country permits a military law for the government of the army, even in times of internal tranquillity, to co-exist with the general law of the land. But the former applies to military persons only; and at the same time any military person committing an offence against a subject of the realm, punishable by the law of the land, must be delivered over to the civil magistrate. The military jurisdiction comprehends all matters relating to the discipline of the army, to the cognizance of which the civil courts are not competent—as disobedience of orders, cowardice, &c.; and extends to such crimes as desertion, mutiny, and holding correspondence with the enemy.

MARTIALIS, MARCUS VALERIUS, was a native of Bībilis, in Spain, where he was born, about 40 A.D. He came to Rome at an early age, and passed about thirty-five years of his life in that city. About the commencement of Trajan's reign, he retired to his native town. Domitian gave him the 'jus trium liberorum,' and conferred on him the dignity of tribune ('Epig.' ii. 91; iii. 95), for which and

other favours the grateful poet made a most abundant return of flattery. Martial was acquainted with most of his literary contemporaries, Juvenal, Quintilian, Pliny the Younger, and others, as appears from his own writings (ii. 90; xii. 18, &c.)

There are extant of Martial fourteen books, entitled 'Epigrammata,' of which the thirteenth also bears the particular name of Xénia, and the fourteenth that of Apophoréta. A book called 'Liber de Spectaculis,' which is prefixed to the 'Epigrams,' contains a number of small poems on the shows of Titus and Domitian. The whole collection contains above 1500 epigrams.

As literary compositions Martial's Epigrams deserve high praise, and he has been justly styled the Virgil of epigrammatists. Their subjects are very various; praise of rural life, sarcastic invective against folly and vice, and elegiac pieces in honour of the dead, alike employ his muse, and are illustrated by his genius. In an historical point of view his works are very valuable, and they present a vivid picture of the atheism, luxury, prodigality, profusion, avarice, and cruelty which in his time made Rome hideous. Some of his epigrams, it should be added, do not answer to the modern idea of that class of composition, but are really short and sometimes pathetic sonnets on different themes, free from obscurity of expression or satirical point.

The best editions of Martial are those of Lemaire, 1825; and Schneidewinn, 1842.

MARTIGUES. [BOUCHES-DU-RHÔNE.]

MARTIN, the name for some of the Swallow tribe, as the *House Martin* (*Hirundo urtica*, Linn.), the *Bank* or *Sand Martin* (*Hirundo riparia*), and the *Black Martin*, or *Swift*. [SWALLOWS.]

MARTIN I. II. III. IV. V. [POPE.]

MARTIN, JOHN, an eminent English painter, was born near Hexham, in Northumberland, in the year 1789. Like most great artists, he evinced a remarkable artistic talent at a very early age, and from the first declared his determination to follow no other profession. He commenced, however, at the lowest step of the ladder, and with a view to becoming an heraldic painter was apprenticed to a Newcastle coachmaker, with whom he remained about a twelvemonth. His skill as a colourist had already been manifested, and his parents now placed him under the care of an Italian artist named Boniface Musso. In 1806 he removed to London, to reside with his master's son, the well-known enamel painter, Charles Musso or Muss.

When in his nineteenth year he married, and for some time supported his wife and himself by teaching a few pupils, and painting designs on glass and china. His difficulties were almost insuperable. While engaged on his first great picture, 'Zadak in search of the Waters of Oblivion,' he was frequently brought to the verge of starvation. It is related of him that, on one occasion he found himself reduced to his last shilling—a bright shilling, which he had preserved on account of its very brightness, but at length was constrained to exchange for bread. He went to a baker's shop, bought a loaf, and was taking it away, when the tradesman snatched it from him and flung back the shilling, because it was a *bad* one. Returning to his lodgings he searched for some forgotten crust to satisfy his hunger. Supported by the inspir-

ing energy of a self-reliant mind he struggled on; he had the courage to work and wait, and at length the picture was ready for exhibition. 'But you may guess my anxiety,' says Martin himself, 'when I overheard the men who were engaged to put it in the frame, disputing as to which was the top of the painting!' It soon, however, attracted the attention of connoisseurs, and Martin found himself famous.

His 'Clytie,' a beautiful work, was exhibited at the Royal Academy in 1814. Then followed the grand design of 'Joshua commanding the Sun to stand still,' and 'Belshazzar's Feast,' which, exhibited in 1821, gained the prize of 200*l.* at the British Institution.

Martin's most celebrated pictures are 'Macbeth,' the 'Fall of Babylon,' 'Destruction of Herculaneum,' the 'Creation,' the 'Deluge,' the 'Seventh Plague,' the 'Paphian Bower,' and the 'Fall of Nineveh,' all displaying the same conspicuous qualities—a lofty imagination, a fertile fancy, and a curious exaggeration of colour. There is thought, fancy, talent, in all his pictures, but his conceptions are frequently extravagant, and in carrying them out he too often oversteps 'the modesty of nature.' Some of his finest ideas will be found in his illustrations to Milton, with whose sublime and unworlly imagination he was well-fitted to sympathize. He left unfinished three large works, the 'Judgment,' the 'Plains of Heaven,' and the 'Day of Wrath.' Having retired to the Isle of Man, he was suddenly seized, while painting, with paralysis, on the 12th of November, 1853. Losing the power of speech and the use of his right hand, no expectation of his recovery could reasonably be entertained, and after a lingering illness, he expired in February, 1854, aged sixty-five.

MARTIN, SAINT. [ANTILLES.]

MARTIN-DE-LA-RÉ. [CHARENTE INFÉRIEURE.]

MARTINI, GIAMBATTISTA, was born at Bologna in 1706, and died in 1784. He became maestro di capello in 1723 in the Franciscan convent, to which order he belonged. His sixty Canons in the unison, for two, three, and four voices, are still known and admired; but his chief reputation rests on his 'Essay on Counterpoint,' published in two folio volumes at Bologna, in 1774, and on his 'History of Music,' in three volumes 4to, the last of which appeared in 1781.

MARTINIQUE, or MARTINICO, one of the French West India islands, between lat. 14° 24' and 14° 53' N., long. 60° 50' and 61° 18' W., with an area of 381 square miles, and a population (in 1861) of 136,562, of whom 87,000 are black. In form it is very irregular, and its surface is very uneven, being generally occupied by conical-shaped hills, of which one, Mont Pelée, is an exhausted volcano. The island contains a great number of streams, which are used to turn sugar mills, and the coast, being indented by numerous bays and inlets, affords many good harbours. About one-fourth of the surface is covered with dense forests. The climate is moist, but healthy; and the soil fertile. The two principal towns are Fort de France (formerly Port Royal), the capital, and St. Pierre, which is the most populous town. The former is on the north coast, and has 13,101 inhabitants. It is the residence of the governor, has a tribunal and chamber of

commerce, and a college and garden for the naturalization of East Indian plants. The harbour is excellent, and is defended by two forts. Fine liqueurs and preserves are exported. *St. Pierre* is an open roadstead on the western coast, affording very indifferent shelter to shipping, but it is the principal place of trade in the island, and it is said to be the handsomest town in the West Indies. It has 23,000 inhabitants, numerous public buildings and schools, a theatre, and a botanical garden. The roadstead is defended by several forts. The Empress Josephine, the first wife of Napoleon I., was born here in 1763.

The staple production of the island is sugar, to which is added small quantities of coffee, cotton, cocoa, and cloves.

Martinique was first settled by a party of about 100 men, headed by a French planter, M. Desnambre, from St. Christopher, in 1635. It was taken in 1762 by the English, but was restored at the peace in the following year. In 1794 it was again taken by the English, and again restored to France at the peace of Amiens. It was once more captured by the English in 1810, and finally restored by the treaty of Paris in 1814, since which time it has remained under the dominion of France. At the beginning of 1839 it suffered greatly from an earthquake. Slavery was abolished by decree of the French Republic in 1848.

MARTYN, HENRY, known as *The Missionary*, was born at Truro, 1781. He went to Cambridge in 1797, and became senior wrangler in 1801, and a fellow of St. John's in 1802. His intimacy with the Rev. Charles Simeon led to his adoption of ardent religious principles, and ultimately to his devoting himself to the duties of a missionary in 1805. In this capacity he traversed large tracts of India and Persia, and finally died at Tokat, in Asia Minor, in 1812.

MARTYR, JUSTIN. [JUSTIN MARTYR.]

MARTYRS, MARTYROLOGY, from the Greek *Martur*, 'a witness.'

By the term *martyr* we now generally understand a person who suffers death rather than renounce his religious opinions; and those who have made a profession of their faith and thereby endured sufferings short of death are called *confessors*. The annals of the early Christian church contain the histories of many martyrs, whose astonishing fortitude under the most cruel tortures was doubtless one great cause of the rapid diffusion of Christianity. We learn from the writings of Cyprian, bishop of Carthage in 248, that the sufferings of martyrdom were held to purge away the stain of sin, so that the martyr was admitted at once into paradise without needing the fires of purgatory. Martyrs were thought to expiate by their blood not only their own sins, but those of other men, and even of the church; and the fiery baptism of martyrdom was accounted of equal efficacy with the sacraments of Christ. The earliest account of a Christian martyrdom is that of Stephen in the Acts (vii.). It is very difficult to ascertain the number of martyrs who suffered in the early persecutions.

The opponents of Christianity have at times endeavoured to show that its martyrs were inspired by political rather than by religious motives. It is possible that some among them may have embraced

Christianity as a means of opposition to a tyrannical ruler, though no proof of such an opinion has been adduced on any credible authority; but all sensible persons will refuse to believe that party spirit or political enthusiasm could contribute many names to the roll of martyrdom. Truth, and the secret influence of God on the heart of man, can alone arouse that sublime devotedness which no tortures can daunt, and which confronts death with heroic calmness.

That department of ecclesiastical history which relates to the acts and deaths of martyrs is termed *Martyrology*; and a work embracing one or more such narratives is called a *Martyrology*.

MARVEJOLS. [LOZÈRE.]

MARVELL, ANDREW, a celebrated English patriot, and an acute, learned, and witty satirist, was born in 1620. His father—a learned and pious clergyman—was master of the grammar-school, and lecturer of Trinity Church, Hull. At fifteen Marvell was sent to Trinity College, Cambridge, and made rapid progress in his studies. Shortly after the death of his father in 1640, he quitted college and went to the Continent, where he spent four years in Holland, France, Italy, and Spain. After his return to his native country, probably about 1642 or 1643, he was employed in giving instructions in the languages to a daughter of Lord Fairfax. In 1657 he was associated with Milton in the office of Latin secretary to the Protector, with a salary to each of 200*l.* per annum. He was chosen by the citizens of his native town to represent them in the Convention, or 'healing' Parliament of 1660; but how far he approved of its proceedings in restoring Charles II., without any security against arbitrary and unconstitutional policy, cannot now be ascertained. We learn, however, that at this time he generously interposed on behalf of Milton, who had been committed to the custody of the sergeant-at-arms; and when 'Paradise Lost' was published, he had the courage to greet the immortal epic with a copy of eulogistic verses. Marvell continued to represent Hull as long as he lived. He wrote daily to his constituents during the sitting of Parliament, and frequently at other times communicated full information respecting public affairs. For some unknown reason, he appears to have been absent from his post between June, 1661, and March, 1663; and in June of the latter year he accompanied Lord Carlisle on an embassy to Russia, Sweden, and Denmark. His absence spared him the pain of witnessing the arbitrary and ruinous measures by which the Parliament and the country were at this period disgraced, and which he could not have opposed with any hope of success. He returned to his parliamentary duties in 1665, when the Parliament was sitting at Oxford, on account of the plague then raging in London. At the commencement of his parliamentary career, Marvell was far from being unfriendly to the Court; but the arbitrary proceedings and licentious lives of Charles and his ministers completely alienated the honest and public-spirited senator, and during the remainder of his career he acted with a small band of patriots, who cautiously, but firmly, resisted the unconstitutional policy of the government. No means were omitted to win over so powerful an opponent; but Marvell's integrity was proof alike against danger and against corruption. He equally despised threats

and bribes. In 1672 Marvell was involved in a controversy with Dr. Samuel Parker, afterwards bishop of Oxford, who had published a book called 'Ecclesiastical Polity,' in which he inculcated the slavish doctrine of divine right and passive obedience. Marvell's reply, 'The Rehearsal Transposed,' displays a mixture of brilliant wit, pungent sarcasm and irony, and sterling argument, which was received with avidity by all classes of people, and which Swift said he perused with pleasure. The 'Second part of the Rehearsal Transposed' appeared in 1673. In 1676 he published another controversial piece entitled 'Mr. Smirke, or the Divine in Mode,' &c., in defence of Dr. Croft, bishop of Hereford, who had been violently assailed by the high church clergy for his liberality and toleration. His next publication, which appeared in the early part of 1678, was entitled 'An Account of the Growth of Popery and Arbitrary Government in England,' and so provoked the government by its truth and biting satire, that a reward was offered for the discovery of the author, printer, or publisher of what was termed 'seditious and scandalous libel.' No prosecution, however, took place. Marvell died shortly after, 16th August, 1678. The corporation of Hull voted a sum for his funeral expenses and for an appropriate monument. Marvell was the last member of Parliament who received wages from his constituents.

MARY I., Queen of England, was the daughter of Henry VIII., by Catherine of Arragon, and was born at Greenwich on the 18th or 19th of February, 1516. She was brought up from her infancy in a strong attachment to the ancient religion, but was induced, from motives of self-interest, to comply with the reforms of her father. Her adherence to the Roman faith finally induced Edward to attempt to exclude her from the succession. [GREY, LADY JANE.]

Mary was scarcely seated on the throne when she proceeded to re-establish the ancient religion. The indications given by the court of a determination to be completely reconciled with Rome were followed by an insurrection headed by Sir Thomas Wyatt, January, 1554, which was in a few days effectually put down. Its suppression was followed by the executions of Lady Jane Grey, her husband, and father, and finally of Wyatt himself.

On July 25, Mary was married to the prince of Spain, afterwards Philip II.; and the reunion with Rome was completed by a parliament which assembled in the beginning of November, and which passed acts re-establishing the whole national system of religious policy as it had existed previous to the first innovations made by Henry VIII. The remainder of the history of the reign of Mary is occupied chiefly with the sanguinary persecutions of the adherents to the reformed doctrines. On the most moderate calculation, and making every reasonable allowance, it will be found 'that in the space of four years almost two hundred persons perished in the flames for religious opinion.' The principal political result of the Spanish alliance was the loss of the town of Calais, the last of the English possessions in France. Mary died, November 17, 1558. She left no issue, and was succeeded by her half-sister Elizabeth. [ELIZABETH.]

MARY STUART, Queen of Scotland, was born December 7, 1542. She was the third and only sur-

living child of James V. of Scotland, by Mary of Lorraine, daughter of the duke of Guise. At the time of her birth her father lay sick in the palace of Falkland; and a few days afterwards he expired. The ambitious Beatoun, archbishop of St. Andrews, produced a testament which he pretended was that of the late king, and immediately assumed the office and title of regent. The instrument was discovered to be a fraud; but Beatoun did not lose his influence, and on September 9, 1543, Mary was crowned by the archbishop, who was appointed lord high chancellor of the kingdom. He had even the address to win over the regent Arran to his views, both political and religious; and thus the French or Roman Catholic party obtained the ascendancy, in furtherance of the objects of which Mary was married to Francis, the dauphin of France, April 24, 1558, and her early years were passed amidst the gaieties of the French court. On the death of Queen Mary of England, claims were put forth on behalf of the Queen of Scots through her grandmother, who was eldest daughter of King Henry VII.; and notwithstanding Elizabeth had ascended the throne, those claims were urged with great pertinacity by the princes of Lorraine, her uncles.

Henri II. died in July, 1559, and in September of the same year Francis was solemnly crowned at Rheims. Mary was now at the height of her splendour; it was doomed, however, to be of short continuance. In June, 1560, her mother died; and in December of the same year, her husband. She then returned to Scotland, and landed at Leith, August 19, 1561, after an absence of nearly thirteen years. During that time Presbyterianism had gained the ascendancy in Scotland, and Mary's adherence to the old faith would have put an end to her popularity, but for her amiability and graceful manners. On the 29th of July, 1565, she was married to her cousin Henry Stuart, Lord Darnley, the youthful heir of the house of Lennox. It has recently been discovered, however, that a secret marriage had taken place four months previously. This marriage was not a popular one in several quarters, and though it gave no general dissatisfaction, there existed no real sympathy between the queen and her people. Her patronage of favourites was generally condemned. Of these the principal were Chastelar the French poet, and the Italian musician, Rizzio. Of these, the former was executed, and the latter murdered by some of the Protestant leaders in complicity with Darnley, whose jealousy had been aroused. Darnley, himself, died not long afterwards under suspicious circumstances. After a short stay in Glasgow, he had returned to Edinburgh with the queen, when he was lodged, not in the palace of Holyrood, as heretofore, but in the house of the Kirk of Field, a mansion standing by itself in an open and solitary part of the town. Ten days after, the house was blown up by gunpowder, and Darnley and his servants buried in the ruins. Whether Mary knew of the intended murder is not proved, but she certainly did not disapprove of it after it was accomplished. The author of the horrid deed was the earl of Bothwell, who was brought before the privy council for the crime; but in consequence of the shortness of the notice, Lennox, his accuser, did not appear, and without a single witness being examined, he was acquitted. Three

months after, having in the interval met the queen, and carried her off a prisoner to his castle of Dunbar, and obtained a divorce against his wife on the ground of consanguinity, he was married to Mary, who had previously created him Duke of Orkney (May 15, 1567).

Public indignation could no longer be restrained. The nobles rose against Bothwell and Mary, who fled before an armed and indignant people from fortress to fortress. At length, after they had collected their followers, a pitched battle near Carberry Hill was about to ensue (June 15, 1567), when Mary abandoned Bothwell, and threw herself on the mercy of her subjects. They conducted her first to Edinburgh, and thence to the castle of Lochleven, where it was determined she should at once abdicate in favour of the prince her son, James. Instruments of abdication to that effect were accordingly prepared, and she was at last constrained to affix her signature to them; upon which the prince was crowned at Stirling, July 29, when little more than a year old. Mary continued a prisoner at Lochleven, but in a few months effected her escape, and collected a considerable army. The battle of Langside ensued, and she was completely routed; whereupon she fled into England, hoping to secure the favour of Elizabeth. In this, however, she was mistaken. Elizabeth detained her a captive till the end of the year 1586—a period of about nineteen years, occupied in various plots for dethroning her great rival—when she was accused and declared guilty of being accessory to Babington's conspiracy, and beheaded at Fotheringhay Castle, February 8, 1587.

MARY II., wife of William III. [WILLIAM III.]

MARY, DUCHESS OF WÜRTEMBERG, or the Princess Marie d'Orleans, was born in April, 1813, during the exile of her father Louis-Philippe, then duke of Orleans, and residing at Palermo with his wife Amelia. She was married to the duke of Würtemberg in 1837, and died at Pisa in January, 1839, in consequence of injuries suffered from the conflagration of her palace at Stuttgart.

From her childhood she evinced a great love for art, and her father procured for her some excellent instructors. Some of her works in sculpture have acquired a European reputation; among these her marble statue of Joan of Arc is the most popular. She executed also an equestrian statue of the heroine, and a small model of the Death of Chevalier Bayard.

MARYBOROUGH. [QUEEN'S COUNTY.]

MARYLAND, one of the United States of North America, lies between 38° 3' and 39° 44' N. lat., and 75° 10' and 79° 20' W. long. It is divided into two portions by Chesapeake Bay and the Susquehanna. That portion which is east of the bay is bounded S. by Virginia and E. by the Atlantic Ocean and Delaware. Pennsylvania forms the whole northern boundary of this state, and Virginia and the Potomac form the boundary of the rest of the state. The area is 9356 square miles, and the population in 1860 was 687,049, of whom 83,942 were free coloured, and 87,189 were slaves.

Surface and Soil.—On the eastern shore, and in some counties on the western, the soil is a mixture of clay and sand, not very fertile, but easily improved by manure, which is found in extensive beds of marl abounding in the district. The country near the sea is level, but on the west there are some hills.

The line of the Atlantic coast is only 33 miles, but including Chesapeake Bay, is 411 miles.

Rivers.—The Potomac rises within the Appalachian mountains, with two branches: the northern branch rises in 39° 12' N. lat., on the eastern declivity of the Backbone range. Twenty miles below Cumberland it is joined by the southern branch, which rises in the centre of Virginia, about 38° 25' N. lat. After this junction the Potomac flows S.E. and S. till it falls by a wide estuary into Chesapeake Bay. The Potomac is navigable to the city of Washington, and is 10 miles wide at the mouth, and one mile at Alexandria, to which place it is navigable for vessels of the largest class. [ALEXANDRIA.] The Patuxent is 90 miles long, and is navigable for 50 miles by vessels of 250 tons burthen. The Patapsco is a small river navigable to Baltimore. The Susquehanna traverses the northern part of Maryland for 15 miles, before it falls into Chesapeake Bay.

Climate and Productions.—The climate is rather mild in the level part of the country, but the winter is sometimes severe enough to block up the harbour of Baltimore with ice for some weeks. Rain is rather abundant; drought is rare.

Wheat, Indian corn, barley, oats, tobacco, honey, silk, wool, maple sugar, and timber of many kinds, are the chief products. The common fruits of England, as apples, pears, plums, and peaches, succeed in most places. The whole country was originally covered with a dense forest, of which part still remains. Along the coasts of the Atlantic and the adjacent swamps a wild vine grows, whose fruit yields a pleasant wine.

In the forests on the mountains, wolves, bears, and deer are still found.

The minerals of this state comprise rich veins of copper and iron ore; coal, lead, cobalt, alum, lime, manganese, gold, &c.

Railways, &c.—Upwards of 500 miles of railway are in operation in Maryland, besides the Chesapeake and Delaware, and the Susquehanna canals. The state is also the seat of several manufactures, and is the sixth in commercial importance in the Union. It has several universities, colleges, and public schools.

Political Divisions and Towns.—Maryland is divided into twenty-one counties. The following are the principal towns, with the population of each in 1860:—*Annapolis* is the capital of the state. [ANNAPOLIS.]

Baltimore is one of the most important commercial cities in the United States. [BALTIMORE.]

Cumberland, situated on the north bank of the Potomac and on the Baltimore and Ohio railway, 134 miles W. from Washington, and 166 miles W.N.W. from Annapolis, contains a court-house, a gaol, a market-house, and several churches. It is the centre of an extensive trade in iron and coal, of which there are mines in the vicinity. Population, 6067.

Frederick, a city 54 miles N.W. from Annapolis, is well built, with wide and regular streets, and contains a court-house, gaol, county offices, several literary institutions, and twelve churches. A branch railway, 3 miles in length, connects it with the Baltimore and Ohio line. Population 8143.

Hagerstown, 26 miles N.W. from Frederick, is regularly laid out, and contains a handsome court-

house, a town-hall, masonic hall, and nine churches, Population 3750.

History and Constitution.—Maryland was first settled as a place of refuge for the persecuted Roman Catholics of England by Lord Baltimore in 1634, and the country received the name of Maryland from Henrietta Maria, the wife of Charles I. It was admitted into the Union in 1788, but the constitution of the state was remodelled in 1851. In the late civil war the first blood was shed in Maryland, several Massachusetts volunteers having been killed at Baltimore on their way to Washington. The sympathies of the state were with the Confederates, but its position with reference to the seat of the Federal government caused it to be occupied by a strong military force, and placed under martial law. It was repeatedly invaded from Virginia and made the scene of several bloody conflicts. The legislative body consists of twenty-two senators, who are elected for four years, and seventy-four representatives, who are elected for two years. The governor is elected for four years. Maryland sends two senators and six representatives to Congress, and has eight votes for the election of president of the United States.

A state penitentiary and asylum for the insane have been erected at Baltimore.

MARYGOLD. [CALENDULA.]

MARYPORT. [CUMBERLAND.]

MASANIELLO. [ANIELLO.]

MASCARENHAS. [BOURBON, ISLE OF.]

MAS-D'AZIL. [ARIÈGE.]

MASÈRES, FRANCIS, was born in London, December 15, 1731. His father was a physician, descended of a family which was driven out of France by the revocation of the Edict of Nantes. He was educated at Clare Hall, Cambridge, and took the degree of B.A. in 1752, having gained the highest place, both in classics and mathematics. Having obtained a fellowship in his college, he removed to the Temple, was in due time called to the bar, and went the Western circuit for some years with little success. He was then appointed (about 1763) attorney-general for Canada, in which province he remained till 1770, distinguished by his loyalty during the American contest, and his zeal for the interests of the province. On his return to England he was appointed cursor baron of the Exchequer, which office he held till his death. He was also at different times deputy recorder of London and senior judge of the sheriff's court. He died May 19, 1824, at Reigate, in the ninety-third year of his age.

Baron Masères (as he was commonly called) has acquired celebrity partly from his own writings, and partly from the munificence with which he devoted a part of his income to reprinting such works as he thought useful, either in illustration of mathematical history or of that of his own country.

Of these reprints the most important is the 'Scriptores Logarithmici,' a collection in six volumes quarto, published in various years from 1791 to 1807, of writings on the subject of logarithms. Here we find the works of Kepler, Napier, Snell, &c., interspersed with original tracts on kindred subjects. The republication of these old writings has brought them within reach of many students to whom they would otherwise have been inaccessible, and has thus tended to promote historical knowledge and to excite inquiry.

The 'Scriptores Optici,' 1823, a reprint of the optical writings of James Gregory, Descartes, Schooten, Huyghens, Halley, and Barrow, has a merit of the same kind.

MASHAM, ABIGAIL, was the daughter of Francis Hill, a merchant of London, who married the sister of Mr. Jennings, the father of the duchess of Marlborough. Her relative, then Lady Churchill, procured her the place of waiting-maid to the Princess Anne. She retained her situation after the princess ascended the throne, and acquired great influence over her. Miss Hill married Mr. Masham (son of Sir Francis Masham, of Otes in Essex) in 1707. Harley, afterwards earl of Oxford, connected himself with the new favourite; a change of ministry took place, and in 1711 Mr. Masham was raised to the peerage. He and his wife appear to have been engaged in the intrigues of the Tories in favour of the exiled House of Stuart. Lady Masham lived a long time after the death of the queen, and died at an advanced age, December 6, 1734.

MASHING. [DISTILLATION.]

MASKELYNE, NEVIL, was born in London, October 6, 1732, was educated at Westminster, and afterwards at Catherine Hall and Trinity College, Cambridge, in which university he took the degree of B.A., with distinction, in 1754. In 1755 he took orders, but he had previously been led to turn his attention to astronomy by the solar eclipse of 1748, and by his acquaintance with Bradley, whom he assisted in the formation of his tables of refraction. In 1761 he went to St. Helena, to observe the transit of Venus, and to detect, if possible, the parallax of the fixed stars. In this voyage, and in one undertaken to Barbadoes, in 1764, to try the merits of Harrison's new chronometers, he acquired that knowledge of the wants of nautical astronomy which afterwards led to the publication of the Nautical Almanac. In 1765 he was appointed to succeed Mr. Bliss as astronomer royal, and from this time, with the exception of his journey to Scotland in 1772, to determine the mean density of the earth by observing the effect of the mountain Schehallien, in Perthshire, upon the plumb-line, his life was one unvaried application to the practical improvement of astronomical observation. He died February 9, 1811.

Delambre dates the commencement of modern astronomical observation, in its most perfect form, from Maskelyne, who was the first to construct a standard catalogue (in 1790) of stars; that is, a number of stars observed with such frequency and accuracy, that their places serve as standard points of the heavens.

MASON BEE (*Osmia*), a genus of insects belonging to the family *Apidae*, or Bees. The species of this genus are noted for their habit of making their nests of small grains of sand, beautifully pierced and cemented together by a gummy secretion. The nests are placed in the corners of walls, in angles formed at the turns of brick walls, and similar situations. Another closely related form (*Megachile muraria*) carefully gathers the grains of sand from the earth with which they may be mixed, glues them together with its viscid saliva into masses the size of small shot, and carries them to their place in its jaws. Having laid a foundation, the walls of a cell are built, and in it an egg is deposited; then another is

made and filled in the same way; and so on till a cell is formed for each egg to be laid.

MASON, WILLIAM, born in 1725, was the son of a clergyman at Hull. He took his B.A. degree at Cambridge in 1745, after which he removed from St. John's College to Pembroke, of which college he was elected fellow in 1747. Having taken orders, he was presented to the rectory of Aston in Yorkshire, and became chaplain to the king. He died in 1797, aged seventy-two, having been for years precentor and canon-residentiary of York.

Mason's Poems are now little read. Two tragedies, 'Elfrida,' and 'Caractacus,' a descriptive poem called 'The English Garden,' and some odes, are his principal productions; but he is perhaps best remembered as Gray's biographer and friend.

MASONRY (from the French *maison* and *maçon*) signifies both the operation of constructing with stone and the parts of a building consisting of such material. It is a most important branch of architectural practice. Owing to its expense, masonry, until recently, was not much employed in England, except for public buildings or others of the highest class, the mason's work being in other cases restricted to such parts as steps to doors, string-courses, facias, and plain cornices externally, and to pavements and stairs in the interior.

The different kinds of stone used in masonry are noticed in the article *STONE FOR BUILDING*.

Walls which are not of solid masonry throughout, but built either of brick or inferior stone and rubble, with only an external facing of squared stone laid in courses, are termed *ashlar*, or *ashlaring*.

MASONS, FREE. [FREEMASONRY.]

MASORA, a Jewish critical treatise on the Hebrew text of the Bible. As the sacred books were originally written continuously, without even any breaks into words, the Jews found it necessary to establish a rule or canon to determine the exact reading, and this is called the Masora.

MASQUE or MASK, a species of drama which originated in the custom of enlivening processions and spectacles by the introduction of masked persons to represent imaginary characters. Gradually, in England, a dramatic form and poetic meaning were given to these shows, and finally they were performed with the aid of music, machinery, and decoration. They reached their climax of popularity in the reigns of James I. and Charles I., when Ben Jonson invested them with the splendour of his imagination, and Inigo Jones brought his taste and ingenuity to bear upon their stage presentment. One of the finest examples of this class of composition is, however, the work of a severer genius—we allude to Milton's 'Comus.'

MASQUERADE, an amusement introduced into England in the sixteenth century from Italy. It is distinguished from the masque by the general mingling of the company in dance and conversation, in place of the execution of a particular dance or preconcerted action by certain individuals. Granacci, who died in 1643, is said to have been the inventor of masquerades.

MASS. By the mass of a body is meant the quantity of matter which it contains, upon the supposition that differences of weight are always the consequence of different quantities of matter. This involves an hypothesis: for instance, if gold be, bulk for bulk, nineteen times as heavy as water, it is pre-

sumed that a given bulk of gold contains nineteen times as much matter as the same bulk of water.

MASS (*Missæ*, in Low Latin; *Missah*, 'an oblation or sacrifice,' in Hebrew) is a church service which forms an essential part of the ritual of both the Roman Catholic and Greek or Eastern churches, and in which the consecration of the sacramental bread and wine takes place. The congregation take no ostensible part in the service, but they follow it mentally, or in their prayer books, in which the text of the prayers is generally accompanied by a translation in the vulgar tongue. The priest does not address the congregation, but has his back turned to them, except at the end of certain prayers, when he turns round and says, '*Dominus vobiscum*' ('the Lord be with you'), and at the '*Orate, fratres*,' &c. ('brethren, pray,' &c.), which are responded to on the part of the congregation by the clerk. The Mass consists (1) of the preparation or introduction; (2) the consecration, both consisting of suitable prayers and invocations; (3) the communion, when the priest takes the sacrament in both forms and then descends from the altar and administers it to any of the congregation who wish to take it, but only in the shape of the consecrated wafer; (4) the *post communio*, consisting of a few more prayers, a blessing from the priest, and the reading of the first fourteen verses of the first chapter of John. The priest wears various vestments, the colours of which vary with the occasion. By the commandments of the church every Roman Catholic is bound, except in the case of illness, to attend mass once at least on Sundays and other holy days, and the transgression of this precept is reckoned a sin. Pious persons hear several masses in succession, and many attend mass every day in the week, for it is celebrated every day in each parish church; but except on Christmas day, no priest is allowed to celebrate it more than once unless by special dispensation. A priest must not break his fast, either by food or drink, from the previous midnight until he has said mass, out of respect for the real presence of 'Christ in the sacrament.' The service is, indeed, essentially connected with, and depends on, the doctrine of Transubstantiation. [SACRAMENTS.] It is held both in the Roman Catholic and Greek churches to be the sacrifice of the new law, a real, though unbloody offering, in which Christ is the victim, in substance the same with the sacrifice of the cross, and instituted as a commemoration of that sacrifice, and as a means of applying its merits through all ages for the sanctification of men. The Mass is performed entirely by the officiating priest standing before the altar, and attended by a clerk, who says the responses. The prayers of the Mass are all in Latin in the Roman Catholic church, in ancient Greek in the Eastern church, and in Syriac among the Maronites and Jacobites, but never in the vulgar or vernacular tongue of the country. The present service was the work of Gregory I. in the sixth century.

On great festivals and other solemn occasions the Mass is performed by a priest or prelate, attended by a deacon and subdeacon, who says the responses and chants the epistle and gospel of the day. On those occasions the Mass is sung, or at least parts of it, by a choir, accompanied by the organ and other musical instruments, and is called 'high mass.'

The 'Missale' is the name of the book which contains the ritual of the mass, and which the priest holds open before him on the altar. Some of the Old Missals, whether MSS. or printed, are beautifully ornamented with paintings, and are valued as bibliographic curiosities.

The Protestant and reformed churches have no mass, as they do not believe in the doctrine of Transubstantiation; but several of the detached 'Oremus' or prayers of that service, have been retained in the liturgy of the Church of England, translated into the vulgar tongue.

MASSA'CCIO, called *Tommaso Guidi*, was born at San Giovanni in Val d'Arno, in the year 1402, and died in 1428 or 1429. He was a disciple of Masolino da Panicci, to whom he proved as much superior as his master was to all his contemporaries. His most perfect works are the frescoes of S. Pietro del Carmine at Florence.

MASSACHUSETTS, one of the United States of North America, lies between $41^{\circ} 23'$ and $43^{\circ} 52'$ N. lat., and $69^{\circ} 50'$ and $73^{\circ} 10'$ W. long. The Atlantic Ocean washes its eastern and southern shores. On the south it is bounded by Rhode Island and Connecticut, W. by New York, and N. by Vermont and New Hampshire. Its greatest length is about 190 miles, and its greatest breadth 90 miles. The area is 7800 square miles. The population in 1865 was 1,250,000, of whom 10,000 were free coloured.

Surface and Soil.—The surface of this state is uneven; hilly and broken in the centre, east, and north-eastern parts, and level and sandy in the south-east. The western portion, though mountainous, does not attain to a very great elevation above the sea. Saddle Mountain, the highest land in the state, is 3505 feet; Mount Washington, 2624 feet; and Mount Wachusett, 2018 feet high. The east and south-east coasts are much indented with bays. The principal islands are Martha's Vineyard and Nantucket, which are noted for their whale and other fisheries.

Rivers.—The western and mountainous region is traversed by the Housatonic, which flows S. nearly 50 miles, when it enters Connecticut; it is a very rapid river, and not navigable in Massachusetts. The Connecticut enters Massachusetts from New Hampshire. [CONNECTICUT.] The Merrimac rises in New Hampshire on the western declivities of the White Mountains, and falls into the Atlantic after a course of more than 150 miles. The tide ascends to Haverhill, 15 miles from its mouth, but above it the course of the river is obstructed by several falls and rapids, all of which are now avoided by canals, and an uninterrupted navigation has thus been effected as far as Concord in New Hampshire.

Climate and Productions.—The climate of this state is much colder in winter, and warmer in summer, than the southern districts of Great Britain, though the difference of latitude amounts but to about nine degrees. In the spring it is subject to chilling north-east winds. The mean temperature is 48° , or two degrees less than that of London. In January the thermometer falls to 8° below zero; while in June it rises to 98° Fahr. The change of temperature is often 40° in twenty-four hours.

As Massachusetts was early settled, a greater por-

tion of its surface is cultivated than in most of the other states. The soil generally is rocky; and although the most approved systems of agriculture are adopted, and pursued with great industry, the corn produced is not sufficient for home consumption. The principal productions are Indian corn, rye, oats, potatoes, hemp, flax, peas, hops, beans, and pumpkins, which last are used as food for swine and cattle. Wheat, buckwheat, and barley are raised only in smaller quantities. All the fruit trees of England are cultivated. The fishery of cod in Massachusetts Bay and on the banks near Nantucket is important. Large quantities of mackerel are likewise taken.

Iron occurs in several places, and limestone abounds in the western parts of the state, where some good marble is found. Near the coast are numerous salt marshes. Much sand is used in glass manufacture.

Canals and Railroads.—Railways intersect the state, and connect all the large towns. There are altogether more than 1600 miles open. The conveyance of merchandise inland is also much facilitated by the Middlesex, Blackstone, Hampshire and Hampden, and Farmington canals.

Manufactures, Commerce, &c.—Massachusetts is one of the most enterprising states of the Union, and has very extensive manufactures of agricultural implements, general machinery, cotton, boots and shoes, and watches. There are also flourishing ship-building yards, and at least one-sixth of the United States Navy has been supplied by Massachusetts. The principal port is BOSTON, which is admirably screened from the storms of the Atlantic, and accessible to the largest vessels. The tonnage of all the vessels belonging to the state is over 800,000—nearly as much as that of the whole French mercantile marine. A large number of ships are employed in the whale fishery, chiefly from the port of New Bedford. The value of foreign imports into Boston in 1865 was 45,000,000 dollars.

Divisions, Towns, &c.—Massachusetts is divided into fourteen counties, which contain many large and important towns. The following are the principal, with the population in 1860 :—

Amherst, 82 miles W. from Boston, is the seat of Amherst College, a flourishing institution, with an observatory, and a good library of over 20,000 volumes. Population, 3052.

Andover, 22 miles from Boston, on the south-west side of the Merrimac, and on the Maine Railway, has 6748 inhabitants, some of whom are employed in manufactures of woollens.

Barnstable is a seaport town, 74 miles from Boston, on the south side of a bay of the same name, which opens into Cape Cod Bay, to which there is a branch railway. Population, 6000.

Boston is the capital of the state. [BOSTON.] *Cambridge*, *Charleston*, *Chelsea*, *Dorchester*, and *Roxbury*, are all contiguous to Boston, and joined to it by several bridges. They may therefore be regarded as suburbs of that city. *Cambridge* is the seat of Harvard University, the oldest in the United States, having been founded in 1638, with a museum, laboratory, botanic garden, and a library of about 140,000 volumes.

Dartmouth is 65 miles S. from Boston, and has many vessels engaged in the whaling and coasting trade.

Dedham, 13 miles S.S.W. from Boston, is situated on the Charles River, and has a gaol, court-house, and bank. Population, 4477.

Fall River, 51 miles S. from Boston, is a seaport on the Fall River, at its entrance into a branch of Narraganset Bay. The river affords splendid water-power, which drives many factories; and the town has also considerable shipping, and several banks. Population, 14,026.

Gloucester is 30 miles N.E. from Boston, near Cape Ann, on the Atlantic. It has a spacious and safe harbour, near the entrance of which are two lighthouses. The inhabitants number 10,904, and are mostly employed in navigation and the fisheries.

Lawrence is a town on the left bank of the Merrimac, 26 miles N. from Boston. In the course of a few years this place has risen from a mere village to a manufacturing town of considerable importance. In 1845 a dam across the Merrimac was constructed here, by which a fall of 28 feet of water was obtained; and a canal was formed for leading the water to the mills. There are now extensive linen, cotton, and woollen factories, and an iron foundry. Lawrence has also a town-hall, gaol, twelve churches, public schools, literary association, and two banks. The town was incorporated in 1847. Population, 8283.

Lexington, 11 miles N.W. from Boston, is a small town, which only requires notice as the place where the first blood was shed on the breaking out of the revolution—eight men having been killed by the British in an engagement on April 19, 1775. A monument has since been erected on the spot to commemorate the event.

Lowell is a city and manufacturing town, 25 miles N.N.W. of Boston, with which it communicates by canal and railway. It is situated on the south bank of the Merrimac, where the Concord River flows into it. Population in 1830, 6474; in 1860, 36,827. Lowell is the great seat of the cotton manufacture in the United States, for which there are upwards of fifty mills, employing 13,000 hands, of whom about two-thirds are females. It is often called the Manchester of America. The fall of the Pawtucket Canal—a descent of 32 feet, accomplished by four locks—affords immense water-power, by which most of the machinery of the mills, &c., is kept in motion. In the town are several churches; a high school, a grammar, and about thirty free schools; a lyceum; literary and mechanics' institutes, with library; three banks, and twelve incorporated companies; together with numerous private firms extensively engaged in the manufacture of cotton, linen, and woollen fabrics; bleacheries; powder-mills; and machinery. Among the publications of the city is a well-conducted magazine, the contributors to which are the young women of the factories. The general condition and morals of the workpeople are said to be highly satisfactory.

Lynn, 9 miles N.E. from Boston, on the shore of Massachusetts Bay, is a favourite place of resort for bathing in the summer season, and is famous for the manufacture of ladies' shoes, of which from 4,000,000 to 5,000,000 pairs are made annually. Population, 19,083.

Marblehead, 16 miles N.E. from Boston, situated on a rocky projection in Massachusetts Bay, is chiefly inhabited by fishermen. Population, 7647.

Nantucket, 119 miles S.S.E. from Boston, situated on the north side of Nantucket Island, at the bottom of the bay, has an excellent harbour. In and around the town are woollen cloth factories, rope-walks, felling and corn mills. Steamers ply daily to New Bedford. Population, 6094.

New Bedford, 55 miles S. from Boston, with which it is connected by a railroad, is situated near the western extremity of Buzzard's Bay. It contains a town-house built of granite, a court-house, custom-house, and many churches. The inhabitants are much engaged in the whale fishery, which employs from 300 to 400 ships; and there are also oil, soap, and candle factories, and cotton mills. Population, 22,300.

Newburyport, 38 miles N. by E. from Boston, is situated on the south bank of the Merrimac, at its entrance into the Atlantic. The custom-house is of granite, with a Doric portico. This town is connected with Boston by railway. The inhabitants, who are partly employed in the fisheries, number 13,401.

Northampton, 93 miles W. from Boston, situated on the west bank of the Connecticut, was incorporated as early as 1654.

Pittsfield, 151 miles W. from Boston, is situated on the line of railroad from Boston to Albany, and is 1000 feet above the sea. Manufactures of cottons, woollens, machinery, and fire-arms are carried on here.

Plymouth, a seaport, 38 miles S.E. from Boston, has a spacious but shallow harbour, a court-house, gaol, several churches, manufactures of cotton, and vessels employed in fisheries and in foreign trade. This is the oldest town in New England, having been the landing-place of the Pilgrim Fathers from the *Mayflower*, on the 22nd December, 1620. Population of the town, 6272.

Quincy, 9 miles S. by E. from Boston, is distinguished for the granite hills, which rise in some places to the height of 600 feet. A railroad extends from the quarry 3 miles to the tide-water on Neponset River, and was the first railroad made in the United States.

Salem, a city and seaport, 16 miles N.E. from Boston, was settled in 1628. It is situated on a tongue of land formed by two inlets from the sea called North River and South River. It contains a court-house, gaol, market-house, and many churches. There are also a lighthouse, tanneries, corn and saw mills, and railway stations; and the town is defended by two forts. Its East India trade is considerable; besides which it has an active coasting trade and whale fisheries. Salem is distinguished for its literary institutions and its commercial enterprise. Population, 22,252.

Springfield, 91 miles W. from Boston, on the east side of the Connecticut, contains one of the United States arsenals—the largest in the Union, employing 300 hands: 175,000 stand of arms are kept constantly in stock. It is also a great railway centre. Population, 15,199.

Worcester, 40 miles W. by S. from Boston, contains a court-house and several churches. The railroad from Boston to Springfield and Albany passes through it, and the Blackstone Canal connects it with Providence; besides which there is a railroad

to Norwich, in Connecticut. The town is noted for its schools and manufactures; and among its public buildings are a lunatic asylum and the hall of the American Antiquarian Society. Population, 24,960.

History and Constitution.—The first settlement was formed in 1620 at Plymouth, by about 120 families of English nonconformists, who had fled to Holland, and thence proceeded to Cape Cod. The American revolution began in Massachusetts. The first constitution was formed in 1780, and was revised and modified in 1820. The legislature consists of forty senators and 240 representatives, elected for one year. The governor is also elected annually. Massachusetts sends two senators and eleven representatives to Congress, and has thirteen votes in the election of the president of the United States. Every male citizen of the age of twenty-one years, who has resided one year in the state and six months in his election district, and who has paid a tax within two years, has a right to vote: he must, however, be able to read the Constitution of the state in the English language.

In the state are many churches of all denominations; and the educational establishments consist of 5 colleges, 3 theological seminaries, 2 medical schools, 70 incorporated academies, 800 unincorporated and private schools, and upwards of 4000 public or free schools. In fact, no state possesses greater facilities for the education of its inhabitants, and as a consequence it has given birth to many of the leading minds of America. Its charitable institutions are also on a most liberal scale; and in illustration of the general well-being of the people, it may be stated that in 1865 less than one per cent. of the inhabitants were either deaf and dumb, insane, blind, convicts, or paupers.

MASSÉNA, ANDRÉ, Prince of Essling, Duke of Rivoli, and Marshal of France, was born at Nice, May 6, 1758. Left an orphan at an early age, his education was greatly neglected. In 1775 he entered the army as a private soldier. After a diligent discharge of his duties for fourteen years he attained the rank of sergeant, but discouraged by this slow promotion, he retired to his native city, where he made an advantageous marriage. The breaking out of the French revolution recalled him to his former profession, and he was appointed adjutant-major of the battalion raised in the department of the Var, of which regiment he subsequently became colonel. In August, 1793, he was made general of brigade, and general of division a few months afterwards. In the Italian campaigns of 1794 and 1795 he served under the generals Kellermann and Scherer. When Bonaparte assumed the command of the army in Italy he employed Masséna actively on all occasions of importance. The scenes of his principal exploits were Montenotte (9–11 April, 1796), Millesimo (14 April), Castiglione (29 June–5 July), Arcola (15–17 November), and Rivoli (9 January, 1797). In February, 1798, he was appointed to the command of the army which, under General Berthier, was occupying Rome and the Papal States. Multiplied complaints of his avarice occasioned his recall, and he was left without employment till 1799, when the command of the armies of the Danube and of Switzerland was confided to him. In the direction of this campaign he evinced a military talent of the

highest order. On the return of Bonaparte from Egypt, Masséna was employed by him to defend Genoa. He arrived there on February 18, 1800, and defended it against superior forces, and amidst the horrors of famine, till June 3. On the same day that Napoleon became emperor, Masséna was created a marshal of France. In 1805 he was again appointed to the command of the army in Italy. After the peace of Pressburg (December 20, 1805), Masséna had the command of the army which was to conduct Joseph Bonaparte to Naples. In 1807 he was appointed to the command of the right wing of the army opposed to the Russians in Poland, and his services during this important campaign were rewarded by the title of Duke of Rivoli. He greatly distinguished himself at Landsbut and Eckmühl. At the battle of Essling the defence of the village of Aspern was committed to Masséna, and his services on that occasion were rewarded by the title of Prince of Essling. His operations also were highly effective at Engersdorf and at Wagram. Napoleon called him 'l'Enfant chéri de la Victoire' (Victory's favoured child). In 1810 Marshal Masséna was appointed to the chief command of the army in Portugal. His exploits in this campaign have not added to his reputation as a general, while the frequent examples of his cruelty, avarice, and breach of faith, have left a deep stain upon his memory. One achievement, however, his masterly retreat into Spain after the failure of his attempts on the lines of Torres Vedras, has been the subject of the highest praise and admiration.

Masséna was recalled from Spain in 1812. In 1813 he was sent to Toulon to take the command of the eighth military division, from which place he formally declared his adhesion to the Bourbons, on April 6, 1814, and was by them confirmed in his command. On the return of Napoleon from Elba, after some hesitation, he recognized his government. After Napoleon's second abdication he was appointed commander-in-chief of the national guard of Paris. Being a member of the council of war which was assembled for the trial of Marshal Ney, he joined the majority in declaring the incompetency of the court. He died April 4, 1817.

MASSILLON, JEAN BAPTISTE, was born June 24, 1663, at Hyères, in Provence, and at a very early age entered the Collège de l'Oratoire of that town. He took orders, and in 1696 was made director of the seminary of St. Magloire, at Paris. He preached two celebrated Lent sermons with great success before Louis XIV. and his court at Versailles. He was made bishop of Clermont in 1717. He died of apoplexy in 1742. His pulpit oratory was highly esteemed in France, and his sermons have great merit as compositions. The most interesting of his works, next to his sermons, are his 'Conferences.' Massillon's works were collected and published by his nephew, in 12 volumes 8vo, in 1745 and 1746.

MASSINGER, PHILIP, born at Salisbury, in 1584, was the son of one of the earl of Pembroke's retainers. In 1602 he was entered at St. Alban's Hall, Oxford, by that nobleman, with the view of being educated to become his chaplain; but his tastes inclining him to the study of poetry and romance, rather than to logic and philosophy, he was abandoned by his patron, and repaired to London, where

we first hear of him as the author of the 'Virgin Martyr,' which appeared in 1622. There is evidence also that after Beaumont's death he assisted Fletcher in the composition of some of his plays. During the rest of his life Massinger was employed in dramatic composition, and the last of his works appeared only six weeks before his death, which took place March 16, 1640, at his own house on the Bankside.

In 1759 a bookseller's edition of Massinger appeared, which was followed in 1761 by another; and in 1777 by a third, edited by Monck Mason. The best edition is that by Gifford, published in 1805. A one volume edition by Hartley Coleridge may also be commended. His 'New Way to pay Old Debts' still keeps the stage.

MASSINISSA. [NUMIDIA.]

MASSOWAH, a port in Abyssinia, on the Red Sea.

MAST of a ship is an upright spar of wood resting on the keelson, and rising through the decks to a considerable height, for the purpose of sustaining the yards upon which the sails are stretched. Masts are built of several pieces of wood, usually Norway fir, but of late sometimes of iron. The joints are strongly riveted together, and bound by iron hoops. These joints are respectively named the mast proper, and above this the topmast, the top-gallant mast, and the royal mast; the full height being about 240 feet in a first-rate man-of-war. A ship properly so called has three masts, named, according to position, fore, main, and mizen masts. A brig has a fore and a main mast, with top and top-gallant masts, and sails like those of a ship, but it has no mizen mast. A schooner has two masts, with no topsails; and a sloop only one.

MASTER and SERVANT. [SERVANT.]

MASTER AT ARMS, a petty officer of the Navy, who may be considered the head of the police of the ship; his assistants are called ships' corporals.

MASTER ATTENDANT, the officer next in rank to the superintendent of the royal dockyard.

MASTER OF A SHIP, in the Royal Navy, is an officer of inferior rank to the captain, commander, and lieutenants, who has charge of the ship's stores, and, under the orders of the captain, attends to the details of sailing the ship. On entering the service they are styled Masters' Assistants, and are paid at rates varying from 55*l.* to 75*l.* per annum. The next rank is second master, with pay varying from 90*l.* to 137*l.*, and then master, with pay according to length of service from 182*l.* 10*s.* to 365*l.* per annum. The title of Staff-commander has of late been given to the senior masters. In 1866 there were 286 staff-commanders and masters in the British Navy, the total charge for pay and allowances being 67,464*l.*; 199 second masters, charge 20,632*l.*; and 203 masters' assistants, charge 12,065*l.* In the merchant navy the master, called by courtesy the captain, is the commander of the ship, and has the sole management of it. Masters who have obtained certificates from the Board of Trade are eligible for the Royal Naval Reserve, with the rank of Lieutenant. [SHIP.]

MASTER OF ARTS. [ARTS, DEGREES IN.]

MASTER OF THE HORSE, one of the officers of the Court, who has superintendence of the royal stables and of all horses belonging to the sovereign.

The office is one of great dignity and antiquity, and is usually held by a nobleman. The salary is 2500*l.* a year, and the tenure of office depends on the existence of the political party in power. The Master of the Horse rides next to the sovereign on all state occasions, and has the privilege of making use of the royal horses, pages, and servants. In his department are eleven gentlemen equerries and four pages of honour.

MASTER OF THE HOUSEHOLD, an officer in the Lord Steward's department of the royal household. This office is held during the sovereign's pleasure, and is not dependent on political changes. The salary is 1150*l.* per annum, and the duties are the selection and management of the household servants.

MASTER OF THE ROLLS. [CHANCERY.]

MASTERS IN CHANCERY. [CHANCERY.]

MASTICH, a resin which is extracted from the trunk and branches of the *Pistacia lentiscus* by incision. This tree grows in the Levant, and particularly in the island of Chios. Mastich is composed of two resins, one of which is soluble in dilute alcohol, and the other is not; this last constitutes from 1-5th to 1-12th of the whole weight of the mastich, and possesses very nearly the characters of copal, it being soluble in absolute alcohol, ether, and oil of turpentine; these liquids also dissolve mastich without leaving any residue. Mastich is principally employed as an ingredient in varnish, and as a temporary stopping for carious teeth.

MASTIFF, the name of a variety of dog of a very old English breed, now seldom seen in its original state of purity. This is the *Dogue de Fort Race* of Buffon and the French, the *Mastivus* of Ray, and the *Canis molossus* of Linnæus. A true-bred mastiff is of considerable size, and very stoutly built. The head is well developed and large, the lips deep and pendulous on each side of the mouth, and the whole aspect noble. British mastiffs (though some think bull-dogs) were highly prized in ancient Rome for their prowess in the combats of the amphitheatre.

MASTODON, the name of an extinct genus of gigantic pachydermatous proboscidean Mammals (*Mastotherium*, Fischer), whose remains are found abundantly in the third and fourth, or pliocene, divisions of the tertiary fresh-water deposits, and also, but less frequently, in the deposits of the second or miocene period.

In the greater portion of their organization the Mastodons must have closely resembled the elephants. The tusks, the proboscis, the general conformation of the body and the limbs, were very similar; and the principal distinction between the two genera was formed by the molar teeth. These indeed were gradually pushed forward from behind as they are in the elephant, and displayed the same relative increase in proportion as the animal was advanced in life; but unlike those of the elephant, their crowns exhibited on cutting the gum large conical points of a mammiform structure, whence the animal derives its name. As these conical points were worn down by mastication, the tooth presented discs more or less large according to the degree of attrition which it had undergone.

The ascertained species are tolerably numerous, but the remains of the *Great Mastodon*, *Mastodon*

giganteus, Cuv., appear to have been the first that attracted attention. These occur in considerable abundance in North America. They gave rise to much speculation and much erroneous opinion, at first; for though the form and size of the molar teeth forbade the inference that they could have belonged to any of the large existing animals, the formidable appearance of the pointed conical tuberosities of the crowns led to conclusions directly the reverse of truth.

One of the principal deposits of Mastodon bones appears to have been the Big-bone Lick in the north part of Kentucky, near the Ohio. None of the remains have the appearance of having been rolled, but seem to have been unmoved since the death of the animal; and it is worthy of remark that those which were found at the river of the Great Osages, which runs into the Missouri a little above its confluence with the Mississippi, were in a vertical position, as if the animals had been bogged or buried in the mud.

Buffon seems to have been the first who noticed the occurrence of these teeth in the Old World, and figures one alleged to have been found in Little Tartary, and given to him by the comte de Vergennes. This is very large, having from eight to ten points, and weighing eleven pounds four ounces. He also figures another from the museum of the Abbé Chappe, said to have been brought from Siberia. Pallas announces another instance, and gives a figure of one from the Ural mountains. Cuvier states that he for a long time thought that his *Mastodon giganteus* inhabited the old Continent as well as America, but he confesses his doubts as to this point.

Example—*Mastodon giganteus* (Cuv.), *Mammuth Ohioticus* (Blum.), *Elephas carnivorus* (Gul. Hunter), *Mammoth* of William Hunter and of the Anglo-Americans. This animal must have equalled the elephant in height, but seems to have been longer and stouter in its proportion.

A magnificent skeleton of this species, as well as teeth and other relics in abundance, are contained in the British Museum.

MASOUD'Y, ABOU'-L-HASAN 'ALI' BEN-HUSEYN BEN-'ALI', one of the most celebrated Arabian writers, was born, according to his own statement, at Bagdad, in the third century of the Hejira, or the ninth of the Christian era. Masoud' was gifted with great talents, which he applied at an early age to learned pursuits. He gathered an immense stock of knowledge in all branches of science, and his learning was not mere book learning, but he improved it in his long travels through all parts of the East, Turkey, Eastern Russia, and Spain. He died at Cairo in A.H. 345 (A.D. 957).

No Arabian writer is quoted so often, and spoken of with so much admiration by his countrymen, as Masoudi, and although only a small portion of his numerous and voluminous works is known to Europeans, there is sufficient to show that he deserves his reputation.

MASULIPATAM, a seaport town in Hindustan, is situated on the eastern coast in 16° 10' N. lat., and 81° 14' E. long. About a mile and a half south-east from the town, is a fort in the form of a parallelogram, 800 yards long by 600 yards broad, and a straight causeway, 2000 yards long, connects the fort with the town. There are manufactures of

chintzes in the town and neighbourhood, considerable quantities of which are exported; they are much esteemed in Persia. This is the only part of the eastern coast of Hindustan on which the surf does not beat, and the harbour affords good anchorage for ships of 300 tons burthen. The town is 226 miles N.N.E. of Madras, and 1758 feet above the sea. Its population is 28,000. It is the capital of a district of the same name, the total population of which is 520,866, a part of whom are Hindus and Mussulmans. The trade of the place has latterly declined. The fort is surrounded by a salt morass, communicating by a canal with the Kistna and the sea. An extensive irrigation has been carried out by the government, at a cost of 241,000*l*. Rains are so precarious that at times the country is desolated. The district yields rice, millet, vegetables, tobacco, and cotton; the minerals are a little iron ore, and a few diamonds. The French established a factory at Masulipatam in 1750. It was taken by assault in 1759 by the English, under Colonel Forde, and has since continued in our possession.

MATADOR, the name given to the person who in Spanish bull fights inflicts the death-wound on the bull. After the *banderilleros* have goaded the animal to madness by fastening squibs upon him and discharging them, the matador advances with a naked sword and aims a fatal blow at him. If this is effectual, the slaughtered bull is dragged away and another brought forward.

MATAMORAS, or **EL REFUGIO**, a river port of Mexico, on the right bank of the Rio Grande, 40 miles from the Gulf of Mexico, is one of the most important ports in the empire. It exports specie, hides, wool, and horses; and imports manufactured goods, chiefly from Great Britain and the United States. The population of the town is about 15,000. On the 7th May, 1846, the United States troops defeated those of Mexico under the walls of Matamoras. In the late American civil war the port was much used for the purpose of forwarding goods to the Confederate states.

MATANZAS. [*CUBA*; *HAVANNAH*.]

MATARO. [*CATALUNA*.]

MATCH, in Gunnery, is a material employed in firing military mines or in discharging pieces of ordnance. Before the invention of fire-locks, hand-guns or small-arms were fired by matches, which the soldiers carried with them when on service; and matchlock fire-arms are still used in some remote parts of Asia.

What is called *slow-match* is only a piece of slightly twisted hemp which has been well soaked in a strong solution of saltpetre with boiling water. It burns very slowly; a piece a yard in length being scarcely consumed in less than eight hours. The materials employed in the formation of *quick-match* consist of a wick of cotton steeped in a mixture of saltpetre and meal powder with spirit of wine and rain-water.

MATCH-BOX. [*ARMS*.]

MATCHES. [*LUCIFER MATCHES*.]

MATÉ. [*PARAGUAY TEA*.]

MATE OF A SHIP. In the Royal Navy this title is now changed to *Sub-lieutenant*, and is the grade between lieutenant and midshipman. The pay is 5*s*. per day; and in 1866 there were 307

sub-lieutenants, the total charge for that year being 28,012*l*. The word *Mate* is now used when speaking of the assistants to the petty officers, as gunner's-mate, &c.

In the merchant service the first-mate ranks next to the captain, and commands in his absence, holding a position similar to that of lieutenant in the naval service.

The word *Mate* signifies a companion, equal, fellow-workman, or deputy, and in that sense is much used by the labouring classes.

MATELICA. [*MACERATA*.]

MATERA. [*BASILICATA*.]

MATERIA MEDICA, the division of medical science which treats of the knowledge of medicines, their action on the animal economy, and mode of administration. Much labour has been spent in contriving classifications of the materia medica. Some have arranged the articles according to their natural resemblances; others, according to their real or presumed virtues; others, according to their active constituent principles. Of old, the materia medica consisted of more articles than at present. The tendency is to diminish it still further, to get rid of those articles which possess no advantages over others equally common, or whose properties are doubtful.

MATERIALISM is a name applied to any philosophical system which denies the existence of a spiritual or immaterial principle in man, called the mind or soul, distinct from matter, or which (changing the phrase) denies the immateriality of the soul. The name is applied to systems which differ very widely from one another, in respect of the consequences deduced from the denial of the soul's immateriality: and thus it comes to pass that the popular meaning of the word has become loose and incorrect, comprehending what are no better than accidental consequences of the pure and proper idea. Such accidental consequences are the denial of a future state, and absolute atheism; and atheism and materialism are often treated in current conversation as convertible expressions.

The name 'materialism,' also, is one of that sort for which Mr. Bentham has invented the epithet *dyslogistic*. As applied in current conversation, it always carries with it censure. Indeed there is hardly a single word in the whole range of philosophic terminology better fitted to exemplify the evils of looseness of application or of allowing feelings to tinge and discolour the notions conveyed by names.

The following is a brief summary of the views of Dr. Priestley, who has more formally than any other writer enunciated the principles of materialism in the pure and proper sense of the word. He denies the existence of a separate immaterial principle in man, called the mind or soul, because he thinks that an immaterial principle could not exist in union with the material body, and because he thinks further that all mental phenomena (as they are called), may be explained by means of supposed movements arising out of the bodily organization. The method by which he thus explains mental phenomena is that of Hartley. [*HARTLEY*.] But, denying the existence of a soul, separate from the body, and capable of surviving when the body perishes, he does not yet deny the immortality of man, and a future state of rewards

and punishments. On the contrary, he distinctly affirms these on the authority of Scripture.

Materialism, even as it is expounded by Dr. Priestley, is devoid of philosophical foundation, and rests on a disregard of the limits of true philosophy. Its truth cannot be tested by observation. It rests altogether on hypothesis and conjecture. When we go beyond what are called the qualities of the mind, or of matter either, and speculate upon what it is itself, whether it is something else, or differing from that something, whether it has or has not an existence, we have no help but in supposing, and conjecturing, and imagining.

The converse of the word materialism is immaterialism. This is only used as an abstract term, and even thus very seldom; spiritualism being generally used in its place.

MATERIALS, STRENGTH OF, is the power that a solid body possesses of resisting forces tending to break it.

The *load*, or combination of external forces, which is applied to any piece in a structure or in a machine, produces *strain*, or alteration of the volume and figure of the whole piece, and of each of its particles. The strained particles exert *stress*, being an effort to recover their original volumes and figures; and the strain adjusts itself so that the combined stress of the particles balances the action of the load. If the load is continually increased, it at length produces either *fracture*, or (if the material is very tough and ductile) such a disfigurement of the piece as is practically equivalent to fracture, by rendering the piece useless.

The *ultimate strength* of a body is the load required to produce fracture in some specified way. The *proof strength* is the load required to produce the greatest strain of a specific kind consistent with safety; that is, with the retention of the strength of the material unimpaired. A load exceeding the proof strength of the body, although it may not produce instant fracture, produces fracture eventually by long-continued application and frequent repetition.

Each solid has as many different kinds of strength as there are different ways in which it can be strained or broken, as shown in the following classification:—

	Strain.	Fracture.
Direct	{ Extension ... Tearing.	
	{ Compression... Crushing.	
Transverse . . .	{ Distortion ... Shearing.	
	{ Twisting ... Wrenching.	
	{ Bending ... Breaking across	

A *factor of safety* is the ratio in which the ultimate strength or breaking load of a body is greater than the *working load*. For a *dead load* (that is, a load applied by slow degrees, and acting with perfect steadiness, like the weight of the structure itself) the factor of safety in the case of perfectly sound materials may be made simply equal to the ratio in which the ultimate strength is greater than the proof strength. For a *live load* (that is, a load put on suddenly, and accompanied with vibration and rapid motion, like a swift train on a railway bridge) the factor of safety is in general made twice as great, because the straining effect of a load suddenly applied is about twice as great as that of the same load when applied by slow degrees. In practice, the load

is usually partly dead and partly live; or its action is intermediate between that of an absolutely steady load and an absolutely sudden load; and accordingly, the factor of safety has intermediate values. A further allowance is in general made in the factor of safety to provide against unforeseen defects in the material or workmanship. The following are examples:—

	Dead Live Load. Load.
Factors for best possible materials and work, ...	2 ... 4
Factors for good ordinary materials and work—	
In iron and other metals, ...	3 ... 6
In stone and brick, ...	4 ... 8
In timber, ...	5 ...10

Most experiments on the strength of materials give the *ultimate strength* only. In using those data for the designing of structures and machines, the most convenient process of calculation is to multiply the intended *working load* of a piece by the proper factor, so as to find the *breaking load*, and to make the ultimate strength of the piece equal to that breaking load.

The *proof* or *testing* by experiment of the strength of a piece of material is to be conducted in two different ways, according to the object in view.

I. If the piece is to be *afterwards used*, the testing load must be so limited that there shall be no possibility of its impairing the strength of the piece; that is, it must not exceed the proof strength. About double of the working load is in general sufficient. Care should be taken to avoid vibrations and shocks when the testing load approaches near to the proof strength.

II. If the piece is to be *sacrificed* for the sake of ascertaining the strength of the material, the load is to be increased by degrees until the piece breaks, care being taken, especially when the breaking point is approached, to increase the load by small quantities at a time, so as to get a sufficiently precise result.

The *proof strength* requires much more time and trouble for its determination than the ultimate strength. One mode of approximating to the proof strength of a piece is to apply a moderate load and remove it, apply the same load again and remove it, two or three times in succession, observing at each time of application of the load the *strain* or alteration of figure of the piece when loaded, by stretching, compression, bending, distortion, or twisting, as the case may be. If that alteration does *not sensibly increase* by repeated applications of the same load, the load is within the limit of proof strength. The effects of a greater and a greater load being successively tested in the same way, a load will at length be reached whose successive applications produce increasing disfigurements of the piece; and this load will be greater than the proof strength, which will lie between the last load and the last load but one in the series of experiments.

It was formerly supposed that the production of a *set*, that is, a disfigurement which continues after the removal of the load, was a test of the proof strength being exceeded; but it is now known that in most materials a set is produced by almost any load, how small soever.

The strength of bars and beams to resist breaking across, and of axles to resist twisting, can be tested by the application of known weights either directly or through a lever.

To test the tenacity of rods, chains, and ropes, and the resistance of pillars to crushing, more powerful and complex mechanism is required. The apparatus most commonly employed is the hydraulic press. In computing the stress which it produces, no reliance ought to be placed on the load on the safety valve, or on a weight hung to the pump handle, as indicating the intensity of the pressure, which should be ascertained by means of an accurate pressure gauge. This remark applies also to the proving of boilers by water pressure.

The measurement of tension and compression by means of the hydraulic press is but an approximation. It may be sufficient for an immediate practical purpose; but for the exact determination of general laws, although the load may be applied at one end of the piece to be tested by means of a hydraulic press, it ought to be resisted and measured at the other end by means of a combination of levers.

The solution of all problems regarding the strength of materials depends on the following principle:—Conceive a piece of material which is acted on by a load distributed in any manner to be divided into two parts by a sectional plane. Then, if the strength of the piece is sufficient, the *external forces* acting on one of those two parts must be exactly balanced by the *stress*, or internal force, exerted upon each other by the particles at the two sides of that plane. This enables the amount of that stress to be determined; and when its mode of distribution is also known, its greatest intensity can also be determined; and according as that greatest intensity is within or beyond a certain limit, the strength of the piece is sufficient or insufficient at the section under consideration.

Tenacity.—The ultimate strength or breaking load of a bar exposed to direct and uniform tension is the product of the area of cross-section of the bar into the *tenacity* of the material. Therefore, let

P denote the breaking load, in pounds;

S the area of section, in square inches;

f the tenacity, in pounds on the square inch; then

$$P = fS; \quad S = \frac{P}{f}.$$

The following are some of the most useful values of the tenacity of materials, in lbs. on the square inch:—

METALS.

Bronze or gun metal (copper 8, tin 1),	36,000
Copper, cast,	19,000
“ sheet,	30,000
“ bolts,	36,000
“ wire,	60,000
Iron, cast, various qualities,	13,400 to 29,000
“ “ average British,	about 16,500
Iron, malleable: boiler plates,	50,000
“ “ large forgings,	40,000 to 50,000
“ “ bars, rods, & bolts,	50,000 to 70,000
“ “ wire,	70,000 to 100,000
Steel,	80,000 to 130,000

TIMBER.

Ash,	17,000
Fir and pine,	12,000 to 14,000
Oak,	10,000 to 19,800
Teak, Indian,	15,000

MISCELLANEOUS.

Hempen hawser, <i>girth in inches squared</i> ,	$\times 1,050$
Hempen cable, <i>girth in inches squared</i> ,	$\times 672$
Iron wire ropes, <i>per square inch of iron</i> ,	90,000
“ “ <i>per pound weight to the fathom</i> ,	4,480
Leathern belts, <i>working tension per square in.</i> ,	285
Silk fibre, <i>tenacity per square inch section</i> ,	52,200

The tenacity of a given material, *in lineal feet of itself*, is equal to the tenacity in lbs. on the square inch divided by the weight of a piece of the material a foot long and an inch square. The following are examples:—

Plate iron,	15,000
Bar iron,	18,000
Iron wire rope,	27,000
Charcoal iron wire,	30,000
Cast steel,	38,600
Hempen ropes,	from 18,000 to 27,000
Flaxen canvas,	21,000 to 32,000
Deal timber,	48,000
Teak timber,	54,000
Flaxen yarn,	52,000 to 59,000
Flaxen thread,	95,000
Silken thread,	120,000

Cylindrical Boilers and Pipes.—Let r denote the radius of a thin hollow cylinder, such as the shell of a high pressure boiler;

t the thickness of the shell;

f the tenacity of the material, in pounds per square inch;

p the intensity of the pressure, in pounds per square inch, required to burst the shell. This ought to be taken at *six times* the effective working pressure—*effective pressure* meaning the excess of the pressure from within above the pressure from without, which last is usually the atmospheric pressure, of 14·7 lbs. on the square inch or thereabouts.

Then

$$p = \frac{ft}{r};$$

and the proper proportion of thickness to radius is given by the formula—

$$\frac{t}{r} = \frac{p}{f}.$$

The tenacity of good wrought-iron boiler plates has been stated as 50,000 lbs. per square inch. That of a double-riveted joint, *per square inch of the iron left between the rivet holes*, is the same; that of a single-riveted joint somewhat less, as the tension is not uniformly distributed. It is convenient in practice to state the tenacity of rivetted joints in lbs. *per square inch of the entire plate*; and it is so stated in the annexed table. The joints of plate-iron boilers are single rivetted; but from the manner in which the plates break joint, analogous to the bond in masonry, the tenacity of such boilers is considered to approach more nearly to that of a double-riveted joint than that of a single-riveted joint.

Wrought-iron plate joints, double rivetted, the diameter of each hole being 3-10ths of the distance from centre to centre of holes,	85,700
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Wrought-iron plate joints, single rivetted, ...	28,600
Wrought-iron boiler shells, with single-rivetted joints properly crossed, ...	34,000
Wrought-iron retort, with a welded joint, ...	30,750
Cast-iron boilers, cylinders, and pipes (average British iron), ...	16,500

Spherical Shells, such as the ends of 'egg-ended' cylindrical boilers, the tops of steam domes, &c., are *twice as strong* as cylindrical shells of the same radius and thickness.

Thick Hollow Cylinder.—The assumption that the tension in a hollow cylinder is uniformly distributed throughout the thickness of the shell is approximately true only when the thickness is small as compared with the radius. The tension is in fact greatest at the inner surface of the cylinder; and it is at that surface that it first gives way when the pressure is greater than the material can bear.

Let R represent the external and r the internal radius of a thick hollow cylinder, such as a hydraulic press, the tenacity of whose material is f , and whose bursting pressure is p . Then

$$\frac{R^2 - r^2}{R^2 + r^2} = \frac{p}{f};$$

and, consequently,

$$\frac{R}{r} = \sqrt{\left(\frac{f+p}{f-p}\right)};$$

by means of which formula, when r , f , and p are given, R may be computed.

Thick Hollow Sphere.—In this case, using the same symbols as in the last Article, the following formulæ give the ratios of the bursting pressure to the tenacity, and of the external to the internal radius:—

$$\frac{p}{f} = \frac{2R^3 - 2r^3}{R^3 + 2r^3};$$

$$\frac{R}{r} = \sqrt[3]{\left(\frac{2f + 2p}{2f - p}\right)}.$$

Cylindrical Flues.—When a thin hollow cylinder, such as an internal boiler flue, is pressed from without, it gives way by *collapsing*.

The following formula gives approximately the *collapsing pressure* p , in lbs. on the square inch, of a plate-iron flue, whose length l , diameter d , and thickness t , are all expressed in the same units of measure:—

$$p = 9,672,000 \frac{t^2}{l d}.$$

When flues are strengthened by rivetting round them rings of T-iron, or angle iron, at equal distances apart, their strength is that corresponding to the length from ring to ring.

Resistance of Fastenings to Shearing.—In structures and machines cases occur in which the principal pieces, such as plates, links, or bars, being themselves subjected to a direct pull, are connected with each other at their joints by fastenings, such as rivets, bolts, pins, screws, cotters, or keys, which are under the action of a shearing force. It is in every such case important that the pieces connected and their fastenings should be of equal strength.

If the *shearing stress* were uniformly distributed

throughout the cross-section of a fastening, the ultimate strength of that fastening would be simply the product of its area into the ultimate shearing strength of the material. But owing to unequal distribution of the stress, the strength of fastenings may be reduced, for rectangular sections, to *two-thirds*, and for circular sections, to *three-fourths* of the greatest possible strength.

The following are the resistances of some materials to shearing, in pounds on the square inch:—

Cast iron, ...	27,700
Wrought iron, ...	50,000
Fir and pine, ...	500 to 800
Oak, ...	2,300
Ash and elm, ...	1,400

Resistance to Direct Crushing.—Direct crushing is produced by pressure in those cases in which the pillars, blocks, struts, or rods, along which the pressure acts, are not so long in proportion to their diameter as to have a sensible tendency to give way by bending sideways.

Let P denote the *crushing load* of the piece;

S the area of its transverse section in square inches;

f the resistance of the material to crushing, in lbs. on the square inch; then

$$S = \frac{P}{f}.$$

MATERIALS.	Crushing pressure, in lbs. on the square inch.
Brick, red, ...	550 to 1,100
Fire brick, ...	1,700
Granite, ...	5,500 to 11,000
Limestone, ...	4,000 to 4,500
Sandstone, ...	2,200 to 5,500
Rubble masonry, ...	4-10ths of cut stone.
Cast brass, ...	10,300
Cast iron, ...	82,000 to 145,000
" " average, ...	112,000
Ash (dry, along the grain), ...	9,000
Oak, elm, " "	10,000
Fir, pine, " "	5,400 to 6,200
Teak, Indian, " "	12,000

The resistance of timber to crushing, while green, is about one-half of its resistance after having been dried.

Resistance of Long Rods and Pillars to Crushing by Bending.—Pillars and struts whose lengths exceed their diameters in considerable proportions (as is almost always the case with those of timber and metal), give way, not by direct crushing, but by bending sideways and breaking across—being crushed at one side and torn asunder at the other.

Let P be the crushing load of a long rod or pillar, in lbs.;

S the sectional area of material in it, in square inches;

l , its length, } both in the same

h , its least external diameter, } units of measure.

Then, approximately—

$$P = \frac{fS}{1 + a \frac{l^2}{h^2}}.$$

The following are values of f and a , for pillars fixed at both ends, by having flat capitals and bases:—

	f , lbs. per inch.	a .
Wrought iron (rectangular), .	36,000 ...	$\frac{1}{3,000}$
Cast iron (hollow cylinder), .	80,000 ...	$\frac{1}{400}$
Timber (rectangular), . . .	7,200 ...	$\frac{1}{250}$

A pillar or rod rounded or jointed at both ends is as flexible as a pillar of the same diameter, fixed at both ends, and of double the length, and its strength is nearly the same. A pillar jointed at one end and fixed at the other is as flexible as a pillar of the same diameter, and of once-and-a-third the length; and its strength is nearly the same.

In wrought-iron framework and machinery, the bars which act as struts, in order that they may have sufficient stiffness, are made of various forms in cross-section, well known as 'angle iron,' 'channel iron,' 'T-iron,' 'double T-iron,' &c. For each of those forms, the constant a is to be diminished in the ratio in which that form is less flexible than a plain rectangular section.

Wrought-iron cells are rectangular tubes (generally square) usually composed of four plate-iron sides, rivetted to angle-iron bars at the corners. The ultimate resistance of a single square cell to crushing by the buckling or bending of its sides, when the thickness of the plates is not less than one-thirtieth of the diameter of the cell, is about 27,000 lbs. per square inch section of iron; but when a number of cells exist side by side, their stiffness is increased, and their ultimate resistance to a thrust may be taken at 33,000 to 36,000 lbs. per square inch section of iron. The latter co-efficients apply also to cylindrical cells.

Resistance to Cross-breaking.—Bending and cross-breaking are produced by a transverse load. A piece of material subjected to a transverse load is called, in general, a *beam*. The simplest case of a transverse load is when three parallel forces applied to a beam balance each other. In order that they may balance each other, the middle force must act in the contrary direction to the two endmost forces; and each of the three forces must be proportional to the distance between the other two. For example, the middle force may be a weight resting on the beam, and the endmost forces the upward pressures exerted by two props that support it; or the endmost forces may be weights resting on the beam, and the middle force the upward pressure exerted by a prop. The external forces that act upon a beam having been determined, the straining actions which they exert at a given cross-section of the beam are found as follows:—Consider all the external forces which act on one only of the two parts into which the cross-section divides the beam, and take their resultant; this will be the *shearing action* at that cross-section; and the particles at the cross-section ought to be able to exert an equal and opposite *shearing stress*. Then take the *resultant moment* of the same external forces; that is, multiply their resultant by its leverage, or perpendicular distance from the given cross-section; this will be the *bending moment* exerted at the given cross-section; and the particles at that cross-section ought to be able to exert an equal and

opposite *moment of resistance*. The moment of resistance is produced in the following manner:—When the beam bends, one side of it becomes compressed and the other stretched. In general, the side towards which the middle external force acts is stretched, and the other side compressed; for example, when a beam is loaded in the middle and supported at the ends the lower side is stretched and the upper compressed; and when a beam is supported in the middle and loaded at the ends, the upper side is stretched and the lower compressed. The stretched particles exert longitudinal tension, and the compressed particles an equal and opposite longitudinal thrust; and that pair of equal and opposite stresses, acting at the two ends of a lever whose length is a certain fraction of the depth of the beam, constitute a couple, whose moment (so long as the beam is strong enough) is equal and opposite to the bending moment exerted by the load at the given cross-section.

In practice, the strength of a beam against the shearing action of the load is in general more than sufficient; so that the bending moment and the moment of resistance are chiefly to be considered; and in particular, the bending moment and moment of resistance at that cross-section at which the bending moment is greatest. That cross-section is situated as follows:—

In a beam supported at both ends and loaded at any intermediate point, or supported at any intermediate point and loaded at the ends, the intermediate point;

In a beam supported at both ends, with an uniformly distributed load, the middle of the beam; and in a beam supported at the ends and loaded in any manner, the point which divides the load into two parts, respectively equal to the supporting pressures.

The *magnitude* of the load is most conveniently expressed in *pounds*, and the *leverage* in *inches*; so that the *bending moment* is expressed in *inch-pounds*.

In the following formulæ, W denotes the *total load*, in pounds;

c , in beams fixed at one end and free at the other, the *length of the free part*, in inches;

c , in beams either loaded or supported at both ends, the *half span*, between the extreme points of load or support and the middle, in inches;

M , the bending moment in inch-pounds.

For beams {	fixed at one end and loaded at the other, . . .	$M = cW$.
	fixed at one end and uniformly loaded, .	$M = \frac{cW}{2}$.
	supported at both ends and loaded at an intermediate point, whose distance from the middle of the beam is x , . .	$M = \frac{(c^2 - x^2) W}{2c}$.
	supported at both ends and loaded in the middle, .	$M = \frac{cW}{2}$.
	supported at both ends and uniformly loaded, .	$M = \frac{cW}{4}$.

If W be the intended *breaking load* of the beam,

G G

found by multiplying the working load by a proper factor of safety, M will be the *moment of rupture*, to which the *moment of resistance to rupture* at the place where the tendency to break is greatest must be made equal.

That moment of resistance is given by the formula—

$$M = n f b h^2;$$

in which

b denotes the extreme breadth of the piece, in inches;

h its extreme depth, in inches;

f a factor depending on the material, called the *modulus of rupture*, in pounds on the square inch;

n a factor depending on the figure of the cross-section.

M having been computed from the breaking load and its leverage, and f and n being known, the transverse dimensions of the beam are to be such that

$$b h^2 = \frac{M}{n f}.$$

It is obvious that the breadth and depth may be varied, and still give the product $b h^2$ the same value; but there are limits to that variation founded on considerations of stiffness and stability.

The following table gives examples of the values of the factor n for some of the more usual forms of cross-section:—

I. Rectangle $b h$ (including square), . . .	$\frac{1}{6}$.
II. Ellipse, vertical axis h , horizontal axis b (including circle, for which $b = h$), . . .	0.0982
III. Hollow rectangle, $b h - b' h'$; also I-formed section, where b' is the sum of the breadths of the lateral hollows, . . .	$\frac{1}{6} \left(1 - \frac{b' h'^3}{b h^3} \right)$.
IV. Hollow square, $h^2 - h'^2$	$\frac{1}{6} \left(1 - \frac{h'^4}{h^4} \right)$.
V. Hollow ellipse, . . .	0.0982 $\left(1 - \frac{b' h'^3}{b h^3} \right)$.
VI. Hollow circle, . . .	0.0982 $\left(1 - \frac{h'^4}{h^4} \right)$.

MODULUS OF RUPTURE, IN LBS. ON THE
SQUARE INCH.

Wrought iron, plate beams	f , 42,000
“ “ bars and axles, ...	54,000
Cast iron, ...	$18,750 + 23,000 \frac{H}{h}$,
(where H is the <i>depth of solid metal</i> in the section of the beam, and h the <i>extreme depth</i> .)	
Ash, ...	12,000 to 14,000
Fir, pine, ...	7,000 to 12,300
Larch, ...	5,000 to 10,000
Oak (British, Russian, and American), ...	10,000 to 13,600
Teak, ...	14,800

The modulus of rupture is *eighteen* times the load required to break a bar one inch square, supported at two points one foot apart, by being applied in the middle of the bar.

Some beams tend to break by tearing at the stretched side, and some by crushing at the compressed side, according to the nature of the material and the figure of cross-section; so that the modulus of rupture represents in some cases the tenacity of the stretched side, and in others the resistance of the compressed side to crushing. When the form of cross-section is similar above and below, the beam gives way by tearing or by crushing, according as the tenacity or the resistance to crushing is the smaller; thus, in general, wrought-iron beams and timber beams give way by crushing, and cast-iron beams by tearing. Economy of material makes it desirable that the tendencies to give way by crushing and by tearing should be as nearly as possible equal; and this is accomplished by making the cross-section more massive in form at that part which is exposed to the kind of strain against which the material is weaker. For example, if the beam consists of a vertical web with a pair of flanges along its edges, the stretched flange is made the larger, in cast iron, in the ratio of 5 or 6 to 1, and the compressed flange in wrought iron, in the ratio of 4 to 3 or of 5 to 4.

Resistance to Wrenching.—For equal values of the modulus of rupture, denoted by f , the strength of a cylindrical axle to resist wrenching is double of its strength to resist breaking across. A square shaft is stronger against wrenching than a round shaft of the same diameter, in the ratio of 10 to 7, nearly.

The modulus of rupture by wrenching is the same, or nearly the same, with that of resistance to shearing.

Stiffness and Resilience of Materials.—In many cases it is necessary to consider, not merely what state of stress will be produced in a given piece of material by a given load, but also what alteration of figure will be produced. The property of resisting alteration of figure is called *stiffness*, and is expressed as a quantity by dividing the intensity of a stress by the fraction expressing the corresponding strain, or proportionate alteration of dimension. The quotient is called a *modulus of stiffness*, or of *elasticity*.

The quantity of mechanical work done in straining a piece of material up to its proof strength, is found by multiplying half the proof load by the extent to which the material yields at the point where the load is applied. This is called the *resilience* of the material; it is proportional to the square of the proof strength divided by the stiffness; and it represents the power of bearing shocks.

A structure should neither be so yielding as to make it when loaded assume a shape unfit for its purpose, nor so stiff as to make it deficient in resilience.

The strain or yielding of a piece of material, so long as the load does not exceed the proof strength, increases nearly in the simple ratio of the load; in other words, the modulus of elasticity is sensibly constant; but when the load exceeds the proof strength, the strain increases faster than the load. The values of moduli of elasticity given in tables are all for loads not exceeding the proof strength.

Moduli of elasticity are of different kinds, according to the way in which the piece of material is strained. The kind which is of most use in practice, and which is always meant when not otherwise specified, is the modulus of *direct elasticity*, or of resistance to direct lengthening or shortening of a

bar by a direct pull or thrust. It is found by dividing the intensity of the stress by the fraction expressing the proportionate alteration of length produced. The following are examples:—

MATERIAL.	Modulus of direct elasticity, in lbs. on the square inch.
Steel, ...	from 42,000,000 to 20,000,000
Malleable iron, ...	29,000,000 " 20,000,000
Cast iron, ...	23,000,000 " 12,000,000
Teak timber, ...	1,900,000
Oak, ...	2,400,000 " 1,200,000
Pine and fir, ...	1,800,000 " 1,400,000
Ash, ...	1,900,000 " 1,600,000

The following are examples of the chief uses of the modulus of direct elasticity. Let it be denoted by E , and let p be the proof stress. Then

$$\begin{aligned} \text{Proof extension of a bar, in fractions of its length,} &= \frac{p}{E}. \\ \text{Resilience of a bar under tension, of length } l \text{ and cross-section } S, &= \frac{p^2}{2E} lS. \end{aligned}$$

Let h be the depth of an originally straight beam; r the radius of the sharpest curvature to which it can be bent without injury; p the proof tension; and t the proof thrust at the cross-section where the curvature is sharpest; then

$$\frac{r}{h} = \frac{E}{p + t}.$$

Let c be the half span of the beam; then the deflection under the proof load is—

$$\begin{aligned} \text{For a beam of uniform section, supported at the ends, loaded in the middle,} & \frac{c^2}{3r}; \\ \text{For a beam of uniform section, supported at the ends, uniformly loaded,} & \frac{5c^2}{12r}; \\ \text{For a beam of uniform depth; the breadth at different parts of the span made to vary proportionally to the bending moment,} & \frac{c^2}{2r}. \end{aligned}$$

The modulus of transverse elasticity expresses the relation between the intensity of the shearing stress exerted by a particle and the corresponding distortion of that particle. The following are examples:—

MATERIAL.	Transverse elasticity, in lbs. on the square inch.
Malleable iron, ...	about 9,000,000
Cast iron, ...	" 2,850,000

Its chief use is, in connection with the strength of materials, to calculate the angle of proof torsion of a cylindrical rod; that is, the angle through which such a rod is twisted by a twisting moment that produces the proof stress on its outside particles. Let q be that stress; C the modulus of transverse elasticity; l the length of the rod; d its diameter; then the required angle, in circular measure (that is, are to radius unity), is $\frac{2ql}{Cd}$.

(For detailed information on the strength of materials, reference may be made to the following authorities, amongst many others:—Tredgold's *Carpen-try*; Tredgold and Hodgkinson on the *Strength of Cast Iron*; Barlow on the *Strength of Materials*; Kirkaldy on the *Strength of Iron and Steel*; Fairbairn on *Iron*; Fairbairn's *Useful Information*;

Moseley's *Mechanics of Engineering and Architecture*; Rankine on *Applied Mechanics*; Rankine on *Civil Engineering*; Rankine's *Useful Rules and Tables*.)

MATHEMATICS ($\mu\acute{\alpha}\theta\eta\sigma\iota\varsigma$ or $\mu\acute{\alpha}\theta\eta\mu\alpha$), a name given in the first instance to a branch of knowledge, not as descriptive of its subject-matter, but of the methods and consequences of learning it. The word $\mu\acute{\alpha}\theta\eta\sigma\iota\varsigma$, and the Latin *disciplina*, by which it has been rendered, have been the origin of the vernacular terms *mathematics* and *discipline*, the meanings of which have long since separated. The properties of space and number, the subject-matters of the $\mu\acute{\alpha}\theta\eta\sigma\iota\varsigma$, have usurped the name; so that anything which relates to them, however learnt, is called mathematics: the Latin word, on the contrary, still retains the signification of a corrective process; and in speaking of any branch of knowledge, is applied when power of mind is derived from the methods of learning it, as well as knowledge from the results.

The distinction between the old and new meaning of mathematics is most requisite to be kept in mind, because arguments are frequently urged for and against mathematics, in which the discipline is confounded with the communication of facts and processes about space and number.

In the time of Plato, which was probably that of the application of words which imply 'the discipline' to that one exercise of mind which consists in making deductions by pure reasoning from the self-evident properties of space and number, it is probable that such restriction of the word was easily justifiable. At present we have, besides mathematics, physics, the study of antiquity, grammar, &c., which have all been made disciplines, but no one of which was then entitled to that appellation. Nevertheless, it has happened that writers, misled partly by the name of mathematics and partly by the pre-eminence of mathematical reasoning in strictness and connection, have spoken as if it were the only cultivator of the pure reasoning power.

Much discussion has arisen upon the question whether those primary propositions which, from our clear apprehension and willing admission of them, are called self-evident, are notions inherent in the mind, or deductions of early experience. Except to mention this controversy, we have here nothing to do with it. The certainty of these propositions is all that we want, and this is conceded by both sides. The consideration, however, of the fundamental supports of mathematical reasoning is useful and interesting, and, as a safeguard, even necessary. It is not long since a school of metaphysicians existed, who imagined that because all mathematical definitions are precise, therefore the exact sciences are founded upon definition. It was not to them a necessary result of the constitution of our faculties that the three angles of every triangle make up the same amount, but a consequence of definition, which might have been something else, upon different suppositions. We can hardly undertake to explain what we do not understand, but we recommend every beginner in the subject to seek no knowledge about the character of fundamental propositions until he shall have become well acquainted with their consequences. He must take care to admit nothing which is not, or cannot be made, most evidently true; and

he will find that all axioms, as they are called, have the highest sort of certainty, namely, that they cannot be imagined otherwise.

Whatever may be the metaphysical hypothesis to which it is referred, it is certain that there is a real distinction between a mathematical assertion and one of any other kind. If we say that an unsupported bit of lead will fall to the ground, we state a fact of which we are as certain, in the sense of reliance, as we are of the other proposition that two straight lines cannot inclose a space. But in the former proposition, an exception, or even a permanent alteration of the law, is conceivable by the imagination: in the latter the mind would feel sensible of absurdity if it attempted to construct the idea of an inclosure bounded by only two straight lines. No distinctive phrases can be too strong to express the essential difference of these two assertions; but it is a misfortune that all terms which create a sufficient distinction are linked to one or another theory of the human mind. If the mathematical student can receive these terms as indicative of the difference of species, without bending before an hypothesis about the conformation of his own reason, he will do well to adopt them; if, on the other hand, he feel compelled to agree with any one system of mental philosophy, he will neither impede nor advance his mathematical career.

The sciences of which we speak may be considered either as disciplines of the mind, or as instruments in the investigation of nature and the advancement of the arts. In the former point of view their object is to strengthen the power of logical deduction by frequent examples; to give a view of the difference between reasoning on probable premises and on certain ones, by the construction of a body of results which in no case involve any of the uncertainty arising from the previous introduction of that which may be false; to form the habit of applying the attention closely to difficulties which can only be conquered by thought, and over which the victory is certain if the right means be used; to establish confidence in abstract reasoning by the exhibition of processes whose results may be verified in many different ways; to help in enabling the student to acquire correct notions and habits of generalization; to give caution in receiving that which at first sight appears good reasoning; to instil a correct estimate of the powers of the mind, by pointing out the enormous extent of the consequences which may be developed out of a few of its most inherent notions, and its utter incapacity to imagine, much less to attain, the boundary of knowledge; to methodize the invention of the means of expressing thought, and to make apparent the advantages of system and analogy in the formation of language and symbols; to sharpen the power of investigation, and the faculty of suggesting new combinations of the resources of thought; to enable the historical student to look at men of different races, opinions, and habits, in those parts of their minds where it might be supposed *a priori* that all would most nearly agree; and to give the luxury of pursuing a study in which self-interest cannot lay down premises nor deduce conclusions.

As instruments in the investigation of nature and the advancement of the arts, it is the object of the mathematical sciences to give correct habits of judg-

ment and ready means of expression in matters involving degree and magnitude of all kinds; to teach the method of combining phenomena, and ascending from the complicated forms of manifestation to the simple law which regulates them; to trace the necessary consequences of any law, assumed on suspicion, in order to compare those consequences with phenomena; to construct hypothetical representations of laws, or approximations to laws, which shall sufficiently represent phenomena; to convert processes of known accuracy but complicated operation, into others which make up in simplicity for a certain amount of inaccuracy, and to devise means for judging of that amount of inaccuracy, and confining it within given limits; to ascertain the most probable result of observations or experiments which are discordant with each other either from errors of measurement or unknown causes of disturbance; to point out the species of experiments which should be made to obtain a particular sort of information, or to decide between two laws which existing phenomena both indicate as of nearly equal credibility; to make all those investigations which are necessary for the calculation of results to be used in practice, as in nautical astronomy, application of force and machinery, and conduct of money transactions; in a word, though that word by itself would not have presented a sufficiently precise idea, to find out truth in every matter in which nature is to be investigated, or her powers and those of the mind to be applied to the physical progress of the human race, or their advancement in the knowledge of the material creation.

The main branches of mathematical science were formerly stated to be arithmetic and geometry, springing out of the simple notions of number and space. This is too limited a description. Unquestionably the science of numbers, strictly and demonstratively treated, and that of geometry, or the deduction of the elementary properties of figure from definitions which are entirely exclusive of numerical considerations, must be considered as the elementary foundations, but not as the ultimate divisions, of mathematics. To them we must add the science of operation, or algebra in its widest sense—the method of deducing from symbols which imply operations on magnitude, and which are to be used in a given manner, the consequences of the fundamental definitions. The leading idea of this science is operation or process. just as number is that of arithmetic, and space and figure of geometry: it is of a more abstract and refined character than the latter two, only because it does not immediately address itself to notions which are formed in the common routine of life. It is the most exact of the exact sciences, according to the idea of their exactness which is frequently entertained, being more nearly based upon definition than either arithmetic or geometry. It is true that the definitions must be such as to present results which admit of application to number, space, force, time, &c., or the science would be useless in mathematics, commonly so called; but it is not the less true that a system of methods of operation, based upon general definitions, and conducted by strict logic, may be made to apply either to arithmetic or geometry, according to the manner in which the generalities of the definition are afterwards made specific.

The most important question connected with the

mathematical sciences, is the manner in which they should be taught as disciplines of the mind. This concerns all who consider any branch of knowledge in that light; and as education spreads, this view of the subject will become of more and more consequence. Vitally essential as these sciences are to the advancement of the arts of life, we feel, in regard to this branch of their utility, in the situation of those who know that they must and will be attended to, because their cultivation is necessary to the supply of wants which all can feel, and the promotion of interests which all can understand. It is not so with the first-mentioned object of their study, but rather the reverse; for the wants of life being as easily supplied by the results of an illogical as of a logical system (provided only that vicious reasoning be not allowed to produce absolute falsehood), the facilities which laxity of reasoning affords in the mere attainment of results will always recommend it to those whose main object it is to apply the fruits of calculation to the uses of life. Such has been, and we are afraid will continue to be, the tendency of the great advance which the last century made in application.

All we should positively contend for is the necessity of making the entrance to the study as strict and rigorous as reason can make it, to all who are to receive liberal education. In the higher branches of mathematics many opinions prevail, and it would be impossible to make a formal standard of rigour. Add to this, that with a certain degree of experience in the estimation of reasoning, it may be comparatively immaterial which of several different methods is adopted; either may be rigorous if properly understood, and if the habit of reducing looseness of phraseology, or dangerous abbreviation of logic, to strict definition and formal deduction shall first have been well formed. To assist in gaining this end, we shall propose—

First, that no student should be allowed to enter upon the use of language in mathematical reasoning until he has acquired more acquaintance with the nature of assertion, denial, and deduction, than can be obtained from previous education as now given: this is to be done by the study of the elements of logic.

Secondly, that no consideration of facility or practical convenience should prevent the first study of arithmetic and geometry from being strictly demonstrative, and formally rigorous: rigour being defined to consist in explicit statement of every assumption, and logical treatment of every inference.

On the first of the preceding recommendations we shall only observe, that in order to distinguish between accurate and inaccurate inference, an acquaintance with the exact extent of meaning of the several modes of communication is absolutely necessary. This cannot be learnt from the ordinary use of language, which abounds in implications to be suggested by the circumstances of the speaker, the context of the words, or the tone in which they are delivered. Before the phrases of demonstration can be made to convey a meaning limited in both directions, the strict use of language must be made a study; if this be neglected, the words of any book may pass between the teacher and the learner, but no precaution has been taken to secure their conveying the proper meaning, neither too much nor too little.

On the second recommendation, we must first

explain that we hold many points of controversy very cheap, as far as they concern the discipline given by the most elementary branches of mathematics. It matters nothing, in our view of the case, whether an axiom be really incapable of proof, or whether the substitution of another would or would not place the science on a more simple basis. The habit to be formed is that of tracing necessary consequences from given premises by elementary logical steps: the premises to be true or false, the consequences to be true if the premises be true, and dubious (not necessarily false) if the premises be false. The only error which, at the stage in question, it is intended to avoid, is the deduction, as a necessary consequence, of that which is not so. The mind of the learner, however, is allowed to dwell too much at the outset on the absolute truth or falsehood of the conclusions, to the neglect of their connection with the premises: hence it arises that when a process occurs in which it is essential to examine that connection for its own sake, it is the universal complaint that beginners find difficulty and obscurity. From what other cause arises the dislike of the indirect demonstration? [ABSURDUM, REDUCTIO AD.]

Unfortunately for the mental progress of the student, he is often allowed to use premises of an easy form, in cases where a complete preparation for the subject would require more extended first principles, and greater prolixity of deduction. To this, as before observed, no objection can be taken in itself, provided that no consequences be admitted except the legitimate ones. But something more is admitted: the pupil is presented, in consideration of his attention to one set of premises, with the consequences of another, and is allowed to make believe that he has come fairly by the latter. Thus, by a theory which applies only to the ratio of number to number, he is permitted to draw general conclusions upon all ratios. When, in opposition, we advise that the first studies should be demonstrative and rigorous, we do not imply, for instance, that the more difficult system should in all cases be preferred to the less complete but more simple: we confine ourselves to insisting that whatever the premises may be, the conclusions should really follow; and that if the latter be necessarily of a limited character, the limitation should be stated.

The necessity of a demonstrative system of arithmetic is practically denied, in this country at least, by the use of a set of dogmatical rules. Such training would be less prejudicial if the notions of the student on reasoning were more settled, so that he could receive these rules with some fitting idea of their purpose, and of the extent to which they are to be considered as knowledge. As it is, he has no other view of arithmetic presented to him, and his conceptions of number are allowed to be first fettered, and afterwards led astray, by ideas derived sometimes from the reception of the conventional for the necessary, sometimes from modifications of truth which are convenient in practice though unsound in theory. Such an addition to his stock of mathematical power predisposes him to acquiesce in the shifts by which rigour is avoided in other parts of the science; and an arithmetic from which both sequence and accuracy of thought have been excluded is the asylum of geometry against truth, when the latter becomes too

difficult for an unenergetic, that is, untrained power of investigation.

MATHEW, REV. THEOBALD, commonly known as *Father Mathew*, the great apostle of temperance, was born at Thomastown, in Tipperary, on the 10th of October, 1790. He was educated at Maynooth, was ordained a priest of the religious order of Capuchins in 1814, and commenced his labours at Cork. Here he became the counsellor, physician, banker, and friend of the poor, and won their universal love and respect. He introduced the religious brotherhood of St. Vincent de Paul, founded large schools, and established a cemetery on the model of that at Père-la-Chaise. But the great work of Father Mathew's life is the marvellous reformation which he effected in the habits of his countrymen, by converting large numbers of them from drunkenness to sobriety. In 1838 he established in Cork a temperance society, which, owing to his great influence, soon counted 150,000 members. The fame of his eloquence and energy spread rapidly through the country, and he gradually extended the field of his labours to all the towns of Ireland, many of the principal ones of England and Scotland, and even to America. The greatest possible enthusiasm was everywhere excited, and the numbers who were induced to take the temperance pledge are almost incredible, amounting in many instances to 20,000, and even to 50,000 in one day. His association included a large proportion of the adult population of Ireland of all ranks and creeds. The change in the habits of the Irish people was so great that many of the breweries and distilleries were closed. His own relatives, who were distillers, were among the earliest and largest sufferers in this way. Father Mathew's fortune and resources were always exhausted by his philanthropic labours, munificent charities, and the enormous expenses connected with his great mission; and in his declining years he was largely involved in pecuniary difficulties. A pension of 300*l.* was granted to him from the civil list, and collections were made on his behalf in various parts of the kingdom. He died on the 8th of December, 1856.

An excellent biography of Father Mathew was written by J. F. Maguire, Esq., M.P. for Cork, and published in London, 1864.

MATHEWS, CHARLES, was born June 28, 1776. His father intended him for a bookseller, but the son felt an irresistible inclination for the stage, and after several successful provincial appearances, appeared at the Haymarket Theatre, London, in 1803. He subsequently became celebrated in those original entertainments called 'At Homes,' which he gave both in England and America with extraordinary success. He died June 28, 1835, at Devonport. He ranked high as a comedian and a mimic.

MATHIOLA, a genus of cruciferous plants, consisting of annual and perennial herbaceous plants inhabiting the warm countries bordering the Mediterranean, and extending eastwards into Persia and some of the southern Asiatic provinces of Russia. Between thirty and forty species are known to botanists, among which are those which form the Stocks and Gilliflowers of gardens, sweet scented biennials much valued for the beauty and variety of their many-coloured flowers. The principal source of these has been *Mathiola incana*.

MATICA or MATICO. This name is applied to an astringent plant brought from Peru, where it has long enjoyed a high reputation for its styptic properties. Doubts exist as to its botanical origin. Cold water extracts, in about four hours, all its medicinal virtues, and is an eligible means of administering it. A tincture is also employed, and the powdered leaves are given both internally and applied externally. It does not owe its astringent properties to tannin: and it seems to exert a vital action on bleeding vessels, so as speedily to arrest the hæmorrhage. It has been used to check other discharges, such as the profuse expectoration and also the night sweats of consumptive patients. Few drugs exert more than a temporary influence over these symptoms; but among such, Matico seems well entitled to attention.

MATINS (from the Italian *matina*, or the French *matin*, 'morning'), strictly the first part in the daily service of the Roman church. Matins or mattins, however, were divided into two parts, which were originally distinct offices and hours, namely, the *nocturn* and *matin lauds*. The *nocturns* or vigils were derived from the earliest period of Christianity. They originated in the endeavours of the early Christians to avoid persecution, by performing their 'holy mysteries' at night. The custom was afterwards retained from devotion and choice. The *matin lauds* followed next after the *nocturns*, and were supposed to begin with daybreak. We find allusions in the writings of Cyprian, and all the subsequent fathers, to the morning as an hour of prayer. About the end of the third or beginning of the fourth century there was public worship in the morning, as we learn from the 'Apostolical Constitutions,' which record the order of the service.

MATLOCK. [DERBYSHIRE.]

MATRASS, a glass chemical vessel, employed for the purpose of digesting, boiling, and distillation.

MATRICARIA, a genus of plants belonging to the natural order *Compositæ*. *M. Chamomilla*, Wild Chamomile, is common throughout Europe, on dung-hills, in cultivated ground, and on way-sides and waste places. It was formerly used as a medicine, but its place has been taken by the common Chamomile and other plants of the same order.

MATRICULATION (Lat. *matricula*) is a register kept of the admission of persons into any body or society of which a record is preserved. Among ecclesiastical writers mention is made of two kinds of *matricula*, the one containing a list of the ecclesiastics, called *matricula clericorum*; the other of the poor provided for at the expense of the church, called *matricula pauperum*. In modern times the term matriculation is chiefly applied to the enrolment of students at the different universities.

At Oxford every student admitted is entered on the books of some college or hall, where he commences residence immediately on matriculation at the university. The fees are as follow:—A servitor or bible clerk, 10*s.*; a peer, or the eldest son of a peer, unless he renounces his privilege of a shorter term of residence, 8*l.*; every other privileged person, unless he renounces his privilege, 5*l.*; every other person, 2*l.* 10*s.*

At Cambridge admission to a college is either by a personal examination before the tutors and officers, or through a recommendatory certificate specifying

the age, qualifications, &c., of the candidate, signed by a master of arts of either university, and accompanied by a deposit of caution-money to the extent of from 10*l.* to 50*l.* The matriculation fees for the common chest of the university are as follow:—nobleman, 15*l.* 10*s.*; pensioner, 5*l.*; fellow-commoner, 10*l.* 10*s.*; sizar, 15*s.*

At London University every student who proposes to graduate must pass an examination before matriculation. This examination takes place twice a year—on the second Monday in January and first Monday in July. The fee for matriculation is 2*l.*

At the Scottish universities matriculation consists in signing a promise of good behaviour and obedience to the rules. There is a uniform fee of 1*l.* paid at matriculation each year.

MATRIX, or **GANGUE**. Metallic ores are seldom found unmixed in the place in which they occur; they not only accompany each other, but are frequently associated with useless stony bodies, and these are called the matrix, or gangue.

MATSYS, **QUINTIN**, the blacksmith painter of Antwerp, was born at Louvain about 1460, and brought up as a smith, in which occupation he distinguished himself by fertility of invention and admirable workmanship. At Antwerp he fell in love with the daughter of a painter, who having refused to give her hand to any but a member of his own profession, Matsys abandoned the forge, studied art under Roger Van der Weyden, and, inspired by love, rapidly rose into celebrity. He was married in 1491, and his first wife dying, re-married in 1508. His most famous works are—the so-called ‘Misers,’ at Windsor; a ‘Magdalene,’ at Corsham House, Wilts; and the ‘Descent from the Cross,’ in the Antwerp Museum. He died at Antwerp in 1530–31.

MATTER is the name for that out of which all objects external to the mind are thought to be composed, the question being reserved, whether the mind is or is not composed of the same substance. What this substance is to which the name of matter is given, we have no means of knowing. It is sufficient to know and say that man, subject to certain affections of his senses, is led to assign those affections to an external cause. This external cause is that which he calls matter; but all that is known of it is its capability of producing in him certain affections. When, therefore, we speak of the qualities of matter, we do not affect to say what that is which is the *substratum* of those qualities.

MATTHEW, **ST.**, the Apostle and Evangelist, was a native of Galilee, and a publican, or collector of customs and tribute under the Romans. While employed in his office at Capernaum he was called by Christ to follow him (Matt. ix. 9). The only further certain information which we possess concerning him is in the gospels. He is said to have preached the gospel subsequently in Persia and in Ethiopia, and to have died or been martyred at Naddabar in Ethiopia. An account which corresponds in all respects to that of the conversion of Matthew as related by himself is given by Mark (ii. 14), and Luke (v. 27), respecting a publican named Levi, the son of Alphaeus.

‘*The Gospel according to St. Matthew*,’ is a canonical book of the New Testament, ascribed by the unanimous consent of the early Christian writers

to the apostle Matthew. [GOSPEL.] It is generally considered to have been the first written, and most writers have fixed the date of this gospel about A.D. 38. There has been much discussion as to the language in which it was originally written, whether Hebrew or Greek. There may have been two originals, one in Hebrew for the Jewish converts, and one for general use in Greek. If there was only one, the probability is that it was in Greek.

MATTHEW OF WESTMINSTER, a monk of Westminster, and an old Latin chronicler of the time of Edward II. His work, which has come down to us, is entitled ‘Flores Historiarum.’ He begins with the creation, and the first half of the work is filled with the affairs of other countries, and of our own before the Conquest; the remainder contains a valuable account of our history from that period to the death of Edward I. An English translation is included in Bohn’s ‘Antiquarian Library.’

MATTHISSON, **FRIEDRICH VON**, was born at Hohendodeleben, near Magdeburg, January 23, 1761. In 1794 he obtained the appointment of reader and travelling companion to the reigning princess of Anhalt-Dessau, and during the next seven or eight years visited Italy, the Tyrol, and part of Switzerland, relative to which countries his ‘Briefe’ and his ‘Erinnerungen’ furnish many interesting details. His fame rests, however, on his ‘Elegy in the Ruins of an Old Castle,’ which is hardly less popular in Germany than that of Gray is with us, as is also his song of ‘Adelaide,’ with music by Beethoven. Matthisson also performed a good office for the poetical literature of his country by his ‘Lyrische Anthologie,’ a collection in 20 vols., published at Zürich, 1805–7. He died at Wörlitz, near Dessau, March 12, 1831.

MATTO GROSSO. [BRAZIL.]

MATY, **MATTHEW**, **M.D.**, was born in Holland in 1718, at Montfort, near Utrecht. He took his degree at Leyden and came to England in 1740. Through the popularity of his ‘Journal Britannique’ he was introduced to the leading literary men of the day, and had interest sufficient to obtain the post of principal librarian of the British Museum in 1772. He died in 1776. His works are ‘Mémoire sur la Caractère du grand Médecin, Boerhaave;’ ‘Authentic Memoirs of the Life of Richard Mead, M.D.’ At the time of his death he had nearly finished the ‘Memoirs of the Earl of Chesterfield,’ which was completed by his son-in-law, Mr. Justamond, and prefixed to that nobleman’s ‘Miscellaneous Works.’

MAUBEUGE. [NORD.]

MAUCHLINE. [AYRSHIRE.]

MAULÉON. [PYRÉNÉES, BASSES.]

MAUND, the name of a weight used in the East Indies, which varies in different provinces; but the ordinary Indian bazaar-maund is 82½ lbs. The Bombay maund is 28 lbs.; the Surat, 41 lbs.; the Madras, 25 lbs.; and the Bengal factory-maund, 74 lbs. 10 oz.

MAUNDY THURSDAY, the Thursday preceding Easter, so named from the *maunds*, or baskets, in which the alms or gifts made to the poor by our monarchs were formerly contained. These gifts were distributed to as many poor men and poor women as the sovereign numbered years, and consisted of victuals, clothing, and money. The lord high almoner,

and sometimes the monarch, formerly washed the feet of a certain number of the poor. James II. was the first who performed this ceremony. In 1838 a change was made in the maundy men and women receiving money from the clerk of the alms office instead of the accustomed fare.

The custom of the maundy is of considerable antiquity. Augustine, according to Du Cange, is first quoted for it. In England at least it was not entirely confined to royalty. In the earl of Northumberland's 'Household Book,' begun in 1512, folio 354, we have an enumeration of 'Almaner of things yerly geven by my lorde of his maundy, ande my laidis and his lordship's children.'

MAUPERTUIS, PIERRE-LOUIS MOREAU DE, was born at St. Malo, 17th July, 1698. Upon quitting the army, he applied himself assiduously to the study of the mathematics and astronomy. In 1723 he was admitted a member of the Royal Academy of Paris, and in 1727 a member of the Royal Society of London. In 1736 Maupertuis, in company with Clairaut, Camus, Lemoine, and Outhier, were deputed by the Academy to measure an arc of the meridian in Lapland. They were afterwards joined by the Swedish astronomer Celsius.

Maupertuis was one of the first among his countrymen who defended the Newtonian theory against the attacks of Descartes. When Frederick II. was about to re-organize the Academy of Berlin, he offered the presidency to Maupertuis, who accepted it. But his residence at the court of Prussia, which dates from 1745, seems to have been chiefly occupied in cultivating the good graces of Frederick, and he showed but little interest in scientific research. He died at Basle, 27th July, 1759, at the house of two of the sons of John Bernoulli, with whom he had always been on terms of friendship. His latter years were embittered by a dispute with Koenig, professor of mathematics at the Hague and foreign associate of the Academy of Berlin, respecting a mechanical principle of considerable importance, which Maupertuis appears to have been the first to promulgate, and from which he deduced the laws of the reflection and refraction of light, and those to which the collision of bodies are subjected, but of which he was unable to give any general demonstration. This principle, which he incorrectly designated 'the principle of least action,' he enunciated in terms identical with those employed at the present time. The Academy of Berlin, to whose arbitration the dispute was referred, decided in favour of Maupertuis, and ordered the name of Koenig to be erased from their list of associates; but even this decision, added to the support of the celebrated Euler, seemed inadequate to compensate Maupertuis for the raillery of Voltaire, who, although totally incompetent to judge on the scientific merits of the case, had taken the part of Koenig, and published his satirical piece entitled 'Diatribes du Docteur Akakia, Médecin du Pape,' wherein he was too successful in turning into ridicule both Maupertuis and his 'principle.' Frederick laughed at the satire, but ordered it to be burnt by the common executioner, which led to Voltaire's asking and obtaining permission to leave Berlin. ('Vie de Voltaire,' by Condorcet.) A list of the published works of Maupertuis is given in Quérard's 'Dictionnaire Bibliographique.'

MAUR, ST., CONGREGATION OF, a celebrated

society of Benedictines in France, who professed to follow the primitive rule of that order. It was first established in 1618. Among its more eminent members in the seventeenth century may be enumerated Hugh Menard, Luc d'Acheri, Jean Mabillon, Thierry Ruinart, and Bernard de Montfaucon.

MAURA, SANTA. [IONIAN ISLANDS.]

MAURIAE. [CANTAL.]

MAURICE OF NASSAU. [NASSAU.]

MAURICE, ELECTOR AND DUKE OF SAXONY, son of Duke Henry of Saxony, and grandson of Albert, surnamed the 'Courageous,' the founder of the Albertine line, a younger branch of the electoral family, was born in 1521. In 1542 he married Agnes, daughter of the landgrave of Hesse. Although a zealous Protestant, as his father had been, Maurice did not scruple to serve as a volunteer under the Emperor Charles V. 'Ambition,' says Voltaire, 'led him to second the views of the emperor, as ambition led him afterwards to denounce them.' This did not prevent him, however, from paying attention to home affairs. The laws which he established in 1543 are remarkable for their religious and moral bearing. Nor was he wholly under imperial domination; for when in 1542, at the suit of Henry, duke of Brunswick, who had been driven from his dominions, he was cited with the landgrave and the other confederates to appear before the Imperial Chamber, he publicly refused to acknowledge its jurisdiction, while composed entirely of men of a hostile religion, who had openly declared against keeping faith with 'heretics.'

On the breaking out of the war in 1545, between the duke of Brunswick and the landgrave of Hesse, the former applied to Maurice to intercede with his father-in-law to obtain peace. After repeated solicitations, he induced the landgrave to offer terms; but those offered involved so complete a submission on the part of the duke that they were indignantly rejected, and the war broke out afresh. It terminated, however, in the defeat of Brunswick, who, through the mediation of Maurice, was induced to surrender. The prince was accused of having acted a treacherous part in this transaction, and betrayed the duke; but he successfully cleared himself from the charge.

In 1546, on the breaking out of the war between the emperor and the Protestant confederates, John Frederick, elector of Saxony, and the landgrave of Hesse appeared on the latter side, for which they were duly outlawed by imperial authority. Meantime, Maurice had been secretly negotiating with the emperor and Ferdinand of Spain, the former of whom, as an inducement to support his cause, invited him to take possession of the electorate of Saxony. Maurice seems to have hesitated a little at this juncture; but some negotiations which he established with the Protestants led to no result, and he went boldly over to the emperor. During the long and active war which ensued, he distinguished himself greatly by his successes over his Protestant friends. In the following year (1547) the elector was taken prisoner at the battle of Muhlberg. Maurice and the elector of Brandenburg now interceded for the landgrave with the emperor, and by his permission they guaranteed the former his freedom, on condition that he surrendered and made an humble submission. But the emperor, less mindful of his allies' honour than his own interest, detained the landgrave in

prison, notwithstanding repeatedly reiterated remonstrances. Maurice had meantime received the electorate of Saxony from the emperor, and was solemnly invested therein in 1548.

In 1549 several charges having been made against him relative to his alleged attachment to popery, he refuted them in an able letter to his subjects. In 1550 he opposed the emperor through his representatives at the Diet at Augsburg, by protesting against the Council of Trent. In the same year he was appointed to the command of the imperial army which besieged Magdeburg, where he met with considerable success, although he seems to have been willing to favour the inhabitants as far as possible.

In 1551, on the emperor summoning the States to the Council of Trent, Maurice caused the heads of his doctrines to be drawn up by Philip Melancthon; but he refused to send his divines unless a safe conduct was granted them, not only by the emperor, but by the council itself—instancing the case of John Huss, in which the authority of the former had been set at nought. Towards the end of the year, he held a convention in his own states, to make peace with Magdeburg, which was eventually concluded.

In the meantime he had not forgotten the landgrave. After in vain praying the emperor for his restoration to liberty, he proposed to throw off a mask which had been long irksome to him. He accordingly entered into negotiations with the king of Denmark and many of the German states, and also with the king of France. Denmark and most of the states sent ambassadors to the emperor to mediate on behalf of the landgrave, but ineffectually; and Maurice now prepared for open hostilities. In 1552 he took the field with the Protestant princes, and achieved a brilliant campaign. The king of France had in the meantime made war upon the emperor, who, pressed on all sides, was eventually compelled to succumb. The result was the celebrated treaty of Passau, (August 12, 1552) which restored to the Protestants the free exercise of their religion, and the rights of which they had been deprived since the victory of Muhlberg.

Maurice now turned his arms against Albert, duke of Brandenburg, who had repudiated the treaty, and defeated him at Sievershausen in Luneburg, but fell mortally wounded in the engagement (July 11, 1553). He left behind him the renown of a sagacious statesman, a subtle diplomatist, a great captain. 'His was a nature,' says Ranke, 'like none other that Germany has ever produced—so secret, so enterprising, so energetic, so much a man of flesh and blood and not of mere ideas. The fate of Protestantism in Europe depended upon his actions: his desertion from its cause brought it to the verge of ruin; and his desertion from the emperor was the salvation of liberty.'

MAURITIUS, the Island of, called also ISLE DE FRANCE, is situated in the Indian Ocean, between 19° 45' and 20° 33' S. lat., and between 56° and 57° E. long. Its length is about 36 miles, breadth 20, and area 600 square miles.

The resident population of Mauritius on the 8th April, 1861, when the census was taken, was 310,050, the military amounted to 2350, and the crews in harbour to 1062, furnishing a grand total of 313,462—an excess over the census of 1851 of 129,956.

The Indian born population, exclusive of other Asiatics, numbered 172,425, the remainder being negroes, hill coolies, whites, and about 5000 British. The whites of the island are chiefly of French extraction, and speak the French language. The population, excluding the garrison and the shipping, was officially estimated on the 31st December, 1863, to be 323,254, as against 310,050 in 1861, as given above. In 1862 there were 13,986 emigrants, chiefly from India. The dependencies on Mauritius are Seychelles, the Chagos Archipelago, Rodrigues, and some other small insular groups, of which collectively the population was 9058 at the last census.

The island is surrounded by a coral reef, generally running parallel to the shores, at the distance of one or two furlongs, and mostly dry at low water. In this reef occur eleven breaks, by the greater number of which vessels of considerable burden may approach the island. The water between the reef and the shores, being less agitated than the open sea, affords facilities of communication between the places along the coast. The interior of the island consists of a great number of lofty hills, of which the Brabant mountains attain a height of 3000 feet, and Peter Botte Mountain presents an extraordinary shape. In the mountains at the back of Port Souillac and Grand Port is a small lake, which is considered to be an extinct crater. The rains and hurricanes are very violent.

This island was formerly covered with woods, and even now a considerable part of the native forest is allowed to remain for ornament round the plantations. The climate is healthy, the mean temperature of the year at Port Louis being 78°·7; in winter 75°, in summer 81°·8 Fahr. In some of the more elevated districts, however, the climate resembles that of the hills of India, and the thermometer usually stands 7° or 8° lower than at Port Louis. The surface is well watered, and the soil rich in the valleys, producing wheat, maize, yams, and manioc; but the principal product is sugar, the cultivation of which spread rapidly after the English obtained possession of the island; but since 1848 it has often greatly failed from an insect called the 'borer' attacking the canes. This insect is the great enemy of vegetable life, and for its extirpation a prize of 2000*l.* has been offered, but as yet no person has made the desired discovery. Another disease has also attacked the canes, which, when cut, prove destitute of juice and saccharine substance, though their outward appearance indicates health and ripeness. About 30,000 persons are employed on the sugar estates, of whom about 6000 are coolie immigrants from India. The total exports of sugar in 1863 amounted to 274,548,951 lbs., value, 2,494,556*l.*, being a slight increase on 1862, when the quantity was 268,162,351 lbs., worth 2,232,249*l.* The other articles of export are cotton, rum (358,399 gallons), oil, linseed, hides, copper (7000 cwts.), and specie (59,000*l.*), worth altogether 2,720,098*l.* in 1863. The principal articles imported in the same year were haberdashery, mercery, and millinery, and cotton manufactures, plain and coloured, worth altogether about 150,000*l.*; copper (8000 cwts.), wheat (38,000 qrs.), rice (1,284,790 cwts.), other grain, hardware and cutlery, machinery and mill-work, guano (22,000 tons), specie (301,758*l.*), and

wine. The total value of all the imports was declared to be 2,540,605*l.*, of which 569,084*l.*, only, came from the United Kingdom. Nearly half the exports, however, are sent to Great Britain. British vessels carrying 428,462 tons, and foreign ships carrying 182,808 tons, entered and cleared at the ports of this colony in 1863, the total being 611,270 tons. It is a strong proof of the endurance of national tastes in matters of food and clothing, that France still holds the third place as to imports, though she takes but an inconsiderable portion (about a ninth) of the produce of the island. The revenue in 1863 was 518,278*l.*, and the expenditure, 482,524*l.* A public debt of 600,000*l.* was incurred in 1863 for the construction of railways, some of which are now in working operation.

The government of the Mauritius and its dependencies is vested in a governor—whose salary is 7000*l.* a year—aided by an Executive and a Legislative Council, consisting of seven official and eleven non-official members, the latter chosen from the landed proprietors and principal merchants of the island. All their acts are subject to the approval of the British government. The principal towns in the island are Port Louis and Mahébourg. The total cost of the defences and garrison during the year 1863 was 137,500*l.*, of which about 31,000*l.* was defrayed by the colony. Mauritius was taken possession of principally for the protection of British trade in the eastern hemisphere, and its advantages as a coaling station in the direct line to India and China render its retention of more essential importance than ever in case of another maritime war. The roads generally throughout the island are excellent, and two or three lines of railway have very recently been constructed.

Horses are few, and seldom bred in the island. Mules and asses are more numerous, and principally used for the saddle. Cattle, goats, sheep, hogs, and fish abound.

Port Louis, the capital of the island, is situated near the north-western extremity, on a small bay called Port North-West, or Port Louis, which can accommodate a numerous fleet of ships. The town and harbour are strongly fortified, but the entrance to the latter is difficult, and during the hurricane months it is unsafe, except in an inner basin called the Panfaron. The population of the city in 1861 was 74,525, being an increase of 24,616 since 1851. The town has a Roman Catholic cathedral, a Protestant church, and two mosques, a citadel, barracks, bazaar, theatre, and royal college, with between 240 and 250 pupils. Since 1864 railways have been constructed from this port to the extremities of the island, and the town was recently lighted with gas. Among the public buildings may be mentioned the Governor's residence and government offices (which, however, are little better than sheds), central railway terminus, civil hospital, &c. The local affairs of Port Louis are managed by a municipal corporation, which is deeply in debt. In the city is a library containing more than 60,000 volumes, mostly French books; a good botanical garden; and some docks for the repair of vessels. There is another port in the southern part of the island called *Port Grand* or *Mahébourg*, which is not, however, much frequented, as it is encumbered with coral reefs, and difficult

of access for shipping. A lighthouse was erected near it in 1863. There is packet communication monthly between Mauritius and Ceylon.

Mauritius was discovered by the Portuguese in 1505. The Dutch surveyed it in 1598, and planted a settlement in 1640, naming it in honour of Prince Maurice, but they abandoned the island in 1708. In 1715 the French took possession of it, formed a settlement at Port North-West, and called the island *Isle de France*. They remained in its undisturbed possession to the year 1810, when it was taken from them by the British, who since the peace of 1814 have retained it. This island is the scene of St. Pierre's well-known romance of 'Paul and Virginia.' (*Governor's Reports; Colonial Blue Book, &c.*)

MAUSOLEUM, a term applied in modern times to a sepulchral chapel or edifice erected for the reception of a monument; but it originally designated the magnificent structure raised by Artemisia as the tomb of her husband Mausólus, king of Caria, at Halicarnassus, 352 B.C. Of this monument no remains now exist; but from Pliny's description it appears to have been nearly square in its plan, measuring 113 feet on its sides, and 93 on each of its ends or fronts, and to have been decorated with a peristyle of thirty-six columns (supposed by Hardouin to have been 60 feet high, or upwards), above which the structure was carried up in a pyramidal form, and surmounted at its apex by a marble quadriga executed by Pythis, who, according to Vitruvius, was joint architect with Sátyrus in the building. It was further decorated with sculptures and reliefs by Scopas, Bryaxis, Timotheus, and Leóchaes. The entire height was 140 feet.

The mausoleum erected at Babylon by Alexander the Great, in honour of Hephæstion, appears to have been still more magnificent. Those of Augustus, in the Campus Martius, and Hadrian at Rome, were structures of great magnitude and grandeur, and resembled each other in being circular in plan. Hadrian's is now converted into the *Castello di St. Angelo*, in which shape it is familiar to almost every one.

Such places as Henry VII.'s Chapel and the Pantheon of the Escorial may also be considered as mausoleums; but the term is generally restricted to a detached edifice erected merely as a private burying-place or to contain tombs. The queen has recently erected one at Frogmore, near Windsor, where the remains of the prince consort and the duchess of Kent have been interred; and a handsome edifice of this nature, which is said to have cost 100,000*l.*, adorns the grounds of the duke of Hamilton, at Hamilton, in Lanarkshire.

MAUVE. [DYING.]

MAVIS. The name given in Scotland to the *Turdus musicus*, thrush, or song-thrush, which inhabits every European country, being permanent in Britain and spread over the three kingdoms. It haunts gardens and woods near streams and meadows. Its song is sweet and has considerable compass; it can be made to repeat musical airs, and in some instances to articulate words.

MAXENTIUS, MARCUS AURELIUS VALE-RIUS, son of Maximianus, the colleague of Diocletian in the empire, was living in obscurity when, after his father's abdication, and the elevation of Constantine

to the rank of Cæsar, he became envious of the latter, and dissatisfied with the neglect of Galerius towards him. Accordingly he stirred up a revolt among the prætorian soldiers at Rome, and was proclaimed emperor in 306. He retained the imperial title and possession of Italy till 312, when he was defeated by Constantine, and was drowned in attempting to cross the Tiber. [CONSTANTINUS.]

MAXIMA and MINIMA. These Latin words, which simply mean 'greatest' and 'least,' are used to imply, not the absolute greatest or least values of a varying quantity, but the values which it has at the moment when it ceases to increase and begins to decrease, or vice versa. Thus if it be said that the height of the barometer was a maximum at ten o'clock, it means that up to that hour the barometer rose, and then began to fall; in which case it would still be said to have been a maximum, even though it should afterwards rise, and stand at a greater height than at ten o'clock. Thus it is possible that there should be several maxima and minima in one day, and even that one of the minima should be greater than one of the maxima: that is, at one moment when the fall ceases and a rise begins, the barometer may then be higher than it was at another time when a rise had ceased and a fall begun.

MAXIMIANUS, MARCUS AURELIUS VALERIUS, a native of Pannonia, born of obscure parents, served in the Roman armies with distinction, and was named by Diocletian his colleague in the empire in 286. The remainder of his life is given under DIOCLETIAN, CONSTANTIUS I., and CONSTANTINUS. He was put to death at Marseilles, by order of Constantine, for having conspired against his life, in 310.

MAXIMINUS, CAIUS JULIUS VERUS, was originally a Thracian shepherd. He was of gigantic size and great bodily strength. Alexander Severus gave him the command of a new legion raised in Pannonia, at the head of which he followed Alexander in his campaign against the Germans on the banks of the Rhine, where he induced some of his companions to murder Alexander in his tent, as well as his mother Mammaea, in 235.

Maximin, being proclaimed emperor, named his son, also called Maximin, Cæsar and his colleague in the empire. But his cruelty and rapacity aroused enemies against him in various parts of the empire. The province of Africa revolted, and proclaimed Gordian, who was soon after acknowledged by the senate and the people of Rome, in 237. On the news of the defeat of Gordian and his son by the Roman governor of Mauritania, the senate proclaimed emperors Clodius Pupienus Maximus and Decimus Cælius Balbinus, and Maximin was shortly afterwards killed in 238, by his own soldiers, while he was besieging Aquileia.

MAXIMINUS, DAIA, or DAZA, an Illyrian peasant, served in the Roman armies, and was raised by Galerius, who was his relative, to the rank of military tribune, and lastly to the dignity of Cæsar, in 303, at the time of the abdication of Diocletian and Maximian, when he had for his share the government of Syria and Egypt. After the death of Galerius, in 311, Maximin and Licinius divided his dominions between them, and Maximin obtained the whole of the Asiatic provinces. Valeria, the daughter of

Diocletian and widow of Galerius, having escaped from Licinius into the dominions of Maximin, the latter offered to marry her, and on her refusal banished her with her mother into the deserts of Syria. He persecuted the Christians and made war against the Armenians. A new war having broken out between Licinius and Maximin, the latter advanced as far as Adrianople, but was defeated, fled into Asia, and died of poison or despair at Tarsus, in 313.

MAXIMUS PLANUDES. [PLANUDES.]

MAXWELLTOWN. [KIRKCUDBRIGHT.]

MAY, the fifth month of our present year, was the second in the Old Alban calendar, the third in that of Romulus, and the fifth in the calendar of Numa Pompilius. In the Alban calendar it consisted of twenty-two days; of thirty-one in the calendar of Romulus; and of thirty in that of Numa. Julius Cæsar restored to it the odd day of which Numa had deprived it, and of which it still keeps possession. Its etymology is doubtful.

MAY, THOMAS, was born in 1595. In 1637 May was defeated by Sir William Davenant as candidate for the office of laureate, which the death of Ben Jonson had left vacant, which so exasperated May that he became a strong parliamentarian, wrote a history in favour of that party, and held office under it. In November, 1650, he was found dead in his bed. He was buried in Westminster Abbey, but, on the Restoration, his body was removed to a large pit in the churchyard of St. Margaret's, Westminster, and his monument pulled down.

MAY-APPLE, the *Podophyllum peltatum* of botanists, is a useful plant, with an agreeable fruit, but the leaves are poisonous and the root cathartic. It is chiefly cultivated for the sake of its active medicinal properties.

MAY-DAY. The first day of May; so called in England by way of eminence, in commemoration of the festivities which from a very early period were universally, and in many parts of the country are still observed. Many of the rites, such as pulling off branches of trees, adorning them with nosegays and crowns of flowers, dancing round a pole decked with garlands, had no doubt their origin in the heathen observances practised at this season in honour of Flora, the goddess of flowers.

MAY-DEW. The dew of May, which is said to whiten linen, and to afford by repeated distillations a red and odoriferous spirit.

MAY-FLY, the popular name of the *Nemopterus* insects of the genus *Ephemera* and its allies.

MAY-WEED (*Anthemis arvensis*, or Wild Chamomile), a troublesome weed in corn, which is difficult to eradicate, as it is propagated both by seed and by the low-running branches which strike into the soil and take root. It flowers in May, as its name denotes, and sheds its seed long before the corn is reaped. The only certain mode of extirpating it is by great care in clearing the land when it is fallowed or prepared for turnips, ploughing it in as soon as the flowers appear, and never allowing it to go to seed.

MAYENCE. [MAINZ.]

MAYENNE, a department in France, is bounded N. by the departments of Manche and Orne, E. by the department of Sarthe, S. by Maine-et-Loire, and

W. by Ille-et-Vilaine. It approaches in shape to a rectangle, 54 miles long by 40 wide. The area is 1988 square miles, and the population in 1861 was 375,163.

Surface and Products.—The surface of the department is strewed with hills, and in some places cut up by valleys and ravines. From a distance the country has the appearance of a vast forest, such is the number of trees planted in the hedge-rows that inclose each field. The population of Lower Maine does not, as is the case in most parts of France, live in hamlets or villages, but is scattered among isolated farmhouses, each of which stands among thick hedges, and contains a family that is supplied with every necessary of life, both of food and clothing, from the land and their own industry. This isolated and independent existence has left its impress on the people in a certain rudeness of address, an honest but obstinate adherence to old usages, and a consequent aversion to things called improvements. The soil in the arrondissement of Château-Gontier, and in part of that of Laval, is productive in bread-stuffs of all kinds; and sufficient corn for home consumption is raised. Meadow land is scanty, nevertheless a great number of beasts are fed, which form a source of considerable profit to the farmer. Flax, hemp, and fruit trees are extensively grown, and the vine is cultivated to a small extent, but the wine made is of inferior quality. Cider and perry are extensively made. The forests furnish timber for the navy. Well-woolled sheep, pigs, and fowls are numerous. Bees are kept in great numbers.

Rivers.—The department belongs almost entirely to the basin of the Loire, and is drained chiefly by the *Mayenne* (the ancient *Meduana*), which rises in the west of the department of Orne, and running nearly south past the towns of Mayenne, Laval, and Château-Gontier, divides the department of Mayenne into two pretty equal parts. It afterwards flows through MAINE-ET-LOIRE, and joins the Loiret on the right, near Angers. The total length of its course is 100 miles, for the last 45 of which it is navigable.

The department is traversed by the railway from Paris to Brest, which passes through Laval.

Industry.—Iron mines are worked for the supply of some smelting furnaces and forges. There are coal mines near Laval. Marble, granite, flint, building and lime stone, and slate, are quarried. White sand, used in the manufacture of glass, is raised. Linen spinning and weaving are the chief manufactures; cotton stuffs, haircloth, linen thread, and paper are made.

The climate is healthy, and resembles that of the south of England.

Divisions, Chief Towns, &c.—The department contains 1,272,312 acres, and is divided into three arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop.in1861.
Laval, . . .	9	90	133,770
Mayenne, . .	12	110	163,734
Château-Gontier	6	72	77,659
Total, . . .	27	272	375,163

In the arrondissement of Laval, the chief town is LAVAL, which is also the capital of the department. *Argentré*, 6 miles E. from Laval, stands on the slope of a hill near the Jouanne, and has marble quarries, tanyards, and 1745 inhabitants. *Chailland*, 12 miles from Laval, has coal mines, iron forges, smelting furnaces, and a population of 2544. *Evron* stands in a remote but fertile district, 17 miles E. by N. of Laval, and has a population of 5101. This town has a corn market, linen manufactures, and some trade in wine, wool, and brandy.

In the arrondissement of Mayenne, the chief town, *Mayenne*, stands on the steep slopes of two hills, united by a bridge across the river Mayenne, 18 miles N. by E. from Laval, and has a tribunal of commerce, a college, a council of prud'hommes, and 10,370 inhabitants. The streets are irregularly built, and very steep. In the vicinity are some iron foundries. Linen, calicoes, and cotton yarn are the chief industrial products of the town, which has also bleach-mills and dyehouses. *Ambrières*, 6 miles N. from Mayenne, is a well built town of 2720 inhabitants. A castle now in ruins, built here by the Conqueror, is the most interesting object in the town. *Bais*, a town of 2239 inhabitants, S.E. of Mayenne, was burned by the Vendeans in 1799. *Ernée*, prettily situated on the river Ernée, 14 miles W. from Mayenne, is a well built town, with wide straight streets and 6320 inhabitants, who manufacture linen yarn, needles, and cloth. There are iron mines and iron forges near Ernée. The town has a communal college. *Gorron*, 12 miles N.W. from Mayenne, has a population of 2687. The ancient castle of Gorron, one of the frontier fortresses of Maine, has been entirely destroyed, and a corn market erected on its site. *Lassay*, 10 miles N.E. from Mayenne, has 2504 inhabitants and an ancient castle, the erection of which dates from the year 825, and which was the best preserved of the old fortresses of Maine. *Prez-en-Pail*, 20 miles N.E. from Mayenne, on the road to Alençon, has a population of 3300, and a large market for cattle. *Villaines-la-Juhel*, E. of Mayenne, has 2615 inhabitants, who manufacture woollen cloth.

In the arrondissement of Château-Gontier, the chief town, *Château-Gontier*, is situated in a beautiful plain, 16 miles S. from Laval, on the left bank of the Mayenne, over which a stone bridge leads to a large suburb. Of the castle built here by Foulques Nera, count of Anjou, who intrusted its safe keeping to a knight named Gontier (whence the name), there is scarcely a vestige. The town has some bleaching grounds; 7755 inhabitants, who manufacture linen and woollen fabrics, and trade in clover seed, thread, iron, timber, and wine. *Cosse-le-Vivien*, a market town, N.W. of Château-Gontier, has 3372 inhabitants. *Craon*, formerly a fortified town, and famous for its siege by the prince of Conti in 1592, is situated on the left bank of the Oudon, 12 miles W. from Château-Gontier, and has 4291 inhabitants, who manufacture coarse woollens, and trade in corn, linen, thread, &c.

The department forms the see of the bishop of Laval; it is included in the jurisdiction of the Cour Impériale of Angers, and Academy of Rennes; and belongs to the fifth corps d'armée (Tours), and sixteenth Military Division, of which Rennes is head-

quarters. It returns three deputies to the Corps Legislatif.

(*Dictionnaire de la France; Annuaire pour l'An 1866.*)

MAYER, SIMONE, was born in Bavaria, June 14, 1763, and at an early age sent to study music in Italy, in which country he passed the greater portion of his life, and drew his last breath. In 1802 he was chosen maestro di capella to the church of Maria Maggiore in Bergamo. In 1799 appeared his first distinguished opera, now known under the title of 'Il Fanatico per la Musica.' In 1802 he produced his 'Il Misteri Eleusini;' and following on this came his 'L'Equivoco,' 'La Ginevra di Scozia,' 'Lodoiska,' 'Aleramo ed Adelasia,' 'La Rosa Bianca e la Rosa Rossa,' and the most celebrated of all, 'Medea,' in which Madame Pasta made so great an impression throughout Europe. Mayer died in 1845.

MAYER, TOBIAS, was born at Marbach, a town of Wurtemberg, on the 17th of February, 1723. He was left an orphan and unprovided for at a very early age. To gain a livelihood he began teaching the mathematics, and at the age of twenty he studied the principles of gunnery, probably with a view of entering the army. He published a memoir in 1750, 'On the Libration of the Moon.' In 1751 he became director of the observatory at Göttingen, and at the same time or subsequently was appointed professor of economy in that university. At Göttingen, during the remainder of a very short life, he laboured with the most praiseworthy zeal to promote the sciences of geography, navigation, and astronomy. His 'Zodiacal Catalogue' was 'deserving of all confidence' (Delambre), and comprised 998 stars, including those whose correct positions are of most importance to the astronomer. In 1755 he published his 'Lunar Tables' in the 'Acts of the Academy of Göttingen,' and a copy of them was forwarded to the London Board of Longitude. By order of the Board the accuracy of the tables was rigorously tested by Dr. Bradley, who was able in no instance to detect an error greater than 1' 30" (the errors of the other tables then existing sometimes amounted to 10'), and even part of this he was of opinion might be fairly attributed to his own observations. These tables were printed by the Board of Longitude in the year 1767, and likewise the 'Solar Tables' by the same author, in the year 1770. After the death of Mayer at Göttingen on the 20th of February, 1762, the British Parliament, at the recommendation of the Board, paid his widow 3000*l*.

MAYNE, JASPER, was born in 1604, in Devonshire. After being at Westminster school, he was entered as a servitor of Christchurch, Oxford; and in 1631 he commenced M.A. Taking holy orders, he became a popular preacher. He was created D.D. in 1646. Firmly devoted to the royal cause, he was deprived of his student's place in 1648, and two livings which he then held. He resided, till the Restoration, as chaplain in the family of the earl of Devonshire. In 1660 he was restored to his livings; became chaplain in ordinary to the king, a canon of Christchurch, and archdeacon of Chichester. He died in Oxford in 1672. He is remembered only through his plays: 'The City Match,' a Comedy, given in Dodsley's 'Old Plays;' and 'The Amorous Warre,' a tragi-comedy.

MAYNOOTH. [KILDARE.]

MAYO, a maritime county of the province of Connaught, in Ireland, is bounded E. by Sligo and Roscommon, S. by Galway, and W. and N. by the Atlantic Ocean. It lies between 53° 27' and 54° 19' N. lat., and between 8° 31' and 9° 20' W. long. Its greatest length E. to W. is 72 miles; its greatest breadth N. to S. is 58 miles. The area is 2131 square miles, or 1,363,882 acres, of which 497,587 are arable, 800,111 uncultivated, 8360 in plantations, 848 in towns and villages, and 56,976 under water. The population in 1851 was 274,830, and in 1861, 254,796, of whom 246,583 were Roman Catholics, and 6739 belonged to the Established Church.

The coast line, 250 miles in length, is indented with the Bays of Killala, Broadhaven, and Blacksod (the two last being separated from each other by the narrow isthmus of Belmullet), the entrance into the peninsula of the Mullet, Tulloghane Bay, Clew Bay (studded with numerous islets), and the Killerries. Near the coast are the islands of Achill, 35,283 acres; Clare, 3959 acres; Inishturk, 1451 acres; Innisboffin, 2315 acres, and numerous smaller. The surface is of every character; much mountain and waste, and much level and fertile land. The summits of Mulrea, Nephin, and Croagh Patrick are 2680, 2530, and 2370 feet above high sea level; on the summit of the last is a chapel dedicated to St. Patrick.

The soil is mostly light, and with the moist climate better suited to grazing than tillage. The subsoil in the level parts is limestone; in the others red sandstone, mica slate, granite, and quartz; iron ore abounds, but remains unwrought for want of fuel; there are several valuable slate and marble quarries. Lakes Conn, Carragh, Cullen, Castlebar, Carramore Fyogh, and some smaller ones, are within the county; those of Mask and Corrib border it on the south. The occupations are agriculture and fishing; pasturage is more attended to than tillage; the linen manufacture formerly flourished here, but has declined. The salmon fishery on the Moy and the other rivers of the county is very considerable. The breeds of cattle and sheep are generally improved. The chief crops are oats, flax, and potatoes.

The only navigable river in the county is the Moy, which is one of the finest rivers of Ireland. There are no canals. Many good roads have been constructed during the present century.

The coast fishery gives employment to several thousand fishermen. Turbot, sole, cod, ling, hake, haddock, plaice, oysters, lobsters, and herrings are caught.

Divisions and Towns.—Mayo is divided into nine baronies, and contains seventy-three parishes. It is in the diocese of Tuam, Killala, and Achonry; in the Connaught Circuit, and the assizes are held at Castlebar. The county returns two members to Parliament, the number of voters on the register in 1865 being 3679. Mayo is within the Dublin or Northern Military District; and there are barrack stations at Castlebar, Ballinrobe, Westport, Foxford, and Ballaghaderreen.

The following are the principal towns, with the population of each in 1861:—

Ballina is a town and port, 18 miles N.N.E. from

Castlebar, on the banks of the Moy, which here separates the counties of Sligo and Mayo. The river affords excellent salmon fishing, and is the resort of many anglers during the summer season. The population of Ballina proper is 4399; of the portion of the town in the county of Sligo, which is called Ardnaree, 1020: total, 5419 (comprising 4734 Roman Catholics), being an increase of nearly 200 since 1851, contrary to the general rule in Ireland. The town has been much improved of late years, and its trade has greatly increased. It is the seat of a poor-law union, with a large workhouse, and has breweries, flour mills, and manufactures of snuff. The public buildings comprise a fine old church, a large Roman Catholic chapel, Baptist and Methodist chapels, a sessions-house, and two branch banks. Since 1855 Ballina has been governed by a board of fifteen commissioners elected under the Towns Improvement Act (Ireland). The number of vessels which entered the port in 1865 was 101 (9243 tons), and the clearances, 105 (9308 tons). The customs revenue in the same year was 3094*l*.

Ballinrobe is on the Robe, a stream which falls into Lough Mask, 3 miles W. from the town. It contains a sessions-house, union workhouse, church, and Roman Catholic chapel. Population, 2506.

Castlebar, the county town, is situated near the bottom or north-eastern end of the Castlebar Lake, and is watered by the Castlebar River, which flows N.E. and N. to Lough Cullin and Lough Conn. The streets are tolerably regular, and in the square are the county courts, public offices, and a promenade. The town contains also a parish church, spacious Roman Catholic chapel, Methodist meeting-house, castle, infantry barracks, linen hall, workhouse, and county gaol. Castlebar has a good retail trade, and much corn and agricultural produce, and a considerable quantity of coarse linens are disposed of at the weekly markets. It was formerly a parliamentary and municipal borough, but has been disfranchised; and its lighting, paving, &c., is now regulated by twelve town commissioners. Population, 3022.

Clare is a small town with an active retail trade, about 30 miles S. by E. from Ballina, and 13 N.W. from Ballinrobe. Population, 1323.

Crossmolina is a small market town, about a mile from the north-western shore of Lough Conn, watered by the river Deel, which falls into Lough Conn. It consists principally of low slated houses. Population, 1110.

Killala. [KILLALA.]

Westport is a modern town, with regular streets, which were laid out by the late marquis of Sligo with considerable taste; the town occupies a narrow valley, which is watered by a pretty mountain stream running through the centre of it. Two of the principal streets run parallel with the river; and rows of trees on either side form, so far as they extend, the north and south malls. In these streets are a Roman Catholic chapel, court-house, banks, &c. The other streets branch from the malls, and from the acclivity of the grounds are in many places very steep. A good trade is done in corn and provisions, and the distillery and the brewery add considerably to the trade and home consumption of the place. The port and principal corn stores are separated from the town by the intervening demesne of Lord Sligo, and are

about a mile to the westward, at the S.E. extremity of Clear Bay. It is called *Westport Quay*, and has a fishery and several coastguard stations. The parish church is situated in the beautiful demesne of Lord Sligo. There are, besides, in the town a commodious Roman Catholic chapel, and small Presbyterian and Methodist meeting-houses, a linen hall, market house, barracks, a gaol, and workhouse. The linen trade is thriving. Westport is 10 miles S.W. of Castlebar, is governed by eighteen commissioners, and has 3819 inhabitants, 3482 of whom are Roman Catholics. The customs revenue received at the port in 1865 was 1401*l*. The number of vessels which entered the port in the same year was 75 (8372 tons), and the clearances 88 (10,616 tons).

History and Antiquities.—This county formed part of the grant made by King Henry II. to William Fitz-Adelm de Burgh about the year 1180, O'Connor being at that time the native king of Connaught, which included Mayo. There is very little known of the subsequent proceedings of the settlers until the period of the great rebellion succeeding the assassination of William de Burgh, earl of Ulster, in 1333. About this time Mayo was a county. It renounced, however, all subjection to the English law immediately after the murder of the earl, and remained independent for more than two centuries. The first step towards a return to English law and manners was made in 1575, when the chiefs made their submission to Queen Elizabeth; but it was not till 1586 that the English supremacy was fully acknowledged. The old families of Mayo, in general, took part in the rebellion of 1641 and the succeeding wars, and very extensive forfeitures were the consequence. The chief political event after that time was the invasion by the French, under General Humbert, in 1798. The invading force consisted of 1100 rank and file only; but such was the alarm caused by their unexpected descent, that they easily carried the towns of Killala and Ballina; and being joined by a large body of the peasantry, defeated General Lake, at the head of 6000 men, before the town of Castlebar. The surrender of the invading force at Ballinamuck, however, soon restored tranquillity.

The antiquities of the county are chiefly ecclesiastical. There are round towers at Killala, Turlogh, Meelick, and Balla. At Cong are the remains of a splendid abbey, originally founded in the seventh century, and re-edified by O'Connor in the twelfth. At Ballyhaunis are the ruins of a largely endowed abbey, founded by the family of Nangle. Very fine remains of a Franciscan friary at Moyne, founded by William de Burgh, are still standing. Rosserk Abbey, in the same neighbourhood, built by the Joyces in the fifteenth century, is another very striking ruin. The remains of Ballintubber Abbey, seven miles from Ballinrobe, are among the most elegant specimens of early architecture in Ireland. Numerous other remains of religious houses founded by the families of De Burgh, O'Malley, and Nangle, throughout the county, are enumerated.

The military antiquities are not in general of much extent or interest. Carrig-a-Nile, Doona Castle, Inver Castle, and Doonbriste Castle, are the principal.

MAYOR. [MUNICIPAL CORPORATIONS.]

MAZAGAN. [MOROCCO.]

MAZANDERAN. [PERSIA.]

MAZARIN, GIULIO, was born at Pescara in the Abruzzi, on the 14th of July, 1602. His early education was conducted at Rome under the direction of the Jesuits, at whose college he highly distinguished himself; but having attracted the notice of Jerome Colonna, afterwards Cardinal Colonna, he was introduced into the Spanish university of Alcalá, where he continued his studies with great distinction. Returning home, he entered the Pontifical army, serving in the Valteline as captain of infantry; but it was speedily discovered that his genius lay in a different direction. Employed to negotiate between the French and Spanish generals, he was successful in gaining the confidence of both, and in eventually bringing about the peace of Monçon, in 1626. Soon after, France, Germany, Spain, and Savoy being involved in the disputed succession to the duchy of Mantua, and Cardinal Sacchetti being empowered by Pope Urban to act as mediator, Mazarin accompanied him for the purpose of affording assistance. In reality the prime mover of the affair, every success crowned his efforts, when, in 1631, he effected the treaty of Cherasco, which restored and established peace. In 1634 Mazarin was despatched as nuncio to Paris, where, if he did not obtain the object of his mission, he at least contrived to ingratiate himself with the French monarch. In 1636, therefore, he returned to Rome as the agent and champion of the court of France; but Urban declined to gratify Louis by making his envoy a cardinal, and in 1639 the latter again left Rome for Paris. Having been appointed ambassador to Savoy, where his exertions restored peace, we find, in 1641, the name of Mazarin in the list of promotions to the conclave. During the famous Cinq-Mars conspiracy, the new cardinal remained a faithful adherent of his illustrious patron, Richelieu, and on the decease of the latter in 1642, immediately entered upon the functions, if he did not bear the title, of prime minister. The queen-regent, Anne of Austria, however, being prejudiced against Mazarin, raised the bishop of Beauvais to the post of premier; but the sagacious Italian was not slow in convincing her of her mistake, and quickly regained the reins of power. During the long minority of Louis XIV., Mazarin continued to administer the regency; and under his rule the foreign policy of France was completely successful, although at home the country was the prey of intestine strife. Carrying out the projects of his predecessor, Mazarin continued the war with Spain and Germany—a war immortalized by the heroic memories that cluster round such names as those of Condé and Turenne. Finally, the French minister had the satisfaction of concluding the peace of Westphalia, by which the European strife of thirty years was closed, France also gaining thereby several important territorial acquisitions. Meanwhile, the war of the Fronde tormented the vitals of the kingdom; it had broken out the very same year that the war with Germany was concluded; and the Parliament of Paris, in conjunction with the higher aristocracy, revolted against the authority of Mazarin. Headed by the cardinal de Retz, the Frondeurs simply declared against the minister, simultaneously asserting their attachment to the throne. At the outset, Mazarin was forced to yield and flee the capital at the peril of his life; but by dint of subtle plotting

and machinations, he counteracted the efforts of his foes; the disorders of the Fronde were conclusively terminated by the declaration of the king's majority in 1653, and the cardinal was restored to the full enjoyment of unbounded power. But at the comparatively early age of fifty-nine, Mazarin expired at Vincennes on the 9th of March, 1661, meeting death with unshrinking firmness. It has been observed by a recent writer, that of the remarkable ability displayed by Mazarin there cannot be a doubt. Attempts have indeed been made at different times and by various individuals to undervalue his reputation; but that he divined the character of Louis XIV., that he trained Colbert, that he detected and overcame De Retz, may well be received as infallible proofs of his penetration, his skill, and his political sagacity. Inferior in gigantic grasp of mind to Richelieu, he possessed a manœuvring and diplomatic genius that was emphatically his own. Constitutionally timid, he was no hero; he had no great inborn ideal of statesmanship to guide him in his path, and his chief glory was that he walked, an apt pupil, in the footsteps of his great master.

MAZEPPA, IVAN STEPHANOVITCH, Hetman (that is, commander-in-chief) of the Cossacks of the Ukraine, has become celebrated by a poem of Lord Byron, which has for its subject his extraordinary adventure. He was the son of a Polish gentleman in Podolia. The popular story of his arrival among the Cossacks on the back of a wild horse to which he had been bound by the husband of a woman whom he had seduced, has been superseded by a prose version given in the contemporary memoirs of Passek, which state that he retired among the Cossacks overwhelmed with shame at his exposure in his native land. He was born about 1640 in Podolia, was educated at court, and became page to John Casimir, king of Poland. His military talent as displayed at the head of the Cossacks obtained for him the title of Hetman. His submission to the czar of Muscovy, and his secret league with Charles XII. of Sweden, are matters of history. He died in Turkey, whither he had retreated after the battle of Poltava, about 1709.

MAZÈRES-EN-AOIX. [ARIÈGE.]

MAZZOLINI, LODOVICO, a painter of Ferrara, sometimes called Lodovico Ferrarese, was born about 1481. His works are miniature altar-pieces, and are on the whole little inferior to the small works by Garofalo. He died at Ferrara in 1530. His masterpiece is considered to be the picture on wood of 'Christ disputing with the Doctors', in the Gallery of Berlin. There are also three very characteristic works of this master in the National Gallery in London.

MAZZUOLI. [PARMIGIANO.]

MEACO. [MIACO.]

MEAD, a beverage made of water and honey by fermentation. It has been in use from ancient times, and is mentioned by Pliny, who says it has all the bad qualities of wine and none of the good ones. It is, however, a very luscious and palatable liquor.

MEAD, RICHARD, M.D., was born at Stepney, 11th August, 1673. He took the degree of M.D. at Padua in 1695. On his return to England he was appointed physician to St. Thomas' Hospital, London, in 1703; anatomical lecturer at Surgeons'

Hall in 1711; and was afterwards elected a fellow of the Royal College of Physicians. He was also physician to George II. His reputation was very great. He died in 1754. Dr. Mead published 'A Mechanical Account of Poisons,' London, 1702; 'A Short Discourse concerning Pestilential Contagion,' 1720; some papers on Grecian coins struck in honour of physicians; 'On the Scurvy,' 1749; 'On Small Pox and Measles,' 1748; 'Medicina Sacra, seu de Morbis Insignioribus qui in Bibliis memorantur,' 1748; 'Monita et Præcepta Medica,' 1751.

MEADOW SAFFRON. [*Colchicum autumnale*.]

MEADOWS are properly low grounds on the banks of rivers, which, being kept moist by their situation, and also occasionally flooded by the rise of the waters, are best adapted for the growth of grass, and are generally mown for hay. Some meadows of great extent, belonging to a community or district, in which every inhabitant has a right to send his cattle to graze under certain regulations, are never mown.

When meadows are private property they become much more valuable. The flooding is encouraged or prevented according to circumstances, and in many cases artificial irrigation is adopted. [IRIGATION.] If they are exposed to be too often inundated, they are protected by dams and sluices.

The herbage of low wet meadows is generally coarser and less nutritious than that of those which lie higher: hence upland hay, as it is called, is preferred for the better sort of cattle. Upland meadows are very valuable wherever there is a demand for good hay. Not being annually recruited by flooding, they would degenerate if some pains were not taken to keep up their natural fertility. This may be done in various ways: the most obvious is to recruit them frequently with the richest animal and vegetable manure, which, being spread over the surface at a time when showers are abundant, that is, either early in spring or immediately after midsummer, is washed down to the roots of the grass. A meadow, the soil of which is naturally of a rich nature, and adapted to produce fine grasses, may be mown year after year without any perceptible change in the quality of the hay; but meadows of inferior quality require to be occasionally cropped close, to check the growth of the coarser grasses, and to allow the finer to rise.

Of late years the practice of *soiling* has been extensively adopted; that is, all the grass is mown and carried every day in a green state, to cows or horses tied up in a stable. By this means all the advantage of mowing for hay is obtained, besides an abundant supply of rich manure, which can be applied to the land in a liquid and diluted state, when its effect is powerful and certain.

When a natural meadow has been neglected, and the grass is of an inferior quality, and mixed with rank weeds and moss, it requires much care to restore it to its original fertility. In most cases the shortest method and the best is to plough it up, clean and manure it during a course of tillage, and then to lay it down again in a clean and enriched state, by sowing the best sort of grass seeds.

It must be observed that it is not a matter of

indifference what cattle are turned into the meadow after hay-making. Horses invariably produce coarse weeds by their dung and urine; cows may be depastured in autumn, as long as the surface is dry; but sheep are far more advantageous, and may be kept in the meadows at all times, if they are not too wet for the health of the sheep, and if there is no danger of their having the rot. As soon as the surface becomes soft by the autumnal rains, cattle should be excluded.

MEAL-WORM (*Tenebrio molitor*), the name of a heteromorous beetle whose larva occurs in meal; thus the name.

MEAN. By the mean of two or more quantities is meant an intermediate quantity determined by mathematical rules. There are more ways than one of finding a mean, but the two principal results of this kind are called the *arithmetical mean* and the *geometrical mean*. The names are not properly expressive of the distinction between them, but they are established by use.

An arithmetical mean is the simple *average*, formed by adding the quantities together, and dividing by the number of quantities. A geometrical mean is the square root of the product of the quantities.

The arithmetical mean, or average (which is always to be understood when the word mean is mentioned, unless the contrary be specified), is taken to be the most probable result of a number of discordant quantities, which would have been the same but for errors of observation or experiment.

In assuming the average as the most probable result, it is presumed that any one measurement is as likely to err one way as the other; that is, as likely to be too small as too great. If nothing but results be known, this presumption is justifiable; but if it be known that there is more tendency to error of one sort than the other, the most probable result cannot be ascertained until it is found out by how much the average of a very large number of observations would be affected by this tendency.

It is obvious that when observations nearly agree with each other, the average must be nearly the truth required, and the nearer the agreement of the observations, the more nearly. If the observations do not agree well, the average is still more likely than anything else, but not so likely as before.

MEARNS. [*Kincardineshire*.]

MEASLES (*Morbilli*, *Rubeola*), is the popular name of a contagious disease, characterized by an eruption on the skin, chiefly affecting children, and seldom attacking the same individual more than once.

It is ushered in by more or less fever, a running from the nostrils and eyes, with some inflammation of the latter, sneezing, hoarseness, a dry cough, difficulty of respiration, and occasionally slight soreness of the throat. The rash usually appears on the fourth, but sometimes on the third, fifth, or sixth day of a febrile disorder; and after a continuance of four days, gradually declines with the fever. The eruption first shows itself in distinct red and nearly circular spots, having some resemblance to flea-bites: these spots gradually coalesce and form small slightly elevated patches of an irregular figure, but approaching nearest to that of semicircles or crescents. At the commencement of the eruption

the catarrhal symptoms and fever are somewhat augmented, and during its height the whole face is often swollen and the eyelids thereby closed; on its decline, which begins on the fourth or fifth day, the fever ceases, and from those parts of the body previously covered by eruption the cuticle separates in small bran-like scales. With respect to the treatment, little is required during the eruptive stage of the disorder, which is seldom attended with danger. It is chiefly necessary to open the bowels, to confine the patient to a light vegetable diet, with cold acidulated aqueous drinks, and to maintain a cool temperature in the room, which should be moderately darkened. It is frequently epidemic in this country, and although sometimes assuming a fatal type, it is more frequently mild.

MEASURE. One number or magnitude is said to measure another, when the first is contained an exact number of times in the second. [INCOMMENSURABLES; PROPORTION.]

MEASURES. [WEIGHTS AND MEASURES.]

MEAT. In the boiling of meat some regard should be paid to scientific principles. In the general cookery of domestic life this knowledge is most essential. Liebig, the celebrated German chemist, has devoted much attention to the subject; and he has lately published a work on the 'Chemistry of Human Food.' He there tells us that the slow boiling of flesh effects a chemical change in its composition; and that, according to the length of time employed in boiling and the amount of water used, a more or less perfect separation of the soluble from the insoluble constituents takes place. The water or soup in which the flesh has been boiled contains the soluble matter, and the *bouilli*, or meat from which the soup was made, consists chiefly of fibrous, insoluble matter, nearly useless as nourishing food. Thus it is obvious, that when the water in which the meat has been boiled slowly is thrown away, by far the greater part of the soluble or nutritious matter is wasted.

A very different mode of cooking should be adopted when it is wished to eat the meat. The muscular fibres of flesh in its natural state are everywhere surrounded by a liquid containing dissolved albumen. When this is removed by boiling with water, the muscular fibre becomes hard and bony, and this hardness increases the longer it is boiled. 'It is obvious, therefore,' observes Liebig, 'that the tenderness of boiled meat depends upon the quantity of albumen deposited between the fibres, and there coagulating: for the contraction or hardening of the fibres is thereby, to a certain extent, prevented. If the flesh intended to be eaten be introduced into the boiler when the water is in a state of brisk ebullition, and if the boiling be kept up for some minutes, and then so much cold water added as to reduce the temperature of the water to 165° or 158°, the whole being kept at this temperature for some hours, all the conditions are united which give to the flesh the qualities adapted to its use as food. When it is introduced into the boiling water, the albumen immediately coagulates from the surface inwards, and in this state forms a crust or shell; which no longer permits the external water to penetrate into the interior of the mass of flesh. But the temperature is gradually transmitted to the interior, and there effects the conversion of the raw flesh into the state of boiled

meat. The flesh retains its juiciness, and is quite as agreeable to the taste as it can be made by roasting.

MEATH, formerly distinguished as *East Meath*, a county in the province of Leinster, in Ireland, is bounded N. by Monaghan, N.E. by Louth, E. by the Irish Sea, S.E. by Dublin, S. by Kildare, S.W. by King's County, W. by Westmeath, and N.W. by Cavan. Its form is very irregular. Its greatest length E. to W. is 47 miles; its greatest breadth N. to S. is 40 miles. The area is 906 square miles, or 579,899 acres, of which 547,391 are arable, 16,033 uncultivated, 12,767 in plantations, 464 in towns and villages, and 3244 under water. The population in 1851 was 140,750; in 1861, 110,373, comprising 103,327 Roman Catholics, and 6492 members of the Establishment.

Surface, Coast Line, Geological Character.—The coast has a tolerably straight outline running south by east from the mouth of the Boyne to the boundary of the county of Dublin near Gormanstown. The shore is low, skirted by sand-banks or hills, and broken by one or two small streams which flow into the sea. The county has altogether only about ten miles of coast, and no harbour of importance. The climate is comparatively dry and cold. The surface is mostly level or undulating, rising towards the west and north-west.

The county of Meath is for the most part included in the great central carboniferous limestone district of Ireland; the whole of the southern part of the county, and considerable portions of the north and west, are occupied by this formation. A small tract is occupied by the rocks of the limestone formation, and by a small coal-field, the beds of which, however, are found to be not worth working.

The county belongs almost entirely to the basin of the Boyne; a small portion in the northern part belongs to that of the Dee, the heights about Slane separating the two. The southern and south-eastern borders are watered by the affluents of the Liffey, or by some smaller streams which flow into the sea between the Liffey and the Boyne. The chief affluents of the Boyne are the Blackwater, Menagh, Blind, and Deel. The Boyne flows into the sea near Drogheda. The Nobbor is the chief tributary of the Dee. There are several small lakes. Lough Sheelin, which separates the counties of Meath and Westmeath from that of Cavan, is of an oval form, 5 miles long, and about 2½ miles broad. It contains a small islet called Church Island, with the ruins of an old church on it. Lough Bawn, 1½ mile long, but very narrow, and some smaller lakes, lie on the western border of the county. The lake of Kilminalham, formed by an expansion of the river Nobbor, is about one mile long and above a quarter of a mile broad. Bogs are numerous, but the aggregate of their extent is small: the largest is on the border of the county south-west of Athboy.

About 14 miles of the Royal Canal pass through this county, giving access to Dublin and to the Shannon. The county is tolerably well provided with roads, and it is traversed by the Dublin and Drogheda and the Midland Great Western Railways.

Agriculture and Productions.—This county has very few mountain wastes. The land is level, and rich pasturage. The soil is for the most part a loam of the richest character, and in many places of such

depth that the turning up of a fresh portion of the soil by ploughing deeper than usual is considered as an efficient substitute for manuring. The whole quantity of land devoted to green crops is small, in consequence of the abundance of the natural pastures, which are of unequalled richness, and have led the farmers to give their chief attention to grazing.

The quantity of cattle fattened in the pastures of the county is considerable, and the breeds are of superior kinds. The grazing is carried on on a large scale. Many persons fatten from 300 to 500 cows in a season, besides bullocks and sheep. The horses are generally of an inferior kind. The pigs are of a good breed. Poultry is abundant.

The occupations of the inhabitants are almost exclusively agricultural, but some coarse linens are manufactured.

Divisions and Towns.—Meath is divided into eighteen baronies, and contains 146 parishes. It is in the diocese of Meath, which was founded about 1150. Portions of the county are in the dioceses of Armagh and Kilmore. It is in the Home Circuit, and the assizes are held at Trim. The county returns two members to Parliament, the number of registered electors in 1865 being 4155. Meath is within the Dublin or Northern Military District; and there are barrack stations at Navan and Trim.

The following are the principal towns, with the population of each in 1861:—

Athboy, 'the Yellow Ford,' a small town, 7 miles N.W. from Trim, is watered by a stream called the Athboy River, a feeder of the Boyne. Population, 982.

Drogheda is partly in Meath. [DROGHEDA.]

Kells, a very ancient market town, is 10 miles N.W. from Navan, near the south bank of the Blackwater, and on the Kells extension of the Navan branch railway, 36 miles N.W. from Dublin. It contains a sessions-house, a handsome Roman Catholic chapel, an ancient church, with a round tower and cross in the churchyard, and an ancient stone cross, richly carved, in the centre of the town. There are also a district bridewell, union workhouse, fever hospital, market-house, two banks, and some manufactures of lace. The town is governed by fourteen commissioners, who regulate the paving, lighting, cleansing, draining, water supply, &c. The principal proprietor is the marquis of Headfort, whose seat is in the immediate neighbourhood. There is something very imposing about the entrance to Kells—the spacious and well-wooded avenues, the wide streets, adorned with old trees, and terminated by the venerable church and handsome Roman Catholic chapel. The town is improving; and at the weekly markets considerable quantities of produce are disposed of. Population, 3224.

Navan, a market town, is situated at the confluence of the Blackwater with the Boyne, 26 miles N.W. from Dublin, with which, and with Drogheda, it is connected by railway. The town consists of three main streets, from which several lanes branch off. It contains a handsome church and a spacious Roman Catholic chapel, a court-house, a barrack, infirmary, fever hospital, two banks, and a union workhouse. The town is situated in a very rich agricultural district, and much corn is sold at the weekly markets. Brewing, distilling, flax-spinning,

and paper-making, are carried on, and there is a large retail trade. The town has also numerous corn mills, some manufactures of sacking, and exports considerable quantities of agricultural produce by the Boyne. Fifteen town commissioners regulate the local affairs of Navan. Population, 4187, including 4002 Roman Catholics.

Trim, the county town of Meath, 25 miles N.W. from Dublin, is situated on the banks of the Boyne, over which there is an old bridge. It is a very ancient place. The remains of a castle, built in 1220, occupy an area of four acres, and consist of the keep and various other towers and outworks. There are also some remains of an abbey, and a tower of great antiquity is connected with the parish church. The county court-house is a modern structure, and there is a new county prison, a spacious building. Trim is not a place of much thoroughfare, and has little trade. It is a disfranchised parliamentary borough, and is now governed by twelve town commissioners. Besides the parish church there is a Roman Catholic chapel, schools, infantry barracks, union workhouse, bank, &c., and a pillar to the late duke of Wellington, who is said to have been born at the demesne of Dangan, 3 miles S. of the town. This place was taken by Cromwell in 1649. Several Irish parliaments have been held here. Population, 2058, of whom 1791 are Roman Catholics.

History and Antiquities.—At an early period Meath constituted one of the kingdoms into which Ireland was divided. Teamor, now Tara Hill, near the Boyne, was the residence of the sovereign of Ireland, and the seat of the supreme government, and the place where St. Patrick made his first efforts for the conversion of the Irish to Christianity. The kings of Meath became afterwards tributaries to the kings of Ireland. In the invasions of the Northmen, or Danes, the kingdom of Meath suffered severely. Before the invasion of Ireland by Henry II., Dermot MacMurchad, king of Leinster, had reduced O'Melaghlin, king of Meath, and other princes, into a state of subjection; but a quarrel between some of these chiefs led to an invitation by one of them to the English to enter Ireland; and the result was that Richard Strongbow took possession of Meath in 1171, which was conferred by Henry II. as a county palatine on Hugh de Lacy, who was appointed governor of the English pale or district.

For a century and a half Meath was a scene of conflict, sometimes between the English and the Irish, and sometimes between the king and the powerful barons. The English dominion, never fully established, appears rather to have decayed during the reigns of the latter Plantagenet and the Lancastrian princes, and the civil war of the Roses. In the reign of Henry VIII. the power of the English began to revive, when the ancient county of Meath was divided, and West Meath, including the present counties of West Meath, Longford, and part of King's County, was formed into a separate county.

There are several remains of antiquity in the county. At Tara, once the seat of the Irish monarchs, are considerable earthworks. There are considerable ruins of the castles of Scurlogstown, Dunmoe, Athlumley, and Asigh. Slane Castle and one or two others have been fitted up as residences. There are

round towers at Kells, and at Donoughmore, near Navan. There are numerous ruins of ancient monastic edifices: those of the monastery at Duleek, supposed to be the most ancient monastic edifice built of stone and mortar in Ireland, present some remarkable traces of rude architecture. The front of the ancient cathedral at Clonard yet exists, and there are several stone crosses. The ruins of Beective Abbey are extensive and picturesque.

MEATH, WEST, or as it is sometimes written in one word, WESTMEATH, is an inland county of the province of Leinster, in Ireland, bounded by Meath, King's County, Roscommon, and Longford. The greatest length E. to W. is 40 miles; the greatest breadth N. to S. is 35 miles. The area is 708 square miles, or 453,468 acres, of which 365,218 are arable, 56,392 uncultivated, 8803 in plantations, 628 in towns and villages, and 22,427 under water. The population in 1851 was 111,409; in 1861 it had fallen to 90,879, comprising 83,749 Roman Catholics, and 6336 who belonged to the Church of England.

Surface and Geology.—The county is for the most part a gently undulating surface, not rising in any part to a very great height. The whole belongs to the central carboniferous limestone district of Ireland, with the exception of two small districts of yellow sandstone.

The western side of the county belongs immediately to the basin of the Shannon, which forms its western boundary. Lough Ree, the largest of the series of lakes into which that river expands, is also on the western border. This noble sheet of water is 17 miles long from north to south, and of a varying breadth, above 7 miles in one part. Its outline is exceedingly broken and irregular, and its surface studded with a number of small islands finely wooded, some of which have ecclesiastical ruins. The streams which flow into the Shannon or into Lough Ree are all small. There are many small lakes and small bogs.

The central part of the county is drained by streams that empty their waters into several inland lakes, which are connected by small streams with each other, and ultimately with the river Shannon. The chief of these lakes are Lough Sheelin, Owel, Ennel, and Deveragh. These lakes vary from 6 miles to 2 miles in length, and some of them are studded with small islands.

The eastern and south-eastern sides of the county abound with bogs, and some of them are of very considerable extent. The lakes of West Meath abound in pike and very fine trout.

Agriculture and Industry.—The soil comprises heavy loam, light loam, hilly sheep-walks, and a great deal of bog. The chief crops raised by the farmer are oats and potatoes, with some wheat. Flour and meal are manufactured in large quantities. The occupations of the inhabitants are wholly agricultural—chiefly grazing and dairy farming. The long-horned cattle are much valued; some of the best specimens are grazed in this county, and all the stock participate in the blood. The sheep also are of superior breeds.

The Shannon is navigable for steamboats conveying goods and passengers. The Royal Canal crosses this county from east to north-west, and a branch of the

Grand Canal proceeds to Kilbeggan. The principal roads are good. The Midland Great Western Railway passes through the county.

Divisions and Towns.—West Meath is divided into twelve baronies and sixty-three parishes. It is chiefly in the diocese of Meath and the Home Circuit; the assizes are held at Mullingar. The county returns two members to Parliament, and one member is returned for the borough of Athlone. The number of voters on the county register in 1865 was 3568. West Meath is within the Dublin or Northern Military District, and there are barracks at Mullingar.

The following are the principal towns, with the population of each in 1861:—

Athlone is partly in West Meath and partly in Roscommon. [ATHLONE.]

Kilbeggan, 14 miles S.S.W. from Mullingar, is situated on the upper Brosna, and is connected by a branch canal with the Grand Canal, by which corn and other agricultural produce are sent to Dublin. Population, 1283.

Moate, 10 miles E.S.E. from Athlone, contains a neat court-house, a church, Roman Catholic chapel, and meeting-houses for Methodists and Quakers. Population, 1960.

Mullingar, the county town of West Meath, is situated near the centre of the county, and is watered by the Brosna, here a small stream. It is on the Royal Canal (which connects it with Dublin and the Shannon), and is 50 miles W.N.W. from Dublin by the Midland Great Western Railway. It is an important junction railway station. The business is limited to the retail trade of the district, and to the regular cattle fairs and markets. The public buildings of the town comprise the parish church, which is a handsome structure; a large Roman Catholic chapel, considerably enriched in its exterior; a nunnery; two schools; county infirmary; market-house; two banks; extensive infantry barracks and the union workhouse, both at a short distance from the town; and the county gaol and court-house, which are substantial and plain buildings. The local affairs of the town are administered by fifteen commissioners. Population, 5375.

History and Antiquities.—This county was included in the kingdom of Meath, of which it formed the western division. In common with the rest of that kingdom, it suffered severely both from the ravages of the Danes and from civil dissensions, and was included in the county palatine of Meath, granted by Henry II. of England to Hugh de Lacy. It was the scene of frequent hostilities for several centuries between the native Irish and the English. West Meath was separated from Meath or East Meath in the reign of Henry VIII. In most of the subsequent dissensions it shared the fate of the parent county.

There are many vestiges of antiquity scattered through the county, as well as numerous ruins of ancient castles, including some erected by the De Lacys. Sonnagh Castle, one of these, stands on the verge of a small but picturesque lake. Of monastic buildings there are several ruins; and some churches, formerly conventual, are still used for divine worship by Catholics or Protestants.

MEAUX. [SEINE-ET-MARNE.]

MECCA, or MEKKA, the birth-place of Mohammed (571), and the holy city of the Mohammedans,

is situated in that part of Arabia which is called El Hejaz or Hedj, about $21^{\circ} 38'$ N. lat., and $40^{\circ} 8'$ E. long., 70 miles from the Red Sea, in a straight line.

This city is situated in a narrow and sandy valley, bounded by mountains from 200 to 500 feet high. The streets of Mecca are broader than those of eastern cities in general, the houses lofty and of stone, and they have numerous windows which give them a lively and European aspect. The only public place in the body of the town is the large square of the great mosque, which is only enlivened during the Haj (Pilgrimage) by the great number of well-stored shops. The streets are all unpaved, and the town is badly supplied with water—mostly by an aqueduct from the vicinity of Arafat. Most of the houses are constructed for the accommodation of lodgers, and divided into numerous separate apartments, each consisting of a sitting-room and a small kitchen. Except four or five houses belonging to the sheriff, two colleges, and the mosque, Mecca has no public edifices.

The mosque, called Bait-ullah ('God's House'), is only remarkable for the Kaabah ('cube'), which it incloses. The Kaabah stands in an oblong square, surrounded by colonnades; on the east there are four rows of pillars, and on the other sides only three. They are united by pointed arches, every four of which support a small dome, plastered and whitened on the outside. The number of these domes is 152. Seven paved causeways lead from the colonnades towards the Holy House, in the centre—an oblong massive structure, constructed of the gray Mecca stone, in large blocks of different sizes, joined together in a very rough manner. The only door which leads into it is opened only two or three times in the year. At the south-eastern corner of the Kaabah, near the door, is the famous Black Stone. It is an irregular oval, about seven inches in diameter, composed of about a dozen smaller stones of different sizes, well joined together with cement, and perfectly smoothed. Every pilgrim kisses this stone, and it is believed to be the angel who, at the last day, will indicate those of the faithful by whom the Haj has been duly performed. [KAABAH.]

There are several other buildings within the area of the mosque, mostly appropriated to reading prayers, preaching, or the performance of devotions. The Zemzem, or Holy Well, is supposed to be the spring found in the wilderness by Hagar; it is inclosed in a square building of massive construction, and the well-room is beautifully decorated.

The Meccawi, or inhabitants of Mecca, with few exceptions, are Arabians from different countries; but they have amalgamated, and they wear the same sort of dress and have adopted the same customs. They are estimated to number altogether from 30,000 to 60,000. Except a few potteries and dyeing-houses, the people of Mecca have not a single manufacture. During the Haj Mecca becomes one of the largest fairs in the East, and certainly the most interesting, from the variety of nations which frequent it. And from this cause the profligacy of the city, as described by Mr. Palgrave in his recent work on 'Central and Eastern Arabia,' is rampant.

Mecca is governed by a sheriff, chosen from one of the many tribes of sherifs, or descendants of Mohammed, in the Hedjaz.

ME'CHAIN, PIERRE-FRANÇOIS-ANDRÉ, was born 16th August, 1744, at Laon, a town of France, in the present department of Aisne. An accident brought him under the notice and patronage of Lalande. The necessity of affording some pecuniary assistance to his father obliged Mechain to dispose of an astronomical instrument which, by rigid economy, he had recently been able to purchase. Lalande became the purchaser, and, after acquainting himself with the past history of Mechain, procured for him a government appointment as hydrographer. In 1791 the National Convention having determined upon employing the length of the arc of the meridian comprised between Dunkirk and Barcelona as the basis of their new trigonometrical measures, the measurement of the southern portion of this arc, between Rodez and Barcelona, was, at the recommendation of the Academy, confided to Mechain. The northern portion was allotted to M. Delambre. His skill as an observer is particularly mentioned by Delambre, and also the accuracy of all his calculations connected with the survey. Of this Mechain himself was unconscious. He had employed the repeating circle, an instrument which he regarded as absolutely infallible, and finding a difference of three seconds between his observations at Barcelona and Montjouy, he attributed it wholly to his own incapacity. Upon his return to Paris, which he reached with much personal risk, fearing to divulge this discrepancy, he refused to deliver his papers to the Academy. The subject continuing to prey upon his mind, he applied, after several years, to the French Board of Longitude, and urged them to prolong the measurement of the arc from Barcelona to the Balearic islands. To this the Board consented; but being unwilling to dispense with his services at the Paris Observatory, they suggested that Mechain should not be the conductor of the survey. This, however, would have been to relinquish the chief object of his application. He obtained permission to depart, but soon after his arrival in Spain he was attacked by an epidemic disorder, of which he died on the 20th of September, 1805, at Castellon, a town of Catalonia.

MECHANICAL POWERS is the name given to certain simple machines, in which one driving force or effort is made to produce motion against one resistance. As to the general principle of the action of machines, known as that of the 'Conservation of Energy,' or of the 'Equality of Energy and Work,' see the article MACHINE. When only one driving force and one resistance are concerned, that principle leads to the consequence that the effort and the resistance are to each other inversely as the velocities of their points of application, called respectively the driving point and the working point. The use of a machine is to enable an effort, acting through a given distance, to overcome either a resistance greater than the effort through a less distance, or a resistance less than the effort through a greater distance. The theoretical condition of there being but one effort and one resistance is never exactly realized; because in addition to the useful resistance there are always wasteful resistances, which render a greater effort necessary to drive the machine than if the useful resistance alone were to be overcome. In estimating efforts and resistances it is to be borne in mind that an effort acts directly with, and a resistance directly

against, the motion of its point of application; so that when a force is applied to a point in a machine, in a direction oblique to the motion of that point, that force is to be resolved into a transverse component and a direct component, and the direct component alone taken into account. In many writings on the mechanical powers, the resistance is called the 'weight,' and the effort the 'power.' The mechanical powers are classed as follows:—

I. Simple machines, consisting of a body turning about an axis, and having a resistance opposing, and an effort promoting that motion, which forces bear to each other the inverse ratio of their leverages, or perpendicular distances from the axis. This class comprehends the LEVER, and the WHEEL AND AXLE.

II. Simple machines in which the advance of a moving piece is promoted and opposed by a pair of forces, one or both of those forces being oblique to the direction of motion. This class comprehends the WEDGE, the INCLINED PLANE, and the SCREW.

III. Simple machines in which a body is pulled by two or more piles of one cord. This class comprehends the PULLEY.

MECHANICS (from *Μηχανή*, 'machine,' 'device'), originally meant the art of contriving and making machines: then it was extended to the science of the action of machines; and it now comprehends the whole science of those relations of bodies to each other which consist in *motions*, and in tendencies to produce or to prevent motion, called *forces*. The science of mechanics, in its most comprehensive sense, is divided into two branches: *Cinematics*, or *Kinematics* (from *κίνημα*, 'motion'), relating to the comparison of motions with each other; and *Mechanics* proper, to which it has been proposed by some authors to apply the name *DYNAMICS* (from *δύναμις*, 'power,' or 'force'), relating to forces as well as to motions. The latter branch is again subdivided into *STATICS* (*στατική*), relating to balanced combinations of forces, and what is usually called *Dynamics*, and by some authors, *Kinetics* (from *κίνησις*, 'a mover'), relating to forces as causing motion. Another mode of subdivision of mechanics into branches is founded on the condition, solid or fluid, of the bodies whose actions and motions are considered; and is indicated by the prefixes *stereo* (from *στερεός*, 'solid'), and *hydro* (from *ὕδωρ*, 'water'). The prefix *stereo* is used seldom, but *hydro* frequently, as in *HYDROSTATICS*, *HYDRODYNAMICS*, *HYDRAULICS* (the last term meaning properly the science of the flow, or conveyance of fluids, from *αὐλῶν*, 'channel'). *PNEUMATICS* (from *πνεῦμα*, 'wind') means the mechanics of fluids in the gaseous state.

All motions may be expressed by means of changes in the relative distances and directions of points; and all such distances and directions are subjects of geometry; hence all questions in cinematics are solved by geometry. The application of the principles of cinematics to machines constitutes a branch of applied mechanics called *PURE MECHANISM*. [MECHANISM.]

The science of statics is founded on two facts:—*That every force consists in a pair of equal and opposite actions between a pair of bodies*; and *that forces can be represented in direction and magnitude by straight lines*. The former fact is called the *LAW OF ACTION AND REACTION*. The latter fact enables

questions respecting combinations of forces to be solved by geometry: the result of putting together a number of forces being found by putting together the lines representing those forces.

The science usually called *Dynamics*, and by some authors *Kinetics*, is founded on two facts called, the *LAW OF MOTION*. The *FIRST LAW* is, that a *body under no force, or under balanced forces, moves uniformly as to direction and speed*; in other words, *to change the speed or direction of a body's motion requires an unbalanced force*. The *SECOND LAW* is, that *an unbalanced force produces a change in the body's velocity in the direction of that force, which change is proportional directly to the magnitude of the force and the time during which its unbalanced action continues, and inversely to the mass of the body*.

An immediate consequence of the second law is, that an unbalanced force produces a change in the half-square of the velocity with which a body is moving along the line of action of that force, which change is an increase or diminution, according as the force acts with or against that motion, and is proportional directly to the force and the distance through which it acts in its own direction, and inversely to the mass of the body.

The law of action and reaction is sometimes called the 'Third Law of Motion,' but it is in fact a law which holds of all forces, whether producing motion or only tending to do so.

Mechanical Quantities are motions, times, and forces, and quantities depending on motions, times, and forces. The following is a statement of the chief kinds of mechanical quantities, and the principles of their measurement:—

Motion of Translation is simply the length of the line described by a point in the act of changing its position relatively to some other point, and is measured like any other length.

Motion of Rotation consists in the turning of a body into a new angular position, and is measured either in turns and fractions of a turn, or in *circular measure*; that is, by the ratio of a circular arc subtended by the angular motion to the radius of that arc. One turn = 6.2832 nearly, in circular measure. Circular measure is that generally used for scientific purposes.

Time is measured by means of some motion believed to be uniform, or sensibly uniform, such as the rotation of the earth; or by the repetition of equal and similar motions by a given body under precisely similar circumstances, as by the swings of an accurate pendulum.

Velocity, or *Linear Velocity*, is measured by dividing the extent of a motion of translation by the time that it occupies, and is expressed in units of motion per unit of time (as in feet per second).

Angular Velocity is measured by dividing the extent of a motion of rotation by the time that it occupies, and is expressed, for practical purposes, in turns and fractions of a turn per unit of time; and for scientific purposes in circular measure per unit of time.

Acceleration is the rate at which the velocity of a body increases; and *Retardation* the rate at which it diminishes; each found by dividing the change of velocity by the number of seconds that it occupies.

Deviation is the rate at which a body swerves from a straight course, and is found by dividing the square

of the velocity of a body moving in a curve, by the radius of that curve.

Force is measured in two ways, statically and dynamically; and the fact of the agreement of the results of those two ways of measurement is the second law of motion in another shape. The statical measurement of forces is performed by balancing them against each other, either directly or by the aid of suitable machines. It is practicable only with forces exerted amongst bodies at and near the earth's surface, and therefore accessible to man. The unit adopted as a standard in this mode of comparing forces with each other is the weight of some individual body, preserved for the purpose: in Britain, for example, it is the weight of a piece of platinum, called the *standard pound*, kept in the Exchequer Office at Westminster. The dynamical (or as some would call it, the kinetic) measurement of forces is effected by comparing together the motions impressed by them on a given mass of matter in a given time; and this is practicable with bodies whether near or distant, so long as their motions can be accurately determined. From the kinetic mode of measurement is derived a certain unit of force used in scientific calculations, and called the *absolute unit of force*; it is the force which, acting for one second, impresses a unit of velocity on a unit of mass. In Britain the unit of velocity is a foot per second, and the unit of mass the mass of the standard pound. The force of gravity in the average latitude of Britain, acting freely for one second, impresses on the body a velocity of very nearly 32·2 feet per second; hence the ordinary unit of force in Britain, being the weight of the standard pound, is very nearly 32·2 absolute units.

To calculate, in absolute units, the force which produces a given change in the motion of a body, multiply the rate of acceleration, retardation, or deviation, as the case may be, by the mass of the body. This is the only way in which forces acting amongst inaccessible bodies can be compared together.

The *masses* of bodies are known to be proportional to their weights, because of the force of gravity impressing equal velocities in equal times upon all similarly situated bodies, large and small.

The *intensity* of a force is found by dividing its magnitude by the space throughout which its action is distributed. In the case of gravity, that space is the whole volume of the body under consideration. Dividing the weight of a body in pounds by its volume in cubic feet, we obtain, so to speak, the intensity of its weight, or in other words, its *heaviness*, in pounds to the cubic foot. Pressure and tension are forces distributed over surfaces. Dividing the amount of a pressure or tension in pounds by the area of the surface over which it is distributed, in square feet or in square inches, we obtain the intensity of that pressure or tension in pounds on the square foot, or on the square inch.

Statical Moment expresses the tendency of a *couple* of forces to turn a solid body about. A couple is a pair of forces equal, parallel, and opposite, but not directly opposed; and its moment is found by multiplying either of the forces by the perpendicular distance between them, called the *arm*, or *span*, of the couple. The British unit of statical moment is a *foot-pound*: that is, the moment of a couple of forces, each of one pound, with a span of one foot.

Work consists in driving a body against a resistance: that is, a force directly opposed to its motion; and its quantity is computed by multiplying the resistance by the extent of the motion performed against it. [MACHINES, and MECHANICAL POWERS.] The British unit of work is the foot-pound: that is, a resistance of one pound overcome through one foot, or a weight of 1 lb. lifted 1 foot. The foot-pound of work must not be confounded with the foot-pound of statical moment.

Energy is the power to perform work, and is expressed in the same units. The *potential energy* of a body is the work which it is capable of doing, in moving from its actual position to another position which it tends to approach. For example, a store of a million lbs. of water, in a reservoir 100 feet above the level of the sea, and capable of being allowed to descend to that level, possesses 100 million foot-pounds of potential energy.

Impulse is the product of a force, in absolute units, into the time during which it acts on a body, in seconds.

Impetus, or *momentum*, is the product of the mass of a moving body into its velocity. The second law of motion might be otherwise expressed by saying, that the *momentum produced is equal to the impulse exerted*.

Angular Momentum is the product of the momentum of a body into its perpendicular distance from an axis about which it is revolving.

The *Actual Energy* of a moving body is the product of its momentum into half its velocity—in other words, of its mass into half the square of its velocity, divided by the number of absolute units of force in a unit of weight (in British measures, 32·2). A consequence of the second law of motion is, that the *potential energy expended in accelerating a body, is equal to the actual energy gained by the body*.

The term *action* is used to denote the product of the mass of a moving body, its velocity, and the space which it traverses.

Moment of inertia is the product of the mass of a rotating rigid body into the mean of the squares of the distances of its particles from the axis about which it rotates. This quantity, being multiplied by the half-square of the angular velocity, and divided by the number of absolute units in a unit of weight, gives the actual energy of the body.

Mechanical Centres are imaginary points at which, for the sake of convenience in calculation, forces are conceived to be concentrated, notwithstanding that in reality every force has its action more or less diffused. The most important kind of mechanical centre is the *centre of gravity* of a body, or of a system of bodies, at which, in reasoning about the equilibrium or motion of the body or system as a *whole*, its whole weight may be treated as concentrated. That point is identical with the *centre of mass*, at which, under the same circumstances, the whole mass of the body or system may be treated as concentrated. There are other kinds of mechanical centres, but they cannot here be explained in detail.

Amongst the consequences of the laws of motion are certain principles applicable to systems of bodies universally. These are the following:—

CONSERVATION OF MOMENTUM. The resultant momentum of a system of bodies is unchanged by their actions on each other.

CONSERVATION OF ANGULAR MOMENTUM (called also *conservation of areas*). The resultant angular momentum of a system of bodies is unchanged by their actions on each other.

CONSERVATION OF ENERGY. The total energy, actual and potential, of a system of bodies, is unchanged by their actions on each other (provided, in estimating quantities of energy, regard be had to the presence of energy in other forms than that of ordinary mechanical energy, such as heat).

LEAST AND GREATEST ACTION. In all motions in which the forces acting on bodies depend on their positions only, the action is either a minimum or a maximum.

In the science of mechanics there have gradually come to be included mechanical theories of various physical phenomena whose mechanical nature is not directly obvious to the senses, such as the transmission of light and heat, and the action of heat upon the cohesion and elasticity of bodies.

The leading events in the history of mechanics as a science are—the discovery of the principles of the equilibrium of parallel forces, and of hydrostatics, by Archimedes, in the third century B.C.; the discovery of the principle of the balance of oblique forces, by Stevin, and of the laws of accelerated and retarded motion, by Galileo, both of whom flourished during the second half of the sixteenth, and first half of the seventeenth centuries of the Christian era; and the final completion of the principles of abstract mechanics, with the proof that they apply to the heavenly bodies as well as to those on earth, by Newton, towards the end of the seventeenth century. Since the time of Newton no new fundamental law has been discovered in mechanics; but the art of applying mathematical principles to mechanical questions, and the introduction of mechanical principles into the theories of physical phenomena in general, have been rapidly and extensively developed.

MECHANICS' INSTITUTE, a species of educational club, originally established by Dr. Birkbeck, who in 1800 collected an assemblage of the mechanics and engineers of Glasgow, and delivered before them a course of lectures on natural philosophy and other scientific subjects. In 1823 his idea was taken up by various noblemen and gentlemen in London, among whom should be named Lord Brougham; and the first institution of the kind, specially designed for working men, clerks, and artisans, was founded in Southampton Buildings, London. Similar establishments may now be met with in every town in the kingdom of any social or commercial importance. They are supported partly by the members' subscriptions, and partly by contributions, and include a reading-room, a lending library, a lecture room, and classes for the study of the arts and languages. 'Working men's clubs,' recently introduced, are modifications of the old Mechanics' Institutes. They are intended to be self-supporting, to be entirely managed by working men, and to furnish numerous innocent opportunities of recreation to the jaded 'children of toil.'

MECHANISM, or PURE MECHANISM, is the term introduced by Professor Robert Willis to denote that branch of Applied Mechanics which relates to the comparative motions of moving pieces in machines, considered irrespectively of the forces which act upon

those pieces, and irrespectively also of the absolute speed of those motions. For example, when the machinery of a clock is examined, the mere form and arrangement of the moving pieces is sufficient to show that the minute hand makes twelve revolutions for one of the hour hand, and the seconds hand sixty for one of the minute hand. These are facts in pure mechanism; being true independently of the number of revolutions that the hour hand or any other moving piece makes in a given time, and of the force by which the clock is driven. In order that a question regarding the motion of a body may be capable of solution by means of the principles of pure mechanism alone, the body must be either a solid of invariable figure, or a cord of invariable length.

The comparative motion of two bodies at a given instant consists of two elements; the *ratio of the velocities* of those bodies to each other, and the *relation between the directions of their motions*. When the manner in which the bodies are connected with each other is known, their comparative motion can be determined by means of the principle, that the *component velocities of a pair of directly connected points along their line of connection are equal*; and this is the direct problem of pure mechanism. The inverse problem is, to determine how a pair of bodies ought to be connected, in order that they may have a given comparative motion; and this includes amongst its particular cases the designing of the forms of the working surfaces of all pieces of machinery.

(The chief authority on pure mechanism is Professor Willis' treatise on that subject. A summary of its principles, with some of their most useful applications, is given in Rankine's *Manual of Applied Mechanics*.)

MECHLIN, Malines, or Mechelen, a large town in the Belgian province of Antwerp, 13 miles by railway N. of Brussels, and 75 miles E. of Ostend, stands on the Dyle, a navigable feeder of the Scheldt, in $51^{\circ} 2' N.$ lat., $4^{\circ} 29' E.$ long., and has a population of 33,855. The city is well built and remarkably clean. The cathedral, which was built in 1451, and has a tower 370 feet high, the palace of the archbishop, who is primate of Belgium, the arsenal, which contains a cannon foundry, the town-house, and the church of the Jesuits, are the chief public buildings. There are also a Franciscan convent, and an asylum for 800 widows. In the cathedral is the celebrated painting of the 'Last Supper,' by Rubens. The town is the residence of a military commandant, and has a diocesan college, a Roman Catholic university, an academy of painting and architecture, and a society of fine arts. Mechlin is a place of great trade, and was formerly famous for its lace manufactures, but this branch of industry has greatly declined, and at present the principal things made here are shawls, woollen stuffs, starch, tobacco, and beer. An extensive trade in corn, flax, and oil is also carried on. There is water communication with Louvain by means of a canal, which is navigable for vessels of 160 tons, and the city also constitutes an important central point of junction for the entire Belgian system of railways.

MECHOACAN, or MICHOCACAN. [MEXICO.]

MECKLENBURG, a country in North Germany, lying between $53^{\circ} 8'$ and $54^{\circ} 2' N.$ lat., and between

10° 40' and 13° 45' E. long., consisting of the grand-duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz, and the principality of Ratzeburg, is bounded N. by the Baltic, E. by Prussia, S. by Prussia and Hanover, and W. by Lauenburg and Lübeck.

The surface of Mecklenburg may be described generally as a plain; the soil is fertile, and the pasture excellent; cattle are extensively reared, and cavalry horses are exported. The forests produce some excellent timber, and fish abound on the coast and in the lakes. Wheat, rye, barley, oats, peas, and rapeseed, are raised in large quantities for exportation—a great proportion of the barley being sent away in the shape of malt. The climate is moist, but healthy and temperate, though the winters are often severe.

Agriculture is very flourishing over the whole country. A considerable part of the surface is covered with lakes; the largest of these, Müritz, is 18 miles long by 8 broad. The chief rivers are—the Warnow, which is about 100 miles long, and falls into the Baltic Sea at Warnemünde, below Rostock; the Recknitz, which falls into the Baltic further east; the Elde and the Sude, feeders of the Elbe, which touches the south-western boundary at two points.

The grand ducal house of Mecklenburg is the only reigning family in Europe of Slavonic origin, and claims to be the oldest sovereign house in the western world. In their full title, the grand dukes style themselves Princes of the Vandals; and they trace their descent to Genseric, king of the Vandals, who died in 477, and whose offspring settled on the southern shores of the Baltic as rulers of Mecklenburg. One of their descendants, Burewin, obtained the hand of Matilda, daughter of Henry the Lion, and through the influence of the latter was enrolled among the princes of the Holy Roman Empire. They received the ducal title from the Emperor Charles IV. in 1340, and assumed that of Grand Duke by permission of the Congress of Vienna, in 1815. Previous to 1701, Mecklenburg-Schwerin and Mecklenburg-Strelitz formed but one state; at that date the separation of the latter took place, in favour of a younger son of the reigning duke. There being no law of primogeniture at the time, the Diet was unable to prevent the division of the country, which was protested against by subsequent dukes of Mecklenburg-Schwerin without avail.

MECKLENBURG-SCHWERIN comprises an area of 4834 square miles, and had, in 1862, 551,761 inhabitants, the great majority of whom are Lutherans. Although the country is but thinly populated, emigration is carrying off large numbers of the inhabitants, and the population is actually decreasing. This causes great uneasiness amongst the landed proprietors and farmers, for during harvest time hands are scarce, and are likely to become still more so. It is not, however, to be wondered at, for the agricultural population are little removed from the condition of serfs. At the meeting of the Diet, in April, 1864, a bill was passed investing all landed proprietors with power to condemn the labourers on their estates for simple 'neglect of service' to a week's imprisonment, and, besides, 'twenty-five blows with a stick.' The bill became law in May, 1864. There are numerous restrictions on marriage, in consequence of which the proportion of illegitimate children is

greater than in any other part of Germany, and is, moreover, increasing from year to year, so that on an average, one out of every four children born is now illegitimate. In education, also, the grand duchy is behind all other states of the Confederation.

The grand duke has no civil list, or any other grant from the country. His income consists of a large part of the revenues of the state domains, and is valued at above 120,000*l.* per annum. The crown estates altogether comprise nearly one-fifth of the territory of the duchy, and are valued at nearly 12,000,000*l.* They are looked upon, in all respects, as the private property of the duke. The political institutions of the grand duchy are of an entirely feudal character. Nearly the whole legislative power and part of the executive is in the hands of the proprietors of Rittergüter, or knight's estates, numbering 624. Seldom more than one-fourth of these, however, exert their privileges and take their seats in the Diet. To these representatives of their own property are joined thirty-nine members, nearly all burgomasters, delegated by the municipalities and corporate bodies of a like number of towns. The great bulk of the population is without political rights. The Diet meets in annual session, and every two years forms a joint assembly with the states of Mecklenburg-Strelitz, in common legislation for both duchies. The executive is represented in a ministry appointed by and responsible alone to the grand duke. No official budget has ever been published. The statements of public income and expenditure made by statistical writers are grounded on mere supposition, and vary considerably. The expenditure, probably, amounts to about 125,000*l.* per annum. The predominating form of religion is the Lutheran.

To the army of the Confederation, Mecklenburg-Schwerin contributes 5967 men, of which 4693 are infantry, 747 cavalry, and 527 artillery. The actual force kept under arms amounts to about 5500 men, who are raised by conscription, and the purchase of substitutes is permitted. Six years is the nominal period of service, of which two-thirds are allowed on furlough. The commercial navy of Mecklenburg-Schwerin consisted, on December 31, 1864, of 419 vessels, of a total burthen of 151,740 tons. The greater number of these vessels, namely, 372, of a tonnage of 135,612, belonged to the port of Rostock.

The number of vessels which entered and cleared from Mecklenburg-Schwerin in the year 1864 was as follows:—

	Arrived.	Departed.	Tonnage.
Port of Rostock, .	520	464	71,547
Do. Wismar, .	244	254	31,311
Total, .	764	718	102,858

Of these only 81 were British, the greater part being Danish and Swedish. The wheat and flour exported by sea is almost all sent to England at the average price of 38*s.* to 40*s.* per quarter. The total value of all the exports to the United Kingdom in 1864 was 324,564*l.* In the import trade the coal from England is the most important, and has, for some years, been considerably increasing. The value of all the home produce of the United Kingdom received direct in 1864 was 51,252*l.*, but the great mass of imports into Mecklenburg comes by rail from Ham-

burg—for instance, all manufactures, and a great quantity of coffee, sugar, rice, &c.

The following are the principal towns of the duchy:—

Bützow is a decayed town of 3894 inhabitants, some of whom are engaged in manufactures of paper and playing cards.

Doberan, a bathing-place and market town, containing the summer residence of the grand duke, about 2 miles from the Baltic, and 40 miles N.N.E. of Schwerin, has mineral springs and baths, at a temperature of 42° Fahr. Population, 3350.

Güstrow is one of the finest towns in the grand duchy. It was formerly the residence of the princes. The most remarkable buildings are the cathedral, containing some costly monuments of the reigning family; and the old palace (now a house of correction), described as the finest princely residence of the middle ages in Mecklenburg. The town is inclosed by walls, and is a place of considerable commercial importance, having from fifty to sixty factories of various kinds, and many breweries and distilleries. Population, 9100.

Ludwigslust is a market town, with a station on the Hamburg and Berlin Railway, 21 miles E. of Schwerin. It has a tobacco factory and paper mills. Population, 5000.

Malchin is between the lakes Malchin and Cumber, 24 miles E.S.E. of Güstrow. Weaving and turning are carried on here. Population, 4500.

Parchim is 23 miles S.E. of Schwerin, on the Elbe, and has manufactures of woollen cloths, leather, chicory, straw hats, and tobacco. Population, 6489.

Rostock, a trading port, and the largest town in the grand duchy, is situated in 54° 5' N. lat., 12° 20' E. long., on an eminence on the bank of the river Warnow, 9 miles from its mouth in the Baltic, and at the termination of a branch of the Hamburg and Berlin Railway, 44 miles N.E. of Schwerin. It consists of the old, the middle, and the new towns, with several suburbs. The principal buildings are the arch-ducal palace; the university; the court of justice; the town-hall; and the churches of St. Mary and St. Peter: the former contains the tomb of Grotius, and possesses one of the finest organs in Northern Germany; the latter, built in the twelfth century, is remarkable for its fine steeple, 420 feet in height. The university, founded in 1419, has twenty-three professors, and possesses a library rich in Oriental and Spanish literature, theological and other schools, an anatomical theatre, laboratory, and botanic garden. Rostock is the principal trading port of Mecklenburg, and has manufactures of woollen cloth, soap, and chicory; with breweries, distilleries, vinegar, colour, and chemical factories, and sugar refineries. There is also some shipbuilding carried on here. The depth of the water in the river is from 8 to 9 feet, and vessels above that draught load and unload at Warnemünde, the out-port of Rostock. In one of the principal squares is a statue to Blücher, who was a native of this place, which was long one of the Hanse Towns, and retained, until lately, some exclusive privileges. Population (1862), 26,396.

Schwerin, capital of the grand duchy, and of Mecklenburg district, is situated on the west shore

of the lake Schwerin, and on the railway from Hamburg to Wismar, 35 miles S.E. of Lubeck. The town has a striking and important appearance when viewed from a distance. It is a long, irregular, and plain town, containing two or three fine buildings—the grand ducal palace, which is built on a peninsula in the lake, and is an old fortified structure, containing a good picture gallery, and a museum; a fine modern building appropriated to state business; and an old Gothic cathedral, 305 feet in length, and 135 in breadth. Schwerin is the residence of the grand duke. Besides the public edifices already mentioned, there are Lutheran and Roman Catholic churches, a Jews' synagogue, a mint, government offices, &c. This town is mentioned in old records of 1018 as a strong fortress. The manufactures are of vinegar, cloth, pottery, and tobacco. Population (1862), 22,919.

Sternberg, where the Diet meets once every two years, is a small place 29 miles S.W. of Rostock. Population, 1945.

Wismar, an important fortified sea-port on Walpich Bay, 18 miles N.E. of Schwerin, on a branch railway to Hamburg and Rostock. In 1864 the number of vessels belonging to the port was 47, measuring 16,128 tons. The harbour is not deep, but it is considered one of the safest in the Baltic. The town is tolerably well built: the streets being broad and well paved. The principal buildings are—several Gothic churches, a handsome modern town-hall, hospitals, schools, orphan asylum, &c. There are shipbuilding docks, and several breweries and distilleries. The exports consist chiefly of corn; the imports are mostly Swedish productions. Fishing, agriculture, and the manufacture of tobacco, sail-cloth, and linen, employ a large proportion of the population. Wismar was bought by Schwerin in 1803, of the Swedish government, for 1,200,000 dollars. It was founded in 1229, and for a time belonged to the Hanseatic League. Population, 13,128.

MECKLENBURG-STRELITZ lies to the east of Mecklenburg-Schwerin, and covers an area of 997 English square miles, of which 527 belong to the grand duke, nearly one-fourth of it being forest lands. The country is flat, and similar in its features to Mecklenburg-Schwerin; but owing to its being further from the sea, the climate is less humid and changeable.

The population, which, according to the last census, numbered 99,060, is decreasing. The loss, amounting to 690 in eight years, is caused by a strong tide of emigration. The country is divided into two separate provinces, the first of which, Stargard, has a Diet composed of landowners, while the second, Ratzeburg, has no representative institutions whatever. The Stargard Diet periodically joins the legislative assembly of Mecklenburg-Schwerin. Only the possession of a Rittergüt, or knight's estate, gives right to a seat in the Diet, to which neither the towns nor rural populations send any deputies. There are sixty-two such proprietors in the province of Stargard, only a small number of which, however, choose to take their seats. The executive is entirely in the hands of the grand duke, who swallows up the whole of the public revenue.

Mecklenburg-Strelitz contributes 197 men, includ-

ing 200 artillery, to the army of the Germanic Confederation; but by an arrangement with the grand duke of Mecklenburg-Schwerin, the latter has undertaken to furnish the artillery, in return for twice the number of foot-soldiers. The troops are raised by conscription, and serve for a period of six years. The Congress of Vienna permitted Duke Charles Frederick of Mecklenburg-Strelitz to adopt the title of Grand Duke, notwithstanding the exceedingly limited extent of his territory. He is, however, one of the wealthiest of German sovereigns, more than one-half of the country being his own private property. A territory of 7 square miles, with 10,000 souls, which was added to the newly created grand duchy in 1815, was sold by the late grand duke George to Prussia, in 1819, for the sum of 1,000,000 thalers, or '100 thalers per soul.' It is impossible at present to decide what changes will be effected in this and other small German states by the late war between Prussia and Austria (1866).

The principal places are the following:—

New Brandenburg, a pretty, circular town, with broad straight streets, is built near the Tollense lake; manufactures of woollen cloth, cards, paper, and tobacco are carried on. The grand duke has a palace in the town, and a country house in the neighbourhood. Population, 10,000.

Stargard (called Old Stargard) is a small town with 1618 inhabitants.

Strelitz, capital of the grand duchy, situated between the lakes Zierker and Glambeck, 60 miles N.N.W. of Berlin, consists of the old and new towns, which, though one mile apart, form one city. Old Strelitz was formerly the ducal residence, and has a large horse market. New Strelitz, founded in 1733, is built in the form of a star, with eight divergent rays. This town is the usual residence of the grand ducal court. The most remarkable edifice is the ducal palace, which contains a library of 50,000 volumes, and a curious collection of German antiquities. The inhabitants chiefly depend for their support on the expenditure of the court. In the town are a theatre, college, mint, and other government offices. The united population of the two towns is 10,479.

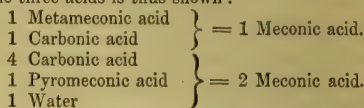
Ratzeburg, a small principality belonging to Mecklenburg-Strelitz, and situated between Schwerin, Lübeck, and Lauenburg, is traversed by the river Trave, and is bounded on the west by the lake of Ratzeburg, by means of which timber, corn, pulse, flax, and cattle are sent to Lübeck for exportation. The inhabitants also carry on considerable fisheries. Ratzeburg, the chief town, mostly belongs to Lauenburg, with the exception of the cathedral and the hospital, which belong to Strelitz. It is the seat of administration of the Duchy of Lauenburg, and has a population of 3250. (*The Statesman's Year-Book*, 1866; *Almanac de Gotha*, 1866; *Consular Reports*, &c.)

MECONIC ACID (Gr. *μήκων*, 'the poppy'), a substance which is found only in opium, where it exists in combination with the alkali Morphia. Meconic acid is a crystalline substance, which acts on litmus paper, and has a sour taste; it is soluble in four times its weight of water, and also in alcohol. The crystals do not alter by exposure to the air, but when heated to 212° they lose 21·5 per cent. of water, and become opaque. When strongly heated,

it is totally vaporized and decomposed. It appears to consist of 3HO, C₁₄, HO₁₁.

The salts which contain this acid are called *meconates*. The chief among them are combinations of the acid with Ammonia, Potash, Soda, Lime, Magnesia, Barytes, and Iron: the whole of these crystallize.

When a solution of meconic acid is heated to ebullition, carbonic acid is evolved, and a brownish solution results; this consists of colouring matter and *metameconic acid*. When a meconate, as of potash or lime, is boiled with hydrochloric acid, no colouring matter results, and yet metameconic acid is formed. This acid is in hard anhydrous grains. *Pyromeconic acid* is a crystalline body, fusible between 248° and 257°, and then flows like oil: it is entirely soluble at a moderate temperature. The relation between the three acids is thus shown:—



MECONIN, *Opimyl*, a neutral principle existing in opium. It is colourless and inodorous, is at first tasteless, but afterwards acid; it is soluble in water, alcohol, and ether, and crystallizes well in any of them; the crystalline form is a six-sided prism with dihedral summits; it fuses at 194°, and is volatilized at 310°, without undergoing any change of properties.

MECONO'PSIS (from *μήκων*, 'a poppy,' and *ψις*, 'a resemblance'), a genus of plants belonging to the natural order *Papaveraceæ*. There is only one species, *M. Cambria*, the Welsh Poppy, and this is a native of Great Britain, but it is a rare plant. It is also found in many parts of Europe. It has yellow flowers, is an ornamental plant, and may be introduced into the garden. It will grow in a rich light soil, in a shady situation. It may be propagated by dividing the roots, or by seeds.

MEDAL (Ital. *medaglia*). Numismatists have usually given the name of medals to those coins that have been struck or cast for particular purposes and on extraordinary occasions, in commemoration of victories, treaties, coronations, and similar important events, or in honour of remarkable persons, in distinction to those which have been issued and generally circulated as money. [COIN.]

Greek medals and medallions are very rare, few being known of earlier date than the establishment of the imperial power at Rome, and when Greece was under Roman dominion. Some of Sicily are not, however, so scarce; they are of very fine design and workmanship, and deserve the careful attention of the connoisseur. Roman medals are more common. Many of great excellence and in high preservation are contained in the collection of coins in the British Museum.

The earliest examples of modern medals and medallions seem to be of the fifteenth century, though there is one remarkable exception to this in a medal of David II., king of Scotland. It is of gold, and was probably executed during that prince's captivity in England, sometime between the years 1330 and 1370. From the fifteenth century there is a succession of medals in most European countries. A

gold medal of the council of Florence, dated 1439, is one of the earliest. A still earlier one, if the date 1415 is correct, is of John Huss; but some doubts have been entertained of its authenticity. Vittore Pisano, a painter of Verona, is celebrated as the restorer of the art at that period; but the medal alluded to of David of Scotland seems to prove that it was practised before his time. Pisano's medals are very large, and are all cast. They are usually inscribed 'Opus Pisani Pictoris.' It is curious that he should always refer to his being a painter while exercising a totally distinct branch of art. The papal medals commence properly with Paul II., who began to reign in 1464; those of pontiffs who lived prior to that date having been added to the collection by successors. The German medals commence in 1453, and are very numerous. The Sicilian medals appear as early as 1501. The Spanish medals begin in 1503. The earliest of Venice appear in 1509; and those of Denmark in 1516. The first Dutch medals seem to be of 1566, and they are remarkable for the elaborate views, maps, and plans that are engraved on many of them.

The French medals do not exhibit any remarkable excellence till the reign of Louis XIV. gave an impulse to the art, and we find his entire life illustrated by medals; some of them are well designed and finely executed. The medallion history of Napoleon deserves notice in the series of medals of France. It is of great extent, and is for the most part honourable to French art.

The series of English coins and medals is one of the most perfect. The first medal is of 1480. It is of a large size, and executed in the early Italian manner. On one side is a portrait with *IO. KENDAL. RHODI. TURCUPELLARIUS*; on the reverse the arms of Kendal, with the inscription, *TEMPORE OBSIDIONIS TURCORUM, MCCCC.LXXX.* The next English medal is of the time of Henry VIII. It is of gold, and bears the king's portrait on one side, with an inscription on the reverse. The first coronation medal appears in the reign of Edward VI. The medals of Queen Mary are numerous, and very interesting from the devices they bear. The Scotch coronation medal of Charles I. is of gold, and was struck at Edinburgh. It is remarkable as being the first struck in Britain with a legend on the edge.

Some remarks on the manner of engraving dies for medals and coins will be found in the article on *Intaglio*. [*INTAGLIO*.]

MEDALLION, a medal of a large size.

MEDALLION, in architecture, any circular or oval tablet bearing on it objects represented in relief, as figures, heads, animals, flowers, &c.

MEDE, JOSEPH, was born at Berden in Essex, in the year 1586, and died in 1638. In 1602 he entered Christ's College, Cambridge, and took his degree of M.A. in 1610, and that of B.D. in 1618. He devoted his entire life, in the retirement of his college, to his studies, and has left, as the chief result of his application, his '*Clavis Apocalyptica*,' said by Bishop Hurd to have been the first rational attempt to explain the Apocalypse. This work was translated by Mr. T. Bransby Cooper in 1833.

MEDEA or **MEDEIA**, in Greek mythology, a daughter of *Eetes*, king of Colchis, who wedded Jason the Argonaut, and by her marvellous wisdom

assisted him to obtain the great prize of the Golden Fleece. But being deserted by Jason for the sake of Glauké, the daughter of Creon, king of Argos, she murdered her two children, poisoned the unfortunate Glauké, and then fled from the land in a chariot drawn by dragons. This is obviously one of the solar legends, and Medea's destruction of her children symbolizes the sun's pernicious influence upon the plants which it has first produced.

MEDEYAH. [*ALGIERS*.]

ME'DIA, a country of ancient Asia. In the time of Strabo it was divided into two divisions, Great Media and Media Atropatène. Great Media, which is a high table-land, had a good climate and a fertile soil. It was separated on the W. and S.W. from the low country watered by the Tigris and Euphrates by a range of mountains called Zagros and Parachotras; on the E. it was bounded by a desert and the Caspian mountains (the modern Elburz range); and on the N. and N.W. by the Cadusii, Atropatene, and the Matieni, thus answering for the most part to the modern Irak Ajemi. Atropatene, which corresponds to the modern Azerbaijan, extended as far north as the Araxes (*Aras*).

The principal town of Great Media was Agbátana, or Ecbátana (Hamadan), the summer residence of the Persian kings. [*ECBATANA*.] In the N.E. of Great Media, near the Caspian gates, was the town of Rajæ (now Rai), afterwards called Európus by the Macedonians, and Arsacia by the Parthians, which was founded, or rather colonized, by the Macedonians under Seleucus Nicátor.

The chief town of Atropatene was Gaza, or Gaziki, as it is called by Ptolemæus, at no great distance from the modern Tauris, or Taubreez. N.W. of Gaza was a salt lake, called Spauta, or Martianus (Shahey, or Urumiyeh).

According to Herodotus the Medes were originally divided into six tribes, one of which was the Magi.

Media originally formed part of the Assyrian empire, but its history as an independent kingdom is given differently by Herodotus and Ctesias. According to Herodotus there were four kings of Media: 1. Deioces, who reigned B.C. 710-657. 2. Phraortes, B.C. 657-635, greatly extended the Median empire, subdued the Persians and many other nations, but fell in an expedition against the Assyrians of Ninus (Nineveh). 3. Cyaxares, B.C. 635-595, extended the boundaries of the empire as far west as the Halys. In an expedition against Nineveh he was defeated by the Scythians, who had made an irruption into southern Asia. After the expulsion of the Scythians, he took Nineveh, and subdued the Assyrian empire, with the exception of the Babylonian district. 4. Astyages, B.C. 595-560, who was dethroned by his grandson Cyrus, and Media reduced to a Persian province.

The Medes revolted during the reign of Darius II., the father of the younger Cyrus, about B.C. 408, but were again subdued. On the downfall of the Roman empire they formed a part of the kingdom of the Seleucidæ, and were subject to the Parthians.

MEDIATISATION, a term used to signify the process of absorption of the smaller German principalities into the larger neighbouring states, by which they lost their *direct* connection with the empire, and became only *mediately* dependent upon it.

MEDICA'GO (from *μνδική*, the Greek name of one of the species), a genus of plants belonging to the natural order *Leguminosæ*. The species are exceedingly numerous, upwards of eighty having been described.

M. sativa, Lucern, is super-eminent as an artificial grass in temperate climates, and a most valuable plant for feeding cattle. It was in high repute among the ancients. The authors 'De Re Rustica,' speak of it with enthusiasm, and all over the continent of Europe, wherever husbandry has made any progress, it is in high reputation. Lucern is a plant which will not bear extreme frost nor superabundant moisture, and its cultivation is therefore restricted to mild climates and dry soils; but where it thrives, its growth is so rapid and luxuriant, that no other known plant can be compared to it. In good deep loams lucern is the most profitable of all green crops; when properly managed, the quantity of cattle which can be kept in good condition on an acre of lucern, during the whole season, exceeds belief. It is no sooner mown than it pushes out fresh shoots, and wonderful as the growth of clover sometimes is in a field which has been lately mown, that of lucern is far more rapid.

Lucern, sown in a soil suited to it, will last for many years, shooting its roots downwards for nourishment till they are altogether out of the reach of drought. In the driest and most sultry weather, when every blade of grass droops for want of moisture, lucern holds up its stem, fresh and green as in a genial spring. The only enemies of this plant are a wet sub-soil and a foul surface. The first is often incurable; the latter can be avoided by good cultivation.

M. falcata is a native of Europe on dry mountainous pastures. In England it is a rare plant, but is occasionally found on dry gravelly banks and old walls. This species is said to be the lucern which is cultivated in Switzerland. *M. lupulina*, Black Medick, or Black Nonsuch, is a native of Europe in meadows, pastures, and waste ground, and is plentiful in Great Britain. It affords excellent fodder for sheep, and must be treated in the same way as lucern. *M. arborea*, Tree Medick, is a native of the south of Europe, and appears to be the *κρίσιος* of Theophrastus, 'Hist. Plant.' lib. 4, cap. 5. Besides the first three species, described above, *M. maculata*, *M. minima*, and *M. denticulata*, are natives of Great Britain.

MEDICAL DEPARTMENTS of the Army and Navy are very important branches of the public service. That of the Army is under the control of a skilful and experienced officer, usually stationed at head-quarters, and called Director-general. His pay is 1500*l.* a year. The medical staff has charge of detachments, hospitals, &c., and comprises 6 inspectors-general, 22 deputy inspectors-general, 19 staff-surgeons-major, 46 staff-surgeons, 194 staff-assistant-surgeons, and 17 apothecaries and dispensers. There are also about 400 regimental surgeons, and 450 medical officers employed with the army in India. Every battalion has a surgeon and assistant-surgeon wherever situated, and an extra assistant when in India or the tropics. The total cost of the medical establishments, services, and supplies of the British army in 1866, exclusive of the regimental surgeons, was 246,544*l.* The medical department

of the navy is also governed by a director-general, whose pay is 1800*l.* per annum. The staff comprises similar ranks to that of the army, but the medical officers are not so numerous, as the sea service is much more healthy than the land service, and the navy is not so large as the army.

The total cost of the naval medical establishments at Haslar, Plymouth, Yarmouth, and Haulbowline, for 1866, was 14,238*l.*; the marine infirmaries at Woolwich, Chatham, Portsmouth, Plymouth, and Deal, 5437*l.*; the medical establishments at Malta, Bermuda, Jamaica, Cape of Good Hope, and Hong-Kong, 8452*l.* For medicines and medical stores for the navy in the same year the cost was 64,800*l.*

MEDICAL PRACTITIONERS. The statute 21 and 22 Vict. c. 90 relates to the medical profession, and enacts that those who falsely pretend to be, or take, or use the title of a physician, doctor of medicine, licentiate in medicine or surgery, surgeon, general practitioner, or apothecary, shall be liable to a fine of 20*l.* or imprisonment. All duly qualified persons are now registered; and if they do not register themselves they cannot fill certain offices, and cannot sue for their fees. By this Act, too, physicians are allowed to sue for their fees as legal debts, which before were considered honoraria, to be paid beforehand, like the fees of barristers.

ME'DICI, FAMILY OF. The oldest member of this family, of whom there is any distinct record, is Giovanni de' Medici, who, at the head of 100 Florentines, forced his way through the Milanese army in 1251. Other members of the family held important offices successively in Florence. The founder, however, of that greatness which his posterity enjoyed for several ages was Giovanni de' Medici, the great-grandfather of Lorenzo the Magnificent. By a strict attention to commerce he acquired great wealth; by his affability, moderation, and liberality, he secured the confidence and esteem of his fellow-citizens. Without seeking the honours of the republic, he was gratified with them all; and his lavish charity procured him the splendid title of the 'father of the poor.' He died in 1428, leaving two sons, Cosmo, born in 1389, and Lorenzo, in 1394, from the latter of whom is derived the collateral branch of the family, which in the beginning of the sixteenth century obtained the absolute sovereignty of Tuscany.

Even in the lifetime of his father, Cosmo had engaged not only in the extensive commercial transactions by which the family had acquired its wealth, but also in the affairs of state. The authority which Cosmo and his descendants exercised in Florence, during the fifteenth century, consisted rather in influence than in any definite power. A party headed by Rinaldo d'Albizi attributed the unfortunate result of the war against Lucca to Cosmo, and obtained his banishment in 1433; but he was recalled in triumph within a year to enjoy for the remainder of his life uninterrupted prosperity. Though a private citizen, he surpassed almost all the princes of Europe in his munificent patronage of literature and the fine arts. He established at Florence an academy for the explanation of the Platonic philosophy, at the head of which he placed the celebrated Marsilius Ficinus. By means of foreign correspondence, he collected the Greek, Latin, and Oriental MSS. which formed the basis of the Laurentian

library. He also endowed numerous religious houses, and built an hospital at Jerusalem for the relief of distressed pilgrims. By his prudent conduct and benevolence he acquired the title of 'father of his country,' which was inscribed upon his tomb; an appellation which, as it was founded on real merit, has ever since been attached to his name. He died August 1, 1464. He had two sons, Giovanni and Piero; and a natural son, Charles, who was canon of Prato.

Giovanni de' Medici was one of the Florentine ambassadors who were sent, in 1455, to take the necessary oaths to Pope Calixtus III. He died in 1463. Piero de' Medici succeeded to Cosmo's fortune and authority at Florence. He was nearly falling a victim to a base plot contrived by his minister Neroni. Piero died December 3, 1469, leaving by his wife, Lucretia Tornabuoni, two sons and two daughters, Lorenzo, Giuliano, Bianca, and Giovanna.

At the death of Piero de' Medici, his two sons inherited his property; but Lorenzo succeeded him as head of the republic. In 1472 he re-established the academy of Pisa: for this purpose he contributed a large sum from his private fortune, in addition to that granted by the state of Florence. Lorenzo, like his father, narrowly escaped a plot laid to assassinate him, by the Pazzi family, and his brother fell a victim to the conspirators. The citizens of Florence were so indignant at the atrocity that they killed two members of the Pazzi family, and hung the bishop of Pisa in his robes for assisting in the plot. This incident led to a war with Pope Sixtus IV., which was continued with varying fortune until 1480. Lorenzo now secured to the republic of Florence a degree of tranquillity and prosperity which it had scarcely ever known before; and by procuring the institution of a deliberative body, of the nature of a senate, corrected the democratical part of its constitution.

Lorenzo distinguished himself above all his predecessors by the encouragement of literature and the arts. His own productions are sonnets, canzoni, and other lyric pieces; some longer works in stanzas, some comic satires, carnival songs, and various sacred poems. Although the ancestors of Lorenzo laid the foundation of the immense collection of manuscripts contained in the Laurentian library, Lorenzo has the credit of adding very largely to the store. On the discovery of the art of printing, Lorenzo appreciated its importance. At his suggestion several Italian scholars devoted their attention to collating the manuscripts of the ancient authors, for the purpose of having them accurately printed. On the capture of Constantinople by the Turks, many learned Greeks took refuge in Italy; and an academy was established at Florence for the purpose of cultivating the Greek language. Lorenzo also augmented his father's collection of the remains of ancient art. He appropriated his gardens in Florence to the purpose of an academy for the study of the antique. To this institution, more than to any other circumstance, Roscoe ascribes the sudden and astonishing advance which, toward the close of the fifteenth century, was evidently made in the arts, and which, commencing at Florence, soon extended itself to the rest of Europe. Lorenzo died in 1492. A graphic account of his death-bed interview with Savonarola is given by Bur-

lacci. Lorenzo acknowledged the commission of three principal offences: the sacking of Volterra, the appropriation of charitable funds, and the execution of innocent persons on suspicion of being implicated in the Pazzi conspiracy. The priest-reformer refused him absolution until satisfied of three things: his sincere faith in God, his restitution of wealth improperly acquired, and the restoration of Florentine freedom. The dying statesman assented to the two first demands, but to the third made no reply, and turned his face to the wall. At the time of his death he was forty-two years old. His life has been written in English by Thomas Roscoe, and the incidents of his age described by Thomas Adolphus Trollope in his 'History of the Commonwealth of Florence.' By his wife, Clarice Orsini, Lorenzo had three sons (Piero, Giovanni, and Giuliano) and four daughters, who arrived at the age of maturity. Piero was born February 15, 1471, Giovanni in 1475, and Giuliano in 1478. Giovanni was afterwards known under the name of Leo X.; and Giuliano, having allied himself by marriage to the royal house of France, became duke of Nemours.

Giuliano, the brother of Lorenzo, left an illegitimate son, who was brought up under the protection of Lorenzo, and was destined to act an important part in the affairs of Europe. The final extinction of the liberties of Florence, the alliance of the family of Medici with the royal house of France, the expulsion of Henry VIII. of England from the bosom of the Roman Church, are principally to be referred to this illegitimate son of Giuliano de' Medici, who under the name of Clement VII. guided the bark of St. Peter through a succession of the severest storms which it has ever experienced.

Piero, the eldest son of Lorenzo, succeeded him in the administration of Florence. The invasion of Italy by the French is matter of history. The plundering of the palace of the Medici, and the dispersion of the valuable library which they had collected, are among the misfortunes which befel Florence during the same period. Piero, by his base treaty with Charles VIII., prepared the downfall of the state which his forefathers had contributed to raise and enlighten.

The Medici were expelled from Florence by the turbulent citizens in 1527, but restored by Pope Clement VII. and Charles V. in 1530. Two years later, the pope's natural son, Alessandro de' Medici, became duke of Florence, and on his assassination by his kinsman Lorenzaccio in 1537, was succeeded by Cosmo I., born in 1519, died in 1574. This able, prudent, and unscrupulous man greatly extended his power, crushed the liberties of Florence, but as some compensation extended its territories, and finally, in 1564, by papal grant, assumed the title of grand duke of Tuscany, a title which was extinguished by the erection of the Italian kingdom in 1860. [ITALY.]

MEDICINE, a science, the object of which is the cure of disease and the preservation of health. Occasionally it is used to comprehend all the branches of the healing art; at others, to comprise one great division, in contradistinction to *surgery* and *obstetrics*. Medicine, in this sense, includes many branches, the chief of which are anatomy, physiology, pathology, therapeutics, hygiene, materia medica, and pharmacy. The earliest records of the practice

of medicine are extremely obscure. Among the Jews it appears to have been entirely confined to the priests, and the whole art seems to have consisted in the prevention of contagion by isolation and cleanliness, and the administration of a few uncertain remedies. The Egyptians, according to the account of Herodotus, must have made some little progress; purging medicines and emetics were well known to them and much used; and such was the subdivision of labour, that there were physicians for every separate complaint, some for the eyes, others for the head, others for the teeth, others for the abdominal parts, and others for diseases which did not manifest themselves by outward visible symptoms. (Herod., ii. 84.) It appears, however, that in the time of Darius the son of Hystaspes, the Greeks possessed at least more skill than the Egyptians. (Herod., iii., 129.) The Greeks probably derived their knowledge of medicine, with that of many other arts, from Egypt, whence Chiron, the Centaur of their fables, is said to have first introduced it among them. His pupil Æsculapius [ÆSCULAPIUS] so much improved the art, that he was deified; and Machaon and Podalirius, his sons, accompanied the Grecian army to the siege of Troy. The descendants of Æsculapius were for many years the chief practitioners of medicine: they were called Asclepiadæ, and were the priests of the temples erected in honour of their progenitor, to which the sick were accustomed to resort for advice and the application of remedies.

In the sixth century before the Christian era, medicine, with other sciences, began to be more philosophically studied in Greece, and among the first of those who devoted much of their time to the investigation of the structure and functions of the animal body was Pythagoras. His pupils Democritus and Heraclitus appear also to have added considerably to the knowledge both of anatomy and of practical medicine, and their contemporary, Herodicus, first introduced the practice of gymnastic exercises, which afterwards formed so large a part of medical treatment. But the most remarkable man in the history of medicine in Greece was Hippocrates, one of the Asclepiadæ, who was born at Cos (where one of the chief temples was erected), B.C. 460, and was the pupil of Heraclitus and Herodicus. [HIPPOCRATES.] His sons Thessalus and Draco, and his son-in-law Polybius, were the most renowned of his descendants, and they are generally regarded as the founders of the medical sect or school which was called the Hippocratic or Dogmatic sect.

The establishment of the Alexandrian school of philosophy forms the next most important epoch. The science of medicine was assiduously cultivated, and the human body was first dissected in Alexandria by Erasistratus and Herophilus. [HEROPHILUS.] The former was the pupil of Chrysippus, a violent opponent of the Hippocratic school, and a bold innovator in medicine, with whom probably originated the schism in consequence of which, for some centuries, every physician ranged himself in one of two sects, the Dogmatists and the Empirics.

During the early periods of the Roman empire, medicine seems to have been little cultivated, and, according to Pliny (xxix. 1), Rome was for 600 years without professed physicians, though not entirely

without medical knowledge. The first individual of any eminence who practised medicine in Rome was Asclepiades of Bithynia [ASCLEPIADES], who lived in the century before the commencement of the Christian era; but he does not appear to have advanced the knowledge of the science. He was succeeded by his pupil Themison, the founder of a sect called Methodics, who held doctrines nearly intermediate between those of the Dogmatists and of the Empirics.

About two centuries later the Methodics were divided into numerous sects, as the doctrines of particular physicians became more generally received. The chief of these sects were the Pneumatics and the Eclectics. The former are represented by their most eminent writer, Areteus [ARETEUS], who lived in the reign of Vespasian, and the chief points of their doctrines are detailed in his life. Of the Eclectics, the most celebrated was Archigenes, of Apamea, who practised at Rome in the time of Trajan. But the most remarkable writer of this age was Celsus, in whose work, 'De Medicinâ,' the progress and condition of medicine previously to and during his life are amply detailed. [CELSUS.]

The individual whose history forms the next chief epoch in the history of medicine is Galen. [GALEN.] For a long time after his death physicians were chiefly occupied in commenting on his works, and imitating, as closely as they could, his practice. His writings were regarded as ultimate authority, and everything that seemed opposed to them was at once rejected. From the time of Galen to the seventh century the only names of any repute (and theirs is but small) are Sextus Empiricus, Oribasius, Aetius, Alexander Trallianus, and Paulus of Ægina; and, after the death of the last of these, no medical work of the least merit was published in the Greek language.

From the seventh to the twelfth century the only nation in which medicine made any progress, or was even prevented from retrograding, was the Arabian. It appears that in the conquest of Alexandria some books were saved from the burning of its magnificent library, and that among them were the writings of Hippocrates and Galen. The latter were soon translated into Arabic and diligently studied; and all the earliest Arabian works on medicine, as those of Ahrun in the eighth, and Serapion in the ninth century, are little more than transcripts of those of Galen. The most illustrious names of this school are Rhazes, Ali-Abbas, Avicenna, Mesne, Albucasis, Avenzoar, and Averroes.

From the decline of the Arabian school in the twelfth century to the beginning of the fifteenth, the history of medicine presents few circumstances of interest. The dissection of the human body was first publicly practised by Mondini at Bologna, about the year 1315; and at about the same time lived Gilbert, the first English writer on medicine who acquired any repute.

In the fifteenth century the sect of chemical physicians arose, and their doctrines, under the bold advocacy of Paracelsus, who publicly burnt the writings of Galen, obtained considerable credit and numerous supporters. In the middle of the sixteenth century the most important improvement commenced in the diligent and accurate study of anatomy by

Vesalius, who, disregarding the general obloquy which he incurred, carefully studied the structure of the most important parts of the human body.

From the time of Vesalius, the study of anatomy was diligently pursued, and in the early part of the seventeenth century was rewarded by several of the most interesting and important discoveries; as that of the circulation by Harvey, of the absorbents by Asellus, of the process of respiration by Malpighi, and numerous others. Among the most celebrated men of the seventeenth century, may be enumerated Glisson, Bartholin, Rudbeck, Fabricius, Hooke, Sylvius, Willis, Riolanus, Fallopius, Bellini, and Sydenham. Somewhat later appeared Stahl, Hoffmann, and Boerhaave.

Among the pupils of Boerhaave were Van Swieten and Haller. Before the time of Haller, the cases of Harvey, Glisson, Malpighi, and others, who devoted themselves to the simple observation of facts and the evident deductions from them, were exceptional; but since his time, the exceptions have rather been those who, with a comparative neglect of observation, have endeavoured only to find or support some theory by which all the phenomena they met with might seem explained. Haller's contemporary Cullen [CULLEN], though he yielded much more to theory, was of eminent service in the study of practical medicine; and his opponent Brown is acknowledged to have introduced many useful lessons in the same branch of the study.

With the gradual oblivion of the hypotheses of both Cullen and Brown, the theoretical study of medicine may be considered to have entirely ceased, and in the present day we may certainly be said to be without any general medical theory. From the time of Haller, medicine has acquired more and more nearly the character of a science of simple observation and the patient investigation of facts.

MEDICK. [MEDICAGO.]

MEDIETAS LINGUE, a jury consisting of half foreigners, half natives, used in pleas between a foreigner and a denizen.

MEDINA, (Arabic, Medinah-el-Nebi, 'the Prophet's city'), the second holy city of the Mohammedans, and the place where their Prophet was buried, is situated in that part of Arabia which is called El Hejaz, or Hedj, about 24° 27' N. lat., and 39° 53' E. long., and about 110 miles from the town of Yembo on the Red Sea, which is the harbour of Medina. Population 5000.

The city forms an oval, about 3000 paces in circumference, and 3000 feet above sea-level. The castle is built on a small rocky elevation, and strongly fortified. The whole is inclosed by a thick wall of stone, between thirty-five and forty feet high, flanked by about thirty towers and surmounted by a ditch: it is well fortified for an Arabian town, and has always been considered the principal fortress in Hejaz. Three well-built gates lead into the town. The houses are handsome, entirely of stone, and generally two stories high. As the stone is of a dark colour, the streets have rather a gloomy aspect, and are for the most part very narrow, often only two or three paces across; a few of the principal thoroughfares are paved with stone. The diminution in the number of pilgrims of late years has caused a great part of the houses to fall into decay. There are only

two large streets which contain shops. The great mosque containing the tomb of Mohammed is the only temple. There are two fine medresses or colleges. The suburbs extend west and south, and cover a larger area than the city itself. They are separated from it by an open space, narrow on the south, but forming on the west a large public place. The greater part of the suburbs consists of large courtyards with low houses built round them, and separated from each other by gardens and plantations: they are inhabited by the lower classes of the town, and those who are engaged in agriculture. Each court-yard contains thirty or forty families, so as to form a hamlet by itself.

The town is supplied with sweet water by a subterranean canal (about 25 feet under ground) which runs from the village of Koba, about three-quarters of a mile distant in a southern direction; and there are numerous wells attached to the houses. This plentiful water-supply made Medina a considerable settlement of Arabs long before it became sacred among the Mohammedans by the flight, residence, and death of their prophet.

The mosque containing the tomb of Mohammed is situated towards the eastern extremity of the city, and, like that of Mecca, forms an open square surrounded on all sides by covered colonnades, with a small building in the centre of the square. The colonnades are much less regular than those of Mecca. Near the south-eastern corner of the mosque stands the famous tomb, detached from the walls so as to leave between it and the southern wall a space of about 25 feet, and 15 between it and the eastern wall. The inclosure which protects the tomb from visitors is formed of a very close iron railing, pierced with several small windows. This inclosure is entered by four gates, three of which are constantly kept shut, and one only is opened every morning and evening to admit the eunuchs, whose office it is to clean the floor and light the lamps. The whole of the inclosure is covered with a lofty dome, rising far above the domes which form the roof of the colonnades, and visible at a great distance from the town. As soon as pilgrims to Medina catch sight of it they repeat some prayers.

The inhabitants of Medina, like those of Mecca, are not Bedowins, but strangers who have visited the place as pilgrims and afterwards settled there, or the descendants of such strangers. Medina is not so great a place of commerce as Mecca, and the merchants are not so rich, but it has the advantage of having a considerable tract around which is fit for cultivation.

MEDITATIO FUGÆ WARRANT, in the law of Scotland, is a writ by which a debtor, supposed to be about to make his escape from the country, is arrested and kept in custody until he pay the debt, or find security to pay it, if he shall be judicially found liable to do so.

MEDITERRANEAN (or *Midland-Sea*; Lat. *Mare Internum*; Germ. *Mittelmeer*), the name of the sea between the Straits of Gibraltar to the west and the Dardanelles and Syria to the east. It is comprised between the parallels of 30° 20' and 45° 50' N. lat., and the meridians of 5° W. and 36° E. long. The distance from Gibraltar to the farthest shore of Syria is 2000 miles, and the narrowest part, between

Sicily and Africa, is 79 miles across. The Mediterranean, including the islands, occupies an area of 784,000 square miles. The surface of country of which it receives the drainage is very difficult to estimate, but may be assumed to exceed this quantity.

The shores of Syria are mountainous between Tripoli and Tyre, but present in many places a large extent of low and flat coast. The coast of Anatolia, the west portion of Asia Minor, is mountainous, rising in some parts very near the sea to 7000 and 8000 feet. About 20 leagues from the nearest coast of Syria lies the island of Cyprus. The islands of Candia, the name given by the Venetians to the ancient Crete, and of Rhodes, are also in this part of the Mediterranean. The numerous islands in the Ægean, between Greece and Asia Minor, forming the Grecian Archipelago, are subject to very heavy squalls. Their sides being steep, and the water very deep, there are in general no anchorages except in particular places. The coast of the Morea, the ancient Peloponnesus, is mountainous, some of the summits exceeding 6000 feet. The coast of Albania, including the ancient Illyricum, is more mountainous and rugged. Off this coast and the Morea lie the Ionian Islands. Proceeding northward we enter the Adriatic, the entrance of which is 40 miles broad. The shores of Dalmatia and Istria afford numerous fine harbours; and above Ragusa are studded with islands affording good anchorage.

The Greeks, especially the Hydriotes, are active sailors. They employ small vessels, half-decked, which both sail and pull, but they seldom venture to sea except in fine weather or with a fair wind. The trade to the Black Sea is chiefly carried on in Greek bottoms. But the coasting trade of the Adriatic is mainly conducted by Austrian vessels and those of the Papal States. The vessels employed are mostly trabaculos, a kind of lugger, and seltees, small vessels of one mast.

The southern extremity of Italy is contiguous to Sicily; between them being the well-known Scylla and Charybdis. Scylla is considered in these days as an ordinary rock, but Charybdis is a vortex which might, on occasions, prove dangerous to a small vessel. The coasting trade is carried on in small Italian vessels.

The Gulf of Lyons, like all the gulfs on the north shores of the Mediterranean, is subject to violent gales from the northward, which sometimes last three days.

The islands of Sardinia and Corsica, lying north and south, extend over 80 leagues of the sea between Genoa and Tunis. The small island of Malta is, from its situation in the narrow sea between Sicily and Africa, and its excellent harbour, the great naval station of the Mediterranean, and second only in importance to Gibraltar.

The east coast of Spain presents numerous harbours, and is particularly adapted to navigation by steam vessels. The Balearic Islands, Majorca, Minorca, with Iviza, are adjacent to the Spanish coast. Gibraltar, standing at the foot of a rocky mountain 1430 feet high, is a place of extraordinary strength. From its situation, and the narrowness of the straits dividing Spain from Africa, which are only 11 miles across, Gibraltar is the key of the Mediterranean. A constant current sets through

the Straits of Gibraltar from the Atlantic at the rate of 2 or 3 miles an hour, and is felt as far as Cabo de Gata in Spain, 150 miles distant. Dr. Halley supposed this current required to supply the loss by evaporation, considering that the rivers which flow into this sea were not sufficient for the purpose.

Ceuta, opposite Gibraltar, is a strong fortress. The African shore from this place to Tripoli is hilly, and in some places sandy and sterile. On the low shelving shores of parts of these coasts the strong northerly winds do not blow home, and accordingly a ship may bear up on a lee shore and anchor in smooth water. Proceeding towards Barca, the ancient Ptolemais, we pass the Gulf of Sydra, or Greater Syrtis, an object of so much dread to the ancient seamen on account of marshes and sea-monsters. Admiral Smyth, who examined this coast, found that these terrors were poetical exaggerations of the difficulties of navigating a low and dangerous bight. Passing the desert shores of Libya, we arrive at Alexandria, founded on a sandy neck of land; and on the low and fertile shores of the delta at the mouth of the Nile, the ports of Rosetta and Damietta.

The navigation of the Mediterranean dates from a period of great antiquity. The story of Minos destroying pirates (Thucyd., i. 4) takes for granted the fact, that there must have been merchant vessels carrying something worth stealing from the earliest recorded period. That the Phœnicians and the Carthaginians navigated the Mediterranean at a very early date is quite certain. Strabo, who described this sea in the first century of the Christian era, describes the Mediterranean as being divided into three basins: the first lying between the Columns of Hercules and Sicily; the second, between Sicily and Rhodes; and the third, between Rhodes and the shores of Syria. His geographical positions, when tested by modern exactness, are found to be frequently wide of the truth.

This sea is navigated by vessels of no great size. There is a form of rig peculiar to the larger vessels, called *polacca*, which has originated in the suddenness and frequency of squalls, that often require the sail to be instantly taken in; for this purpose the masts are made in one piece, and the topsails, on being lowered, can slide down without interruption. The gales, though frequent and violent, never last long. The winds have been remarked as peculiarly variable in the Mediterranean, and three or four vessels have often been seen carrying different winds at the same time. The sirocco, or south-east wind, has always been noted for its depressing effects upon the animal system. Water-spouts are very common. Fish abound, especially the tunny, anchovy, and sardine; coral, sponge, and ambergris are found in large quantities.

The depth of the Mediterranean is without doubt very great, the sea being in most places unfathomable. Though poetically termed a 'tideless sea,' it is not strictly so; since in its latitudinal extent between Venice and the Lesser Syrtis it experiences a rise and fall of from five to seven feet; and there are slight tides in other places. Currents are numerous and strong. (Admiral Smyth's *Monograph on the Mediterranean*.)

MEDJIDIE, ORDER OF, instituted by the Sultan of Turkey in 1852, and conferred on many British

officers after the Crimean war. The decoration is a silver sun of seven triple rays, with the device of the crescent and star alternating with the rays. In the centre is the inscription 'Zeal, honour, and loyalty' in Turkish, and the date 1268, being the Mohammedan year corresponding to 1852. Inside the inscription is the sultan's name on a gold field. The order has five classes, and the badge differs in size for each class. A star of similar design to the medal is worn on the left breast by the first class, and on the right breast by the second class.

MEDLAR. [FRUIT.]

MEDOC. [GIRONDE.]

MEDULLA of Plants, the name given by older botanists to the pith of dicotyledonous plants, from a supposed resemblance to the spinal marrow (*Medula spinalis*) of animals. The *medullary rays* are the processes of cellular tissue stretching out from the pith. These rays become much compressed during growth. The *medullary sheath* is the ring or tube which surrounds the pith, composed chiefly of sap ducts. In monocotyledonous plants there is no proper distinction between the wood and the pith.

MEDUSA, in classical mythology, one of the three Gorgons. She had been celebrated for her personal charms and the beauty of her locks; but Minerva, in revenge for a violation of the sanctity of her temple, turned her locks into serpents, which had the power of petrifying those on whom she looked. She was killed by Perseus, who placed her head upon the ægis of Minerva, which he had used in his expedition, and it retained its petrifying power as before.

MEDUSA (Zoology), the Linnaean name for a genus of simple or free *Acalephæ*, vulgarly known to the British by the name of *Sea-blubbers* or *Sea-nettles*, extremely transparent, difficult to observe in their native element, and still more difficult to preserve, from their gelatinous and easily decomposed texture. These beautiful but evanescent animals are very numerous, swarming on many of our coasts and in our estuaries, and occurring in almost all latitudes. [ACALEPHÆ.]

MEDWAY. [KENT.]

MEERSCHAUM means, in German, *sea-foam*, and the equivalent French name of *écume de mer* is applied to the same substance. It is a silicated magnesian mineral, found in Greece, Turkey, and a few other countries, and is used by the Tartars for washing linen, somewhat in the same manner as pearl ash or fuller's earth. The mineral is principally used, however, as a material for tobacco-pipes, which, when made, are soaked in melted tallow, then in white wax, and finally polished with shave grass. If genuine, a meerschaum pipe acquires a beautiful dark brown colour after being smoked for some time, the oil of the tobacco being absorbed by the clay; and this is a point to which connoisseurs in smoking attach much importance.

MEERUT, a town and district of British India, in the north-west provinces. The town is situated in lat. $28^{\circ} 59' N.$, long. $77^{\circ} 46' E.$, 930 miles from Calcutta, and has 29,000 inhabitants. Here, on the 10th May, 1857, occurred a serious mutiny and massacre—all the officers of the native troops being shot, and the whole of the European inhabitants massacred, without respect to age or sex—after

which the rebel sepoys marched to Delhi, and, proclaiming the old pensioned Mogul emperor of India, inaugurated the sanguinary rebellion of that year. Meerut has a handsome English church, and was inclosed by walls, which, however, are now decayed. There is a military cantonment two miles to the north, and the town is the head-quarters of the Bengal artillery. The district of the same name extends from lat. $28^{\circ} 33'$ to $29^{\circ} 17' N.$, and from long. $77^{\circ} 12'$ to $78^{\circ} 15' E.$ The area is 2332 square miles, and the population about 1,200,000. The principal rivers are the Ganges (which forms the eastern and western boundary) and the Jumna, which supplies water for the Feroz Shah and Doab canals. The Ganges Canal also runs through the centre. The soil is fertile, fruits and sugar-cane being the chief products. The climate is healthy, with a minimum temperature of 32° , and a maximum of 102° Fahr.

MEGALICHTHYS (literally 'Great Fish'), in Geology, a large lizard-like fish of the carboniferous period. It occurs chiefly in the older beds of the coal measures, and is noted for its smooth, enamelled, lozenge-shaped scales, and comparatively small teeth. In the structure of its teeth, the Megalichthys bore great resemblance to those of a related form, the *Lepidosteus osseus*, which is still to be met with in some of the river swamps of North America. They were characterized by a hollow internal conical cavity, external flutings towards the base, and by growth from the bony substance of the jaw. The remains of the Megalichthys were first found at Burdiehouse, in the neighbourhood of Edinburgh. They have since been met with in different parts of the English coal field.

MEGALOSAURUS (Gr. *μεγας*, 'great,' and *σαυρος*, 'a lizard'), the name assigned by Dr. Buckland and the Rev. W. Conybeare to an extinct genus of Saurians found in the oolitic slate at Stonesfield, near Woodstock, and other localities. Huge fragments have been discovered in the ferruginous sandstone of Tilgate Forest in Sussex; and on the Continent in the oolite of Normandy; in the marble of Caen; and on the Jura, near Solothurn, according to H. Von Meyer.

Though no entire skeleton has yet been discovered, the number of bones and teeth collected give sufficient data to enable the observer to pronounce upon the general osseous structure, with almost as great a certainty as would be the result of the examination of the bones of the animal in a perfect and connected state.

The femur, or thigh-bone, and tibia, or leg-bone, are nearly three feet in length severally, so that the entire hind leg must have been nearly two yards long, and the discovery of a metatarsal bone measuring thirteen inches indicates that the foot was of a corresponding length. From these and other remains, including the vertebrae, teeth, &c., the size of this gigantic saurian has been calculated and its habits ascertained. The individual whose enormous thigh-bone (now in the British Museum) was obtained from the sandstone of Tilgate Forest, must have equalled the largest elephant in stature, and have measured from sixty to seventy feet in length.

That this gigantic lizard was carnivorous, the structure of its teeth sufficiently declares; and the

internal structure of the cylindrical and other bones shows that it was a terrestrial animal, though it may have occasionally taken to the water in pursuit of prey, such as Plesiosaurs and fishes. Its ordinary food is supposed to have been the smaller reptiles, crocodiles, and tortoises, whose remains occur abundantly in the strata where those of *Megalosaurus* abound.

MEGAPODIDÆ (Gould). 'The genera *Talegalla*, *Leipoa*, and *Megapodius*, form part of a great family of birds inhabiting Australia, New Guinea, Celebes, and the Philippine Islands. Their habits and economy are most singular, and differ from those of every other group of birds which now exists upon the surface of our globe. In their structure they are most nearly allied to the *Gallinaceæ*, while in some of their actions and mode of flight, they much resemble the *Rallidæ*; the small size of their brain, coupled with the extraordinary means employed for the incubation of their eggs, indicates an extremely low degree of organization.

'The three species of the family inhabiting Australia, although referable to three distinct genera, have many habits in common, particularly in their mode of nidification, each and all depositing their eggs in mounds of earth and leaves, which becoming heated, either by the fermentation of the vegetable matter or the sun's rays, form a kind of natural hatching apparatus, from which the young at length emerge fully feathered, and capable of sustaining life by their own unaided efforts.' (Gould, in Introduction to the 'Birds of Australia.')

MEGARIS, one of the political divisions of ancient Greece, was separated from Boeotia by the range of Mount Cithæron, and from Attica by the high land which descends from the north-west boundary of Attica, and terminates on the west side of the bay of Eleusis in two summits, formerly called Kerata, or the Horns, and now Kandili. Megaris was divided from the Corinthian territory on the west by the Oneian range of mountains, through which there were only two roads from the territory of Corinth into Megaris.

Megaris is a rugged and mountainous country, and contains only one plain of small extent, in which the capital, Mégara, was situated. The area was probably about 700 square miles. The rocks are chiefly calcareous. The country is deficient in springs.

Mégara was built on two hills, and connected with the port of Nisæa by two walls, built by the Athenians when they had possession of Mégara, B.C. 461-445.

Megaris in early times belonged to Attica, but it was taken from the Athenians by the Dorians, and a Corinthian colony was settled at Mégara. It remained for some time subject to Corinth; but afterwards asserted its independence. Mégara planted many colonies, of which the most important were Selymbria, Chalcédon, and Byzantium, on the Bosphorus and the Propontis, and Hyblæan Megara in Sicily. The history of this little state is inseparable from the general history of Greece.

MEGATHERIUM (Gr. *μεγας*, 'great,' and *θειον*, 'a bone'), the *Megatherioids* of Owen, who includes under this family the following genera of extinct Edentata:—*Megatherium*, *Megalonyx*, *Glossotherium*, *Mylodon*, *Scelidotherium*, and others.

It is in South America only that the remains of these

massive animals have been found; and we may add, it is only within the present century that the number of relics collected by enterprising travellers has enabled the philosophic anatomist to correct some errors, and to throw a new light upon the former history of the class Edentata. For a long time, the museum of Madrid afforded the only relics of the *Megatherium* in Europe; they were found on the banks of the river Luxan, south-west of Buenos Ayres, and sent over in 1789; but the skeleton they compose is deficient in several of its parts. Nevertheless Cuvier was enabled to determine with wonderful accuracy the affinities of this extinct giant of the Edentata.

The acquisition, some years ago, of a great portion of the bones of one of these animals by the Royal College of Surgeons, London, tended to supply the deficiency of our information on many points which still remained obscure. These remains were discovered in the bed of the river Salado, which flows through the pampas a short distance south from the city of Buenos Ayres, during an unusually dry period of three years, and presented by Don Hilario Soza, the owner of the property on which they were found, to Sir Woodbine Parish, who liberally transmitted them to the college, with other remains collected in the same locality. Among these remains were portions of an immense armadillo-like shell or crust, of osseous structure, consisting of rosettes united by sutures.

With such materials before him, Mr. Clift applied himself to the drawing up of a paper, entitled 'Some account of the remains of the *Megatherium* sent to England from Buenos Ayres by Woodbine Parish, jun., Esq., F.G.S., F.R.S., by William Clift, Esq., F.G.S., F.R.S.'

It was natural for Mr. Clift to suppose that the portions of dense tessellated armour found with the relics in question once formed the covering of this ponderous beast, and in this opinion Dr. Buckland and other scientific men coincided. It has, however, been since demonstrated by Professor Owen that this tessellated armour does not belong to the *Megatherium*, but to a large armadillo-like animal, to which the professor has assigned the name of *Glyptodon*, and whose hind feet, like the fore feet, appear to be so modified as to form the bases of columnar limbs destined to support an enormous incumbent weight. Moreover, from a rigorous examination of the details of the skeleton of the *Megatherium*, he proves the incompatibility of such a shield with its osseous structure.

The *Megatherium* must have been a most extraordinary animal. With the head and shoulders of a sloth, it combined in its legs and feet an admixture of the characters of the ant-eater and the armadillo. Its haunches were more than 5 feet wide, and its body 14 feet long and more than 8 feet high; its tail was massive and broad; its feet were a yard in length, and terminated by most gigantic claws. Heavily constructed, its movements were slow; it could neither run nor leap; but it could tear up the earth from the roots of trees, and then raised up on a tripod, composed of the hinder limbs and tail, wrestle with the trees of the forest, tear them down, and thus gain access to their leaves and tender shoots or branches.

The following comparative admeasurements, furnished by Mr. Clift, are in Sir Woodbine Parish's work, entitled 'Buenos Ayres and the Provinces of the Rio de la Plata:—

	Elephant. ft. in.	Megatherium. ft. in.
Expansion of the ossa ilia, . . .	3 8	5 1
Breadth of the largest caudal vertebra, ...	0 7	1 9
Circumference of middle of femur, ...	1 0	2 2
Length of the os calcis, . . .	0 7½	1 5

'The collection of fossils,' says Professor Owen, 'brought to England from South America by Mr. Darwin, has enabled me to add the following facts to the history of the Megatherium. Its teeth, for example, do not differ in number from those of the sloths, there being five on each side of the upper jaw. Microscopic examination having demonstrated a marked difference in the intimate structure of the teeth of the sloths and armadillos, I have ascertained by this mode of investigation that the teeth of the Megatherium have the same texture and composition as those of the sloth. And if, from identity of dental structure in two different animals we may predicate a similarity in their food, a glance at the bony framework of the Megatherium is sufficient to show that it must have resorted to other means of obtaining its leafy provender than that of climbing for it, whereby the necessity of inferring a proportionate magnitude of the trees which nourished the Megatherium is obviated.' (See Plate.)

In Professor Owen's admirable memoir on the *Mylodon* and other extinct gravigrade Edentata, the mode in which these animals struggled with the trees, and the peculiarities of their muscular forces, as well as of the nerves which supply the muscles, are depicted with graphic eloquence.

The Megatherium appears to have been furnished with a small proboscis as an adjunct to the tongue in stripping off the twigs and small branches of the prostrate trees; and as in the *Mylodon*, the two tables of the skull are widely separated by extensive cells.

With respect to the *Megalonyx*, it was obviously related to the Megatherium, but was of inferior size, not exceeding an ox in stature, though more solidly and heavily built. Its relics are apparently more rare than those of the Megatherium—they have been found in the cave of Lassa Grande, in Brazil, and also in the Big-bone Cave of Tennessee, U.S.

The genus *Gossotherium* (Owen) is founded on a fragment of a cranium in Mr. Darwin's collection, discovered in the bed of the same river in Banda Oriental in which the skull of the *Toxodon* was found. The fragment includes the parietes of the left side of the cerebral cavity, the corresponding nervous and vascular foramina, the left occipital condyle, a portion of the left zygomatic process, and the left articular surface of the lower jaw. No tooth nor locomotive extremity was present to lend its aid; and yet, upon the slender materials above stated, Professor Owen has been enabled to give generic distinction to the animal to which they belonged, and to fix its place in the animal series satisfactorily.

Allied to *Megatherium* is the genus *Mylodon* (Owen), of which three distinct species have been

described, viz. *M. Darwinii*, *M. Harlani*, and *M. robustus*, which far exceeds the others in size. An almost perfect skeleton of this last animal is preserved in the museum of the Royal College of Surgeons. Like the Megatherium it was formed for tearing down the trees of the forest, after having partially laid bare their roots. In stature it equalled a rhinoceros, but with bones infinitely more massive, muscles infinitely more voluminous and powerful. Its thick muscular tail conjoined to form with the hind limbs a firm tripod, which sustained the animal upright while, exerting its enormous strength, it swayed the tree to and fro, and at last pulled it down.

The gigantic and astonishing skeleton in question was discovered, as we are informed by Professor Owen, 'in the year 1841, by M. Pedro de Angelis, seven leagues north of the city of Buenos Ayres, in the fluviatile deposits constituting the extensive plain intersected by the great Rio Plata and its tributaries, and which has been raised during a recent geological epoch above the level of the sea.

'In this formation, and most probably anterior to its elevation, the animal must have been buried entire, for the parts of the skeleton were found little disturbed, and the very few bones that are wanting are such as would be likely to escape the search of the most diligent collector.

'About the same time, and near the same place, a tessellated osseous carapace of some large quadruped like an armadillo was exhumed, and information of this discovery having been communicated to the Royal College of Surgeons by Sir Woodbine Parish, late Her Majesty's Chargé d'Affaires at Buenos Ayres, both the carapace and the above-mentioned skeleton were purchased by the college.' This carapace is the shell of *Glyptodon clavipes* (Owen).

The *Scelidotherium* (Owen) was a large edentate quadruped, allied to *Megatherium* and *Orycteropus*. [AARD-VARK.]

The remains on which this genus is founded include the cranium, which is nearly entire, with the teeth, and part of the os hyoides; the seven vertical vertebrae, eight dorsal and five sacral vertebrae, both scapulae, the left humerus, radius and ulna, two carpal bones, and an ungual phalanx; the two femora, the proximal extremities of the left tibia and fibula, and the left astragalus.

These bones were discovered by Mr. Darwin at Punta Alta in Northern Patagonia, and in the same bed of partly consolidated gravel as that wherein the lower jaws of *Toxodon* and *Mylodon* were imbedded. All the parts were discovered in their natural relative position, indicating, as Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been but little disturbed. This beach is covered at spring tides, and many portions of the skeleton were incrustated with *Fuustrea*: small marine shells were lodged within the crevices of the bones.

Sufficient of the cranium remains to indicate that its general form resembled an elongated, slender, subcompressed cone, beginning behind by a flattened vertical base which expanded slightly to the zygomatic region, and thence contracted gradually in all its dimensions to the anterior extremity.

MEGRIM (Fr. *migraine*, from Gr. *ἡμικρανία*), a severe intermittent pain affecting one side of the head.

MEHEMET ALI, Viceroy of Egypt, was born at Cavalla, in Roumelia, in 1769. He was one of the most remarkable men of the times in which he lived. In early life he was a humble tobaccoconist; but his tastes being more suited for a military career, he entered the army as a volunteer, and gained the favourable opinion of the governor of Cavalla by his success in suppressing the pirates of that island. In 1799 he headed a contingent of 300 Candian soldiers in an expedition to Egypt, where he co-operated with the British forces for the expulsion of the French. It was here that he laid the foundation of his military renown and his vast political ascendancy. In a short time he was enabled to seize the pachalic of Egypt, through the agency of the Mamelukes. In 1806 he was made Pacha of Cairo; and in the following year received the pachalic of Alexandria, as a reward for his services to the sultan of Turkey. But no sooner had he consolidated his authority, than he turned against his old confederates, the Mamelukes, 470 of whom were massacred in the citadel of Cairo, and 1200 in the country. After their destruction, Mehemet Ali had no difficulty in making himself master of Upper Egypt. He afterwards undertook the reduction of the Wahabies, and assisted the sultan, though unsuccessfully, in his attempts to subjugate the Greeks. About this time he reorganized his army on something like European principles, built a fleet, and erected fortresses and arsenals. His ambition, however, received a severe check by the destruction of his navy at Navarino in 1827. In 1830 he entered into a contest with the sultan for the possession of Syria, when the superiority of his disciplined army became manifest, and in 1832 he succeeded in carrying his victorious arms within a few days' march of Constantinople; but the contest was settled by the intervention of the European powers, though Syria was ceded to him on condition that he should acknowledge himself a vassal of the sultan. For seven years subsequently Mehemet Ali retained the uncontrolled dominion of Egypt, and continued to direct his energetic mind to the internal improvements of his newly-acquired kingdom. He found Egypt a sterile waste, and he left it a powerful country, enriched with commerce, and strengthened by ships and armies. He died at at Cairo on the 2nd August, 1849.

MEININGEN. [SAXE-MEININGEN.]

MEISSEN, a town in the kingdom of Saxony, situated about 16 miles N.W. from Dresden, on the left bank of the Elbe, over which there is a covered bridge, has numerous suburbs, and 10,500 inhabitants. The cathedral; the palace of Albrechtsburg, formerly the residence of the margraves of Meissen, in 1710 converted into a porcelain factory, employing 600 hands, who produce what is known as 'Dresden china'; and the former convent of St. Afa—are the chief buildings. The cathedral is the finest Gothic structure in Germany, and contains many monuments of very early times. There are also manufactures of hosiery, leather, colours, and camel's hair brushes, but the principal source of profit is the making of wine. The district was visited by a terrific flood in December, 1863.

MEISSENHEIM. [HESSE-HOMBURG.]

MEJERDA, or BA'GRADAS, is a river of Africa, which rises in the Great Atlas, and after a N.E.

course of 200 miles through Algeria and Tunis, enters the Mediterranean (Bay of Tunis), 24 miles N. of the city of that name. The Mejerda is not navigated, but it is used to irrigate the fields in the lower part of its course, where it flows through a wide and fertile valley. It overflows in the spring, and fertilizes the adjacent country.

MEKRAN. [PERSIA.]

MELADERMA (Gr. *μῆλας*, 'black,' and *δέρμα*, 'skin'), a genus of fishes of the family Zeidae, so called from the blackness of their skin.

The Greek word *melas*, or *mela*, 'black', is very frequently used as a prefix to compound words in zoology, mineralogy, and other departments of science; as *Melafusus*, 'black-spindled,' a genus of Mollusca, of the family Turbidæ, in which the shell is sub-fusiform, and the base contracted; *Melampus*, 'black-footed,' and *Melancantha*, 'black-spined,' each of them a genus of Mollusca, of the family Turbidæ; *Melania*, a genus of univalve fresh-water Mollusca, the shell of which has an epidermis, with a pointed spire; *Melaniame*, the Black Snails; *Melanite*, an opaque and velvet-black species of garnet, the constituents of which are silica, lime, oxide of iron, alumina, and oxide of manganese; *Melanella*, a genus of Mollusca, belonging to the Melaniana; *Melanochoite*, 'dark-coloured,' a mineral found in Siberia, of a deep orange-red or hyacinthine colour, with a resinous lustre, and nearly opaque, the specific gravity of which is 5.75; *Melantomia*, a genus of Mollusca, of the family Turbidæ, in which the shell is fusiform, and longitudinally ribbed; *Melasoma*, 'black-bodied,' a genus of birds belonging to the Dongo Shrikes, and of the family Laniadæ; also the name of a family of heteromorous Coleoptera, consisting of dark ash-coloured beetles, which are mostly apterous.

MELAIN, the colouring matter of the ink of the Cuttle-fish. It constitutes about three-fourths of the ink when dried by evaporation.

MELALEUCA, a genus of plants belonging to the natural order *Myrtaceæ*.

M. Cajuputi is the species which yields the chief part of the oil brought to Europe under the name of Cajeput oil. It is a native of Amboyna and other East India islands. The oil is obtained by distillation of the leaves and branches, which are collected the night before they are subjected to this process. It is very limpid, pellucid, and of a light or yellowish green colour. In its action on the human frame Cajeput oil participates in the properties of other volatile oils, and is rubefacient externally; stimulant, and antispasmodic, when taken internally.

M. leucodendron, the White Tree, or Cajeput Tree, is a native of the East India islands, and was at one time supposed to yield the oil of commerce. Roxburgh asserts that it possesses little or no fragrance in its leaves, and that it is seldom or never used for the distillation of the oil which is used in the European markets.

Upwards of thirty species of *Melaleuca* have been described, the majority of which are natives of New Holland. Many of them are fine plants with beautiful blossoms, and very desirable for the conservatory or greenhouse.

MELAMPYRUM, a genus of plants belonging to the natural order *Scrophulariaceæ*. Eight species

are enumerated by Don, six of which are European and two American. Of the six European, four are natives of Great Britain. *M. cristatum*, Crested Cow-wheat, is a native of woods and thickets in the eastern counties of England, and also generally of the north and middle of Europe. *M. arvense*, Purple Cow-wheat, is a native in fields of wheat in the south of Europe, and is found in Great Britain, though only rarely, in Norfolk and the Isle of Wight.

MELANCHTHON, PHILIP (or MELANTHON, as he himself was most accustomed to write the name), was born in the small town of Bretten, in the Palatinate of the Rhine, or Lower Palatinate, as it used to be called, the dominion of the elector palatine, on the 16th February, 1497. His father was George Schwartzerde, or Schwarzerdt. On the death of his father he was sent to the College of Pfortzheim, where he lodged in the house of a sister of the celebrated Greek scholar John Reuchlin, who was his relation; and it was from Reuchlin, who had translated his own Teutonic surname into the Greek formation Capnio, on the supposition of its connection with Rauch ('smoke'), that the young Schwartzerde (a compound, meaning, in English, 'black earth'), received the more melodious Grecized appellation of Melanchthon, by which alone he is now known.

After spending about two years at Pfortzheim, Melanchthon went to the University of Heidelberg, and thence to Tübingen, where he remained till, on the recommendation of his friend Reuchlin, he was in 1518 appointed, by the elector Frederic of Saxony, professor of Greek in the newly established university of Wittenberg. This situation he held as long as he lived. At Wittenberg Melanchthon became acquainted with Luther, then occupying the chair of theology in that university; and his name is immortally associated with that of Martin Luther in the history of the Reformation. The remainder of his biography is chiefly the detail of his various labours in the promotion of the doctrines of Protestantism. In 1519 he accompanied Luther to Leipzig, to hold a disputation on the divine origin of the papal authority, with Eckius, one of the ablest of the Catholic champions of that age. For some years after this he was actively employed, not only in writing books in defence of the reformed doctrines, but in founding schools and colleges, in visiting churches, and in other services of the same kind, undertaken at the command of the elector.

In 1530 he was appointed by the general body of the reformers to draw up what was intended to be the conciliatory confession, or exposition of their opinions, which was presented to the emperor at the Diet held at Augsburg in March that year. After the death of Luther, Melanchthon became involved in a bitter controversy with the more ardent spirits of his party, in consequence of his aversion to extreme courses, and especially the timidity he was accused of showing in his approval of the system of compromise between the two religions issued by the emperor in 1548, and afterwards known by the name of the Interim, an approval in which he stood nearly alone among the distinguished men of both sides. He died at Wittenberg, 19th April, 1560, leaving two sons and two daughters by his wife, the daughter of a burgo-master of that town, whom he had married in 1520. His death was in unison with the peaceful

tenor of his life. After having received some cordials, he was asked if he would have anything else; he replied, *Aliud nihil nisi Cælum*, 'Nothing else but Heaven.' His numerous works, consisting of theological treatises, commentaries on several of the Greek and Latin classics, Latin poems, and some historical and philosophical writings, were published in a collected form in five vols. folio, at Basle, in 1544, and in four vols. folio, at Wittenberg, in 1564, again in 1580, and again in 1601. A new and comprehensive German edition has recently been issued. His life was written by Wohllaart in 1860.

MELANORRHÆA, a genus of the natural family of *Terebinthaceæ*, tribe *Anacardiaceæ*. *Melanorrhæa usitata* is familiarly known as the Birmanese Varnish Tree. The tribe to which it belongs abounds in plants yielding a blackish, acrid, and resinous juice, used for varnishing and similar purposes, as the Marking Nut and the Japan Varnish Tree.

The Varnish Tree, or Theetsee, forms a large tree, with the habit of *Semecarpus*, and abounds in every part with a viscid ferruginous juice, which quickly becomes black by the contact of the atmosphere. The varnish is collected by inserting pointed joints of bamboo, which are closed at the other end, into wounds made in the trunk and principal boughs. The joints of bamboo are removed after from twenty-four to forty-eight hours, and their contents, which rarely exceed a quarter of an ounce, emptied into a basket made of bamboo and rattan previously varnished over. In Burmah, almost every article of household furniture intended to contain either solid or liquid food is lacquered by means of this varnish. It is also much employed in the process of gilding: the surface, being first besmeared with this varnish, has then the gold leaf immediately applied to it. The beautiful Pali writing of the Birmanese on ivory, palm-leaves, or metal, is entirely done with this varnish in its native and pure state.

MELANOSPERMÆE (Gr. 'black seed'), an important class of the *Algæ*, consisting of olive-green coloured plants, and including the following orders:—*Fucaceæ*, *Sporoclinaceæ*, *Dictyotaceæ*, *Chordoriaceæ*, and *Ectocarpaceæ*.

MELANTHACEÆ, are a natural order of poisonous Endogens, very nearly related to *Liliaceæ*. The most important species of the order are medical plants, viz., *Colchicum*, or Meadow Saffron, which is employed as a remedy for gout and rheumatism; *Veratrum album*, whose acrid poisonous rhizoma is White Hellebore; *Asagrua officinalis* and *Veratrum sabadilla*, both of which furnish the seeds called Sabadilla, now largely consumed in the preparation of Veratria; and a few North American plants of less moment.

MELASMA, a disease incident to old age, in which a black spot appears upon the skin, and develops into a painful ulcer.

MELASSES or MOLASSES. [MOLASSES.]

MELASTOMA, a genus of plants, the type of the natural order *Melastomaceæ*. The species of this genus are shrubs. The flowers are large, white, rose-coloured, or purple. *M. Malabathricum*, Malabar Melastoma, is a native of the East Indies, and frequent in the Indian Archipelago. The leaves of this plant are employed by the natives as a remedy in diarrhœa, dysentery, and mucous discharges.

MELASTOMACEÆ, an extensive natural order of polypetalous Exogens, nearly related to *Myrtaceæ*. The species are extremely numerous in tropical countries, where they usually form bushes or small trees, and are scarcely known beyond the tropics, with the exception of some *Rhexias*, which straggle into North America. In Europe the order is unknown, unless in gardens, where many species are cultivated for the sake of their gay purple or white flowers.

MELBOURNE, the capital of the colony of Victoria, Australia, is situated in lat. 37° 48' S., long. 144° 57' E., on the Yarra-Yarra river, 8 miles from its mouth, at the head of Port Philip. The river has a bar at its mouth, and a second about half-way to the town, so that the larger ships have to anchor at Hobson's Bay, near the entrance of the harbour. Formerly their cargoes were all discharged by river lighters; but there is now a railway direct from Melbourne, projecting into deep water on the E., and a second line from the W. side of the harbour. The city is commercially the most important in the Southern Hemisphere. The town was officially founded and named from the then English prime minister in 1837, but the site had been selected and occupied two years previously. Population (1851), 23,143; (1861), 108,242, including contiguous suburbs: it was estimated at 150,000 in 1865. The commerce of Melbourne has increased to a very great extent since the date of the gold discoveries in 1851, and now represents about nine-tenths of the entire trade of the colony. The exports and imports are each valued at from 12,000,000*l.* to 15,000,000*l.* annually, about two-thirds of the exports being gold.

The town is chiefly laid out on the right bank of the Yarra, which is crossed by a stone bridge. Its streets are straight, regular, and wide, and are paved and macadamized. Collins Street, the principal thoroughfare, is one-third wider than the famous Broadway at New York. It has been a municipality since 1843, with a 10*l.* franchise; the mayor and aldermen being elected by the council. South Melbourne and several other wards have established separate municipalities. The water supply is obtained from the head of the Plenty river, and it is conveyed a distance of 18 miles in iron pipes. The town was first lighted with gas in 1856, and now has steam, railway, and telegraph communication with the chief towns of Australia. A submarine cable to Tasmania was laid in 1859.

Melbourne has a public library, several handsome churches and chapels, mechanics' institute, hospital, benevolent and orphan asylums, Scotch college, an endowed university, with an annual income of 10,000*l.*, and a parliament house, finished in 1864, at a cost of 400,000*l.*; a custom-house, post-office in the Italian style, several banks and theatres, and Cremorne gardens; barracks, and a botanic garden. There is now a great extent of wharf accommodation, and a patent slip at Williamstown. The chief industrial establishments of Melbourne are flour-mills, tallow-boiling works, and brass and iron foundries. There are three daily and several weekly newspapers.

The shortest sea voyage to Liverpool (*via* Cape Horn), is 12,820 miles; average sailing voyage, eighty-five days; to Calcutta, 5230 miles; sailing voyage, forty-five days. The mean temperature of the year at Melbourne is 57°; in summer, 66°; in

winter, 49° Fahr. St. Kilda and Brighton are marine appendages of the capital, on the shore of Port Philip, visited for sea air, bathing, and occasional recreation.

MELBOURNE, WILLIAM LAMB, VISCOUNT, was born March 15, 1779. His father, Peniston Lamb, of Brocket Hall, Hertfordshire, was raised to the peerage of Ireland in 1770, by the title of Lord Melbourne, baron of Kilmore, created an Irish viscount in 1781, and finally elevated to the peerage of the United Kingdom in 1815, as Baron Melbourne, in the county of Derby.

The subject of this notice entered as a student at Lincoln's Inn, July 21, 1797, and was called to the bar November 23, 1804. In 1805 he married Lady Caroline Ponsonby (daughter of the earl of Bessborough), from whom he was afterwards separated. As Lady Caroline Lamb, she was well known for her literary talents. In the same year the Hon. William Lamb entered Parliament as member for Leominster, and joined the Whig party, then headed by Fox.

During the long and chequered administration of Perceval and Liverpool, Mr. Lamb continued in a course of moderate opposition, occasionally supporting the measures of government. He sat in Parliament for several different places; during the latter part of the time for the county of Hertford. On the accession of Canning to office (1827) he was made secretary for Ireland. Under Lord Goderich's public administration Mr. Lamb retained his office, and continued to serve with that of the duke of Wellington, until the resignation of Mr. Huskisson, in 1828, induced him also to resign. The death of his father, a few weeks afterwards, occasioned his removal to the House of Lords.

The prominent portion of Lord Melbourne's career commenced in 1830 with the Grey administration, when his lordship was appointed secretary of state for the home department. In this position he displayed a power of mind and a firmness of character which surprised the public, and acquired a reputation for political sagacity which marked him out for higher offices in the state. He was recognized as the leader of the Whig party in the upper house, and on Earl Grey's resignation of the premiership in July, 1834, was appointed his successor. He accordingly constructed an administration, but failed to secure the confidence of the sovereign.

In the following November the death of Earl Spencer, father of the then Lord Althorp, caused the removal of his lordship to the House of Peers, and he resigned the office of chancellor of the exchequer. The king intimated to Lord Melbourne that he considered the retirement of Lord Althorp as equivalent to a breaking up of the ministry. There was, therefore, but one course to pursue, and the duke of Wellington and Sir Robert Peel immediately came into power.

On the meeting of the new Parliament in February, 1835, Lord Melbourne in the upper house, moved an amendment to the address, in which he made their lordships express a hope that his Majesty's councils would be conducted in a spirit of well considered reform; and to lament the dissolution of the late Parliament, as having interrupted and endangered the vigorous prosecution of measures to which the wishes of the people were directed. The proposed

amendment, however, was eventually withdrawn. After a few months of adverse votes, the Irish tithe question drove the ministry from office, and Lord Melbourne was reinstated as first lord of the Treasury. The new premier lost no time in forming a decidedly liberal cabinet; and from April, 1835, to September, 1841, the Whig government effected some very beneficial reforms.

Not the least service which Lord Melbourne at this time rendered to his country was the political education of Queen Victoria, whom he trained to perform the responsible duties of her high position with a wisdom and an impartiality that won the 'golden opinions' of men of all parties. In 1841, having no longer a majority in the Commons, the premier retired from office; in the following year he was seized with a partial attack of paralysis, the result of over-exertion of the brain; but he recovered to a great extent, and for several years enjoyed a dignified and lettered ease. He died at his family seat, Broomfield Hall, 24th of November, 1848, in the seventieth year of his age. Lord Melbourne possessed a cultivated and lucid intellect, a cool, courageous temperament, a mind free from prejudice, a large share of common sense, and a highly honourable, frank, and chivalrous disposition. His grace of manner fitted him to shine in social circles, while his wide and liberal scholarship endeared him to men of letters.

MELCOMBE REGIS. [DORSETSHIRE.]

MELDRUM, OLD. [ABERDEENSHIRE.]

MELFI. [BASILICATA.]

MELIA, a genus of plants belonging to the natural family *Meliaceae*, to which it has given its name. The species are few, and chiefly Indian; one is naturalized in the south of Europe, and one is found in North America. *Melia azadirachta* is bitter, and considered a valuable tonic. *Melia azedarach*, the Pride of India, or Common Bread-tree, is a native of China and the north of India. It is much cultivated in the southern United States of North America. Its flowers resemble those of the lilac, and are very fragrant.

MELIACEÆ, a natural order of polypetalous Exogens, consisting of trees or shrubs, inhabiting all countries within the tropics, but very rare in colder climates; the *Melia azedarach*, or Bread-tree, a Syrian plant, now naturalized in the south of Europe, forming the principal exception. In general the species are bitter and astringent, but they are sometimes dangerously poisonous, acting violently as emetics and purgatives. The Cape Ash (*Esebergia Copensis*) and the Neim or Margosa Tree (*Azadirachta Indica*), belong to this order.

MELICA, a genus of plants belonging to the family of Grasses. There are two British species of this genus, *M. uniflora* and *M. nutans*, which are found in damp shady woods. *M. alissima*, a Liberian species, grows to the height of 3 or 4 feet.

MELILOTUS, a genus of plants belonging to the natural order *Leguminosæ*. None of the species are ornamental plants, and they are seldom cultivated except in botanical collections. Two species are found native in Great Britain. *M. officinalis* has long roots, and a branching stem two or three feet high. It grows wild in woods, hedges, and neglected fields. When cultivated in a dry soil and made into

hay, it has a powerful aromatic smell, and mixed in a small proportion with meadow-hay, gives it an agreeable flavour. *M. vulgaris* is a rare plant, and is found in sandy and gravelly places near the sea.

MELIPHA/GIDÆ ('Honey-eaters'), a family of Tenuirostral birds, described by Vigors, as 'that extraordinary group, the existence of the much more considerable portion of which was unknown to the Swedish naturalist, for which there was consequently no place in his system, occupies a prominent and important situation in the ornithological department of nature. Chiefly confined to Australasia, where they abound in every variety of form, and in an apparently inexhaustible multitude of species, they find a sufficient and never-failing support in the luxuriant vegetation of that country. There the fields are never without blossom, and some different species of plants, particularly the species of *Eucalyptus*, afford a constant succession of that food which is suited to the tabular and brush-like structure of the tongue in these birds. Their numbers and variety seem in consequence to be almost unlimited.'

Mr. Gould, in his splendid work on the 'Birds of Australia,' figures and describes fifty-eight species, exclusive of some few which are found in New Guinea and some of the Polynesian Islands. Mr. Gould admits the following genera: *Meliphaga*, *Glyciphila*, *Ptilotis*, *Plectorhyncha*, *Xanthomyza*, *Melicophila*, *Entomophila*, *Acanthogenys*, *Anthochara*, *Tropidorhynchus*, *Acanthorhynchus*, *Myzomela*, *Entomyza*, *Melithreptus*, and *Myzantha*. [TENUIROSTRES.]

MELISSA, a genus of plants belonging to the natural order *Labiata* or *Lamiaceæ*. In its recent state it has a rough aromatic taste and a pleasant lemon-like smell. It is frequently used in infusion, under the name of Balm Tea, as a common drink in fevers. It was one of the medicines recommended by Paracelsus, but at the present day it is only used as a popular remedy.

MELKSHAM. [WILTS.]

MELLITE (Gr. *μῆλι*, 'honey'), a mineral of a honey colour, found in Thuringia, and generally known as Honey-stone. It occurs nodular, granular, and crystallized. The crystals are translucent, and of a honey yellow colour. It is something like amber, but distinguished from it by its weak electricity and double refraction. Its specific gravity is 1.60, and its constituents are mellitic acid, alumina, and water.

Mellitic Acid has a sour bitter taste, is very soluble in water, and also in alcohol, and it crystallizes in colourless needle-form crystals. It consists of O⁴ H¹ C⁴.

MELLON, a compound which, like cyanogen, consisting of the same elements in different proportions, is considered as a compound radical. Mellon has a yellow colour; is insoluble in water, alcohol, dilute hydrochloric or sulphuric acids. By particular treatment there may be produced from it *hydromellonic acid*, a dirty white gelatinous substance, which becomes yellow on drying. Mellon consists of N⁴ C⁶, and this, with H¹, gives hydromellonic acid.

MELODRAMA (Gr. *melos*, 'a song,' and *drama*), a kind of dramatic performance in which music or singing is intermixed. It is, strictly speaking, a musical drama; but in France and England the name

has been extended to sensational plays of a serious nature, which are unworthy of the name of tragedy. Of these 'The Green Bushes' and 'The Colleen Bawn' may be named as favourable specimens. Operas were at first called 'melodramas,' and the word still retains its proper signification in Germany.

MELODY (Gr. *μελωδία*), a musical term for the disposition of sounds for a single voice or instrument in regular order, and in such a relation as to produce an agreeable effect upon the ear. The melody of a piece is sometimes called its air or motive.

MELÖE. The Linnæan genus *Meloe* included the several genera of heteromorous Coleoptera now forming the family *Cantharidae*, interesting on account of its including those beetles known under the name of 'blistering flies,' and employed in medicine. The term *meloe* is now restricted to the apterous *Cantharidae*, and the species are all beetles with large and swollen bodies, and short oval elytra, lapping over each other at the base of the suture. They are sluggish creatures, and feed on various plants, especially the species of *ranunculus*. When alarmed they emit from the articulations of their legs an oily yellow or reddish liquid.

MELOLONTIIDÆ, a family of coleopterous insects of the section *Lamellicornes*, and subsection *Phyllophagi*. This family, of which the common Cockchafer (*Melolontha vulgaris*) is an example, consists of three genera, *Melolontha*, *Rhizotrogus*, and *Serica*, and some sub-genera of minor importance. Species of this family are found in all parts of the world. In the genus *Melolontha* the antennæ are ten-jointed; the terminal five, six, or seven joints are lamellated, and form a large fan-like appendage; in the females the lamellated joints form a smaller club than in the males, owing to their smaller size, and also to a decrease in their number, there being six, five, or four; the labrum is deeply cleft on its lower margin; the claws of the tarsi are furnished with a spine on the under side near the base; the abdomen in the male sex often terminates in a horny pointed process.

Two species of this genus are found in England, the common Cockchafer (*Melolontha vulgaris*, Fab.), and the *Melolontha fulva*, a large species nearly an inch and a half in length, and which is of a blackish-brown colour, with irregular white markings. This beautiful insect is common in some parts of the Continent, but rare in this country, and has been found chiefly in the neighbourhood of Deal.

MELON (the *Cucumis melo* of botanists) is an herbaceous, succulent, climbing or trailing annual, cultivated for its fruit in hot eastern countries from time immemorial, but first introduced into England about 1570. Its original English name was *Musk Melon*. In regions where most cooling vegetables disappear on the approach of great summer heat and drought, the melon, together with the water-melon, become essential substitutes. The antiquity of the cultivation of melons being so remote, and their dispersion over large portions of Asia and Africa so extensive, their indigenous locality cannot be traced at the present day.

If the roots be favourably situated, so far as moisture is concerned, the melon will bear a tropical heat; and, generally speaking, it will not succeed

perfectly in the open air beyond the forty-third parallel of latitude. Its range of atmospheric temperature may be estimated at between 70° and 80°.

Light is so essential, that unless the plants are kept near the glass, no tolerable degree of flavour will be acquired. As much of the direct rays of the sun should be admitted as the plants will endure, more especially when the fruit is approaching maturity. A free admission of the air is also to be recommended, so far as is consistent with the maintenance of a high temperature. The regulation of moisture in the artificial atmosphere in which melons are grown under an English sky is, of all others, the greatest difficulty. Covering the soil with slates or tiles, or with clean gravel, has been successfully resorted to as a mode of preventing the air in the frame from being at all times saturated with moisture exhaled from the soil.

MELÖS. [MILÖ.]

MELPOMENE. [MUSES.]

MELROSE. [ROXBURGHSHIRE.]

MELTON MOWBRAY. [LEICESTERSHIRE.]

MELUN, the ancient *Melodunum*, capital of the French department of Seine-et-Marne, is situated on the Troyes Railway, 26 miles S.S.E. of Paris, and has 11,170 inhabitants, who manufacture woollen stuffs, printed calicoes, leather, bricks, tiles, and cement. This town was besieged and taken by the English in 1419. It is built on an island on both banks of the river Seine, the largest quarter standing on a slope on the right bank, and the three parts being united by two bridges. It is on the whole a well-built town; the banks of the river are lined with quays, and several new promenades have been formed. The church of St. Aspais, on the right bank of the Seine; the church of Notre-Dame, on the island; the monastery of St. Père, the Carmelite convent, now converted into a court-house, a prison, a guard-house, and theatre; the old monastery of La-Maison-des-Frères, and the central prison—are the chief structures in the town. Melun has a good trade in corn, flour, wool, and cattle.

MELVILLE, ANDREW, was born August 1, 1545. He was the youngest of nine sons, children of Richard Melville, of Baldory, near Montrose, in Scotland. At the age of fourteen, he was removed from the grammar-school of Montrose to St. Mary's College, in the University of St. Andrews. This place he left in 1564, with considerable reputation for his proficiency in philosophy and the languages, and repaired to the Continent. His philosophical acquirements obtained for him successively the place of regent in the college of St. Marceon, France, and the chair of humanity in the academy of Geneva, which place he reached on foot, and in a state of destitution. After a residence abroad of two years, he returned to England, and published his poetical paraphrase of the 'Song of Moses,' and a chapter of the Book of Job, in Latin.

Shortly after Melville's arrival in Edinburgh, in July, 1574, he was appointed by the General Assembly principal of Glasgow College. He introduced improvements in teaching and discipline of great importance, and infused an uncommon ardour into his pupils. It was not, however, as a mere scholar or academician that he was distinguished. He was active in the church courts and in the conferences

held with the Parliament and privy council on the then much agitated subject of church government. To him is generally ascribed the overthrow of episcopacy at that time and the establishment of presbyterianism, and he commonly went afterwards by the name of Episcopomastix, or the Scourge of bishops.

In the reformation and improvement of the universities Melville also took a leading part. At the end of the year 1580 he was translated from Glasgow to be principal of St. Mary's College in the University of St. Andrews, where he distinguished himself by his usual zeal and ability. In his scholastic labours he did not lose sight of the condition of the church, and being called on to open an extraordinary meeting of the General Assembly in 1582, he inveighed in strong terms against the arbitrary and oppressive measures of the court. For this he was cited before the privy council for high treason. The charge was not proved; but the privy council found him guilty of behaving irreverently before them, and sentenced him to imprisonment. Fearing his death was ultimately intended, he was urged by his friends to make his escape, and accordingly leaving Edinburgh he went to London, where he remained till about the end of 1585, when Arran having been driven from court, he returned to Scotland, and resumed his former station at St. Andrews. In May, 1606, after the king had ascended the English throne, Melville was desired by James to repair to London that he might consult him on ecclesiastical matters. Melville had various interviews with the king; but having written a Latin epigram, in which he expressed his feelings of indignation at some rites of the English church on the festival of St. Michael, he was summoned before the privy council, found guilty of *scandalum magnatum*, and imprisoned in various places until February 1611, a period of about four years, when, at the solicitation of the duke of Bouillon, who required his services as a professor in the University of Sedan, he was permitted to depart the kingdom. In 1620 his health, which had previously been slightly impaired, grew worse, and in the course of the year 1622 he died at Sedan. (*Life of Andrew Melville*, by Dr. McCrie.

MELVILLE ISLAND is situated on the northern coast of Australia, between 11° and 12° S. lat., and 130° 20' and 131° 34' E. long. Area, 1800 square miles. It is separated from Bathurst Island, which lies east of it, by Apsley Strait, 46 miles long by 3 broad. East of the island lies Coburg Peninsula, where a British colony was established some years ago [ESSINGTON, PORT], and between them lies Dundas Strait, 15 miles wide. The eastern end of Melville Island is only 15 miles from the mainland of Australia. The northern line of coast, and also the western, along Apsley Strait, where alligators abound, are low, intersected by swamps, and covered by impenetrable woods of mangroves. The interior is more elevated, and has an undulating surface. The island is well clothed with wood, and presents one mass of thick green foliage. Water is easily obtained by sinking wells. The natural vegetation is luxuriant, but the soil is not generally good for farming. There are several species of eucalyptus. The zoology of the island is very varied. The native inhabitants are of the Australian stock, but somewhat more intelligent.

ME'LYRIS, a genus of coleopterous insects established by Fabricius, for the reception of certain species of the Linnæan genera *Cantharis* and *Dermestes*. It belongs to the family *Serricornes* of Latreille, and constitutes the type of the family *Melyridæ*. The *Melyridæ* are active and often gaily coloured little beetles, usually found on flowers, which they frequent for the purpose of preying on other insects. The larvæ, as well as the perfect insects, are carnivorous. The family is intermediate between the *Telephoridæ* and *Cleridæ*.

MEMBRANE, a name given to different thin organs, representing a species of supple, more or less elastic webs, varying in their structure and vital properties, and intended in general to absorb or secrete certain fluids, and to separate, envelop, and form other organs. Membranes are either simple or compound. *Simple membranes* comprise three orders:—

1. *Mucous membrane* is so called on account of the mucous fluid by which it is constantly lubricated. Mucous membranes line the canals, cavities, and hollow organs, which communicate externally by different apertures on the skin. The mucous membranes have a striking analogy with the cutaneous tissue, in organization, functions, and diseases. They are composed of corium, papillæ, and epidermis, and are furnished with a multitude of follicles, which secrete a viscid humour—mucus. They receive a quantity of arterial vessels, veins, lymphatics, and nerves.

2. The *serous membranes* are thin, transparent, and composed of one lamina. One surface adheres to other textures; the other is smooth, polished, and moistened by a serous fluid. They are arranged in the form of sacs without apertures, as great intermediate reservoirs for the exhalant and absorbent systems, in which the serous fluid in passing from one system, carries some time before it enters the other. The serous membranes resemble the areolas membrane in structure and diseases. They facilitate the motion on each other of the organs which they envelop.

3. *Fibrous membranes*.—These are almost all continuous, and terminate at the periosteum, their common centre. They are not free or moistened by any particular fluid. They adhere by both surfaces to the adjoining parts; they are firm, resisting, but slightly elastic, and of a white colour, sometimes pearly and glistening. Their vessels are numerous in some, as in the dura mater and periosteum; in others, scarcely perceptible, as in the aponeuroses. The presence of nerves has never been proved, although several circumstances regarding their sensibility render their existence probable. The fibrous membranes serve in general to augment the solidity of the organs which they envelop, to retain the muscles in their respective positions, to favour the motions of the limbs and that of the muscles and skin, and to form canals and rings for the passage of different organs.

There are three species of *compound membranes*:—

1. The *sero-fibrous*, formed of a serous and fibrous lamina, intimately adherent to each other, as the pericardium and dura mater.

2. The *sero-mucous*, formed of a serous and mucous lamina, as the gall bladder at its lower part.

3. The *fibro-mucous*, consisting of the union of a fibrous and mucous membrane, as the mucous membrane of the nasal fossæ, gums, &c.

MEMECYLA'CEÆ are a very small natural order of polypetalous Exogens, consisting of a few tropical plants of little interest. Most of them inhabit the East Indies, the Isle of France, and Madagascar. No useful properties have been assigned to any of the species, except to *Memecylon edule*, an East Indian plant, whose leaves are an ingredient in the dyes of Coromandel, according to Roxburgh, and whose ripe, astringent, pulpy black berries are eaten by the natives.

MEMEL. [KÖNIGSBERG; NIEMEN.]

MEMLING, or MEMMELINCK, HANS, or JAN, was born probably about 1439, at or near Constanx. His principal works are—'St. Ursula and her Companions,' the 'Adoration of the Magi,' and the splendid altar-piece of the 'Marriage of St. Catherine.' There are pictures ascribed to Memling at the Hague, at Antwerp, at Louvain, at Berlin, and at Munich. The date of his death is uncertain, but it probably took place in Spain between 1499 and 1506.

MEMMI, SIMONE, or *Simone di Martino*, was a very celebrated Italian painter of the fourteenth century. He was born at Siena in 1284, or according to Vasari, in 1285. He was the rival of Giotto. Simone now owes his fame chiefly to Petrarch: they were both living at the same time at Avignon during the residence of the popes there, and Simone painted the portrait of the celebrated Madonna Laura for the poet, who rewarded him by writing two sonnets in his honour. Few of Memmi's works now remain, and these are dry and meagre performances. The principal are the frescoes of the chapel degli Spagnuoli at Florence.

MEMNON, in Greek mythology, a son of Eos, or the Morning, and Tithonos, or Titan, the Sun, but represented in the later legends as a son of Laomedon and brother of Priam, who took part in the Trojan war, and was slain by Achilles. His allegorical character, however, is shown by the tears of morning dew which his mother shed over his corpse, just as the big drops fell from the sky when Zeus bewailed the fate of his son Sarpedon. Memnon, at the request of Eos, was raised from Hades to Olympus.

The name Memnon would seem to be corrupted from *Mei-amun*, 'beloved of Ammon.' The Greeks applied it to a celebrated statue at Thebes in Upper Egypt, which at sunrise, either really emitted, or was fabled to emit, a musical sound like the voice of a harp. It is supposed to have been included in the gigantic pile of the Rhamesseion, so called from its reputed founder, Rhameses or Sesostris, whose immense ruins still attract the wondering notice of travellers.

MEMORY is a name given to one of what are called the faculties of the mind—the faculty of remembering or recollecting. The word is used to denote at the same time the operation or act of remembering and the state of the mind when it exercises the faculty, as distinguished from the faculty itself, but this last is a derived and by far the rarer use of the word.

When an idea is reproduced in the mind by any of the ordinary modes of association, and there co-exists with this idea the idea of its having been

before present in the mind, this complex state of mind is a case of memory. We are then said to remember the thing, the idea of which is thus present to the mind. This is an exercise of the faculty of memory.

There is a distinction between *remembering* and *recollecting*, which it is worth while to notice. The ideas that are remembered either come into the mind without any effort on the part of the person remembering, or with such effort. In the first case the person is more properly said to remember; in the second, to recollect. The effort of recollection may be generally described as consisting in seeking out for different ideas which are likely to recall, by any of the ordinary modes of association, the desired idea. What these modes of association are has already been explained in the article ASSOCIATION.

MEMPHIS. [TENNESSEE.]

MEMPHIS (the *Men Nefer* or 'Good Station' of the Egyptians, and the *Memf* of the Arabs), an ancient city of Egypt, once the rival of Thebes in magnitude and splendour, was situated on the western bank of the Nile, about 10 miles S. of Cairo, on the site of the present villages of Kaff-el-Tyat, Metrahenny, and Koum-el-Azyzeh. There are still considerable remains scattered over an extensive area, though it has for hundreds of years been used as a stone quarry by the successive conquerors of the country.

MEN'AGE, GILLES, was born at Angers, August 23, 1613. Ménage began life as an advocate at Paris; but finding this profession not to suit his taste, he became an abbé. He resided for a time in the family of Cardinal de Retz, but finally established himself in a house of his own in the cloister of Notre-Dame, which soon became celebrated for the assemblies of men of letters, whom he continued to gather around him every Wednesday evening to the end of his long life. Of his numerous works the following are the most important:—'*Origines de la Langue Française*;' '*Poemata Latina, Gallica, Græca, et Italica*;' '*Observations sur la Langue Française*;' '*Origini della Lingua Italiana*;' '*Anti-Baillet*;' a valuable edition of Diogenes Laertius, with annotations; and some other editions of classical and other works. After his death in 1692, his friends published, under the title of '*Ménagiana*,' a collection of his bon-mots and the more striking remarks he made in conversation.

MENAI STRAIT. This narrow channel, about 11 miles in length, which separates the island of Anglesey from the mainland of Wales, intervenes on the great mail route from England, by way of Holyhead, to the eastern coast of Ireland. It is crossed by a suspension bridge, of which the first stone was laid August 10, 1819, and the mail-coaches drove over it for the first time January 30, 1826. The Menai Bridge was planned and executed by Telford. The distance between the supporting pyramids or points of suspension is 560 feet, and the height of the carriage-way above high water in the strait is 100 feet. The roadway of the bridge is divided into two carriage-ways, each 12 feet wide, with a foot-path 4 feet wide between them. It is also spanned by a still more remarkable structure—the Britannia Bridge, built by Robert Stephenson, consisting of two tubes of iron placed side by side, through which the up and down trains of the Chester and Holyhead Railway respectively pass. The entire length of each

tube is 1513 feet, and the height above high water 102 feet. Each tube consists of four pieces, the ends of which rest on a central pier built on the Britannia Rock in the middle of the Menai Strait, two towers on the shores of Anglesey and Caernarvonshire respectively, and two abutments farther inland on each coast. There are therefore eight tubes in all. The clear length of each tube reaching from the side-towers to the central tower is 460 feet, so that the entire length of tube across the strait is 920 feet, leaving 593 feet for the entire length of the side tubes. The top of each tube forms a regular arch; the bottom is quite straight and horizontal. The interior height is 26 feet in the centre, and 18 feet 9 inches at the ends. The internal width is 14 feet from side to side. The tubes are formed of plates of wrought iron $\frac{3}{8}$ to $\frac{1}{2}$ inch thick, strongly riveted together. The weight of the whole structure is 10,540 tons, and its cost amounted to 601,865*l*. The first train crossed the strait on March 6, 1860. [HOLYHEAD.]

MENANDER, a Greek poet, one of the writers of the New Comedy, was born B.C. 341, and died, as some suppose, by drowning, B.C. 289 or 290. He wrote more than one hundred comedies, of which only fragments remain. His plays were probably very simple in the dramatic action. Terence, who professed to imitate him, did not adhere to this simplicity, but, as he tells us himself, added to the main plot a subordinate one taken from a different piece of Menander; thus, as he says, making one piece out of two.

MENDELSSOHN BARTHOLDY, FELIX, the illustrious musical composer, was born at Hamburg, February 3, 1809. The son of wealthy parents, he received a careful education, and his natural disposition for music was nurtured by his mother, who provided him with the best examples for study, and judiciously rewarded his youthful exertions. In 1812 the family removed to Berlin, where their home was the resort of the most eminent artists and men of letters. Here the young musician was placed under the tuition of Berger for the pianoforte, and Zelter for composition. His progress was extraordinary, and he made his first appearance in public in 1817, when he played Dussek's military concerto. In his twelfth year appeared his first published pianoforte Quartet, dedicated to Goethe, whom he had visited at Weimar, and from whose counsel and encouragement he derived peculiar benefit. In the spring of 1825 he visited Paris, and was introduced to Cherubini, who, recognizing both his present powers and future promise, warmly advised him to continue his musical studies. In this year was produced at Berlin his opera of 'Die Hochzeit des Camacho' (The Wedding of Camacho), which, despite some marks of immaturity, attests the wonderful freshness and originality of the composer's genius. About this date also he produced his overture to the *Midsummer Night's Dream*, 'Meere stille' (The Calm Sea), and his *Otteto* in E flat; three of the most wonderful works ever produced at so early an age. Not only are the melodies exquisite, but the highest art is perceptible in their arrangement and development, so that it may be said of Mendelssohn's genius, that, like some oriental flowers, it bloomed into full maturity without undergoing the ordinary process of growth.

The incidents of a musician's life are neither many nor striking, and those of Mendelssohn's may easily be recapitulated. He visited London in 1829, and at once secured a reputation. His *Symphony in C minor* was performed at the concerts of the Philharmonic Society, while his pianoforte-playing delighted the most critical and fastidious audiences. While in London he wrote his operetta of 'Heimkehr aus dem Fremde,' known in English as the 'Stranger and Son,'—as a love-offering on the occasion of the 'silver wedding' (the twenty-fifth anniversary) of his parents.

In 1830 he visited Italy, and among the glorious ruins of ancient Rome composed the 'Reformation Symphony,' and the 'Walpurgis Night.' Afterwards he repaired to Naples and Venice, and travelled through Switzerland, everywhere deriving inspiration for his versatile genius, which was keenly alive to the external influences of nature. We find him again in England in April, 1832, and 1833, producing on the former occasion, his *Concerto in G minor*, and overture to the 'Isles of Fingal;' on the latter, the 'Trumpet Overture,' and *Symphony in A minor*.

The death of his father, in November, 1835, was a severe shock to his affectionate nature, and the solemn impression which it produced may be traced in his magnificent oratorio of 'St. Paul.' Home joys were exceedingly dear to him, and his happiness was accordingly increased and confirmed by his marriage in the spring of 1837, to *Mlle. Cecilie Jean-Renaud*, of a good Frankfort family, a woman not unworthy of him.

Passing over some minor works which would have made the renown of any other composer, we must record the production of the 'Hymn of Praise,' in 1840, a composition of immeasurable beauty, replete with the choicest fancies and noblest thoughts; and the setting to exquisite music the lyrical portions of two of the tragedies of Sophocles. In 1842 he embodied his recollections of Scottish scenery in the wondrous *Symphony in A minor*, dedicated to Queen Victoria.

The music to the 'Midsummer Night's Dream;' the overture to 'Ruy Blas;' the matchless 'Songs without Words,' a species of musical composition which he may be said to have created; and above all, the sublime oratorio of 'Elijah,' first produced in London in 1846—were among his later and sublimer works. In 1844, in 1846, and again in 1847, he visited England. In the latter year it was evident that his health had given way under the pressure of incessant work and continual excitement, and the tidings of the sudden death of his favourite sister Fanny, produced a terrible effect on his shattered frame. He died at Leipzig, on the 4th of November, 1847.

It would be difficult to decide in which branch of his art this great composer displayed the most astonishing genius. He was the best contrapuntist since Mozart. Almost unrivalled as a melodist, his command over all the resources of harmony was supreme. In sacred and secular music he was alike distinguished by the fertility and originality of his ideas, which were never forced, but always charmed by their spontaneity. Nor was he only a musician, as a draughtsman he might have attained renown. He was well versed in the ancient classics, and spoke and wrote both English, Italian, and French; while

as a man his character was marked by honour, truthfulness, geniality, and affection.

MENDE. [LOZÈRE.]

MENDICANT ORDERS are certain religious associations in the Roman Catholic church, so called because they give up to the church all property, whether real or personal, which their members may have possessed, and subsist upon alms. They carry out the principle of religious poverty and self-abasement to the extreme. By a decree of the second council of Lyons in 1274, the mendicant orders were reduced to four—viz., Dominicans, Carmelites, FRANCISCANS, and AUGUSTINS, or Austin Friars. [FRIARS.]

MENDIP HILLS. [SOMERSETSHIRE.]

MENDOZA. [PLATA, LA.]

MENÉHOULDE, SAINTE. [MARNE.]

MENGES, ANTON RAFAEL, was born at Aussig in Bohemia, in 1728. He received a rigorous artistic education from his father, who was a painter. In 1741 his father quitted Dresden, whither he had been called by Augustus III. (for he was a native of Denmark), and went to Rome, taking young Menges with him, where he made him labour most assiduously in the Vatican, scarcely allowing him to take his meals. In 1744 he returned to Dresden, when Augustus appointed him court-painter, but he was permitted to revisit Rome and continue his studies for some time longer. He soon began to distinguish himself by his original compositions, among the rest by a Holy Family, in which the Virgin was painted from a beautiful peasant girl, of whom he had become so enamoured that he turned Catholic for her sake and married her. His reputation was greatly increased by the numerous works he executed for Charles III. of Spain. His pencil was employed in decorating the royal palaces of Spain; and the Apotheosis of Trajan, in that of Madrid, is considered his chef d'œuvre. He died June 29, 1779.

MENIN. [FLANDERS, WEST.]

MENISCUS. [LENS.]

MENISPERMA'CEÆ are an important and extensive natural order of Exogenous plants, considered by some to be polypetalous, and referred to De Candolle's *Thalamifloral* subclass; by others placed among the *Monochlamydeæ* of that author. The wood of the stem is arranged essentially upon the exogenous plan, but has some striking peculiarities. According to M. Decaisne, it has no annual concentric layers. The woody plates are always simple, and do not divide longitudinally, as in other Dicotyledons, but increase each year by the formation of a new woody layer outside the former and inside the liber. The latter ceases to grow after the first year.

Menispermacæ are usually bitter and tonic plants. The species of *Cocculus* called *Bakis*, *Fibraurea*, *cinerascens*, and others, are used in their native countries as a remedy for intermittent fevers. *Cocculus palmatus* furnishes the Calumba Root of the shops, a valuable bitter.

MENISPERMUM, a genus of the natural family of *Menispermaceæ*, which formerly contained numerous species, many of them valuable for their medicinal and other qualities, such as the Calumba Root, and the berries called *Cocculus Indicus*, which are now referred to the genus *COCCULUS*.

MENORCA, or, MINORCA. [BALEARIC ISLANDS; SPAIN.]

MENSURATION is the name given to a branch of the application of arithmetic to geometry, which shows how to find any dimension of a figure, or its area, or surface, or solidity, &c., by means of the most simple measurements which the case will admit of. We need hardly say that a complete treatise on this science would involve every branch of mathematical science.

MENTHA PIPERITA (Peppermint), a plant common in many parts of Britain, but cultivated for medical purposes. The dried plant, which is more powerful than the fresh, is of a lively green, with a peculiar aromatic odour, and a pleasant camphor-like taste, at first burning, but at last causing an enduring sensation of cold in the mouth. The dried herb is used for the preparation of a distilled water and of a volatile oil, from which oil spirits, or essence, of peppermint is prepared. Of the oil three varieties occur in commerce, the German, English, and American.

MENTHA PULEGIUM (Pennyroyal), an indigenous species of mint, smaller than most of the others, and of which the entire herb, except the root, is officinal. The odour is strong and peculiarly aromatic; the taste herbaceous and bitter. It has a stimulant and antispasmodic property, similar to most mints. A distilled water, a spirit, and volatile oil are prepared from it, as from the preceding species.

MENTHA VIRIDIS (Spear-mint), a plant of Britain very much resembling *M. piperita*; the colour, however, is of a deep green. From it are prepared a distilled water, a spirit, and a volatile oil, which are used as the former.

MENTZ. [MAINZ.]

MENURA. [MANURA.]

MENYANTHES TRIFOLIATA (officinal part, the leaves), a plant common in our bogs, and hence called Bog-bean, as its leaves resemble the common bean. It contains an extractive (Menyanthin), which is a tonic and febrifuge medicine of undoubted efficacy. The chief use said to be made of the large quantity annually collected is to substitute it for hops in brewing.

MENZIKOFF. [PETER I., the Great.]

MEQUINEZ. [MOROCCO.]

MERCANTILE LAW AMENDMENT ACT. A very important Act was passed in the 19 & 20 Vict. c. 97, 1856, called the Mercantile Law Amendment Act, whereby it is provided that no person shall be prejudiced in his title to the goods of a debtor though a writ of execution or attachment have been issued against them, unless they have been actually seized or attached before he acquired such title, or unless at the time of acquiring such title he have notice of such writ or attachment being in the hands of the sheriff. It is also enacted that, upon any verdict for a plaintiff who seeks to recover goods, the court may order the delivery of such goods without giving the option to the defendant of paying damages for the non-delivery thereof, and retaining such goods.

Important changes in the law affecting guarantees were made by this Act—viz., that from the date of the Act, it was not necessary as theretofore to express the consideration on the face of it for such guarantee. That a change in the firm of guarantors or guarantees shall not be binding on the person making the

promise for anything done or omitted after the change, unless by express stipulation. Further, that any surety who discharges the liability shall be entitled to the securities held by the creditor.

By the same Act it is provided that all acceptances to a bill of exchange shall be in writing, and signed by the acceptor, or some person duly authorized by him.

Some alterations in the limitation of actions are made. [STATUTES OF LIMITATION.]

The Mercantile Law Amendment (Scotland) Act, 19 & 20 Vict. c. 60, 1856, assimilated the mercantile law of Scotland to that of England in many important particulars.

Upon the law of sale, the principal alterations which it made were:—

By s. 1, that goods sold, but not yet delivered to the purchaser, should not be attachable by creditors of the seller after the date of sale; but that the right of the purchaser to demand delivery of such goods might be attached or transferred to his creditors. By s. 2, that when a purchaser of goods, who had not obtained delivery of them, sold them, the second purchaser might demand delivery of them from the original seller; and that the original seller should not be entitled to retain such goods after receiving intimation of this subsequent sale, except for payment of the original purchase price, or for the performance of obligations or conditions forming part of the original contract of sale. But by s. 3, any seller of goods might attach the same by arrestment or pawning, while they still remained in his hands or possession, at any time prior to the date of intimation of their sale to a subsequent purchaser. By s. 5, if a seller, at the date of sale, was without knowledge that the goods sold by him were defective or of bad quality, he was not to be held to have warranted their quality or sufficiency, unless an express warranty to that effect had been given by him, or unless the goods had been sold for some specified purpose.

With regard to the law of guarantee and cautionary obligations, it was enacted by s. 6, that all such securities should henceforward be in writing. By s. 7, that no guarantee granted to or for a firm should be binding upon the granter after any change of the firm, unless the intention of parties that it should continue to be binding, notwithstanding the change, appeared either by express stipulation or by necessary implication. By s. 8, cautioners were no longer, except upon express stipulation, to be entitled to the benefit of discussion, but creditors might proceed at once against either the principal debtor, or the cautioner, or both. By s. 9, when two or more parties became bound as cautioners, the discharge of the one should operate a discharge of the others.

The principal provisions of the Act, as to bills of exchange and promissory notes, were by s. 10, that their date might be proved by parole evidence; by s. 11, that acceptances should henceforward be in writing; by s. 12, that bills drawn in any part of Great Britain or Ireland, or of the islands of Man, Guernsey, Jersey, Alderney, and Sark, upon any person residing within the above-named limits, should be deemed inland bills; by s. 13, that notarial protest should not be necessary except for the purpose of summary diligence; by s. 15, that where a bill had been lost,

stolen, or fraudulently obtained, the holder would be obliged to prove value given for it: and by s. 16, that where a bill had been endorsed to any person after the date of its payment, the endorsee should be liable to all objections or exceptions to which it was subject in the hands of the endorser.

The Act further provided by s. 17, that carriers for hire should be liable for losses by accidental fire occurring to goods while in their possession.

MERCAPTAN, a compound of hydrogen, carbon, and sulphur, discovered by Zeise, and so called from its energetic action on binocide of mercury (*corpus mercurium captans*). It is a colourless liquid, has a penetrating alliaceous smell, and a peculiar sweetish taste; its specific gravity is 0.842, it boils at 144°, and remains fluid at 8°. Water dissolves it sparingly, but ether and alcohol unite with it in all proportions. According to Zeise it consists of H⁶ C⁴ S².

MERCATOR, GERARD (whose real name was Kauffman, of which *Mercator* is the Latin equivalent), was born at Rüpeldam in East Flanders, in the year 1512. He applied himself with great industry to the sciences of geography and mathematics, was patronized by the Emperor Charles V., and appointed, in 1559, cosmographer to the duke of Juliers. He gave his name to the method of geographical projection now usually employed in the construction of nautical maps, in consequence of his having first represented the meridians by equidistant parallel lines, and the parallels of latitude by straight lines at right angles to the meridian, but he did not know the distance which ought to separate these parallels. [MAP.] Nicholas Mercator is said to have discovered the law which regulates these distances; but the English mathematicians having refused to pay for the promulgation of his discovery by accepting a pecuniary challenge which he is said to have proposed to them, he died without communicating it even to his friends. The credit of first investigating the principles of that projection, and applying them to the purposes of navigation, appears to be due to Edward Wright, who explained them in a treatise published in 1599. Gerard Mercator died at Doesburg, December 2, 1594.

MERCHANDISE MARKS ACT, 1862, defines the word 'mark' to be any name, signature, word, letter, device, emblem, figure, sign, seal, stamp, diagram, label, ticket, or other mark of any other description; and the expression, 'trade mark,' to include every such name, signature, word, letter, device, emblem, seal, stamp, diagram, label, ticket, or other mark, lawfully used by any person to denote any chattel, or (in Scotland) any article of trade, manufacture, or merchandise, to be an article or thing of manufacture, workmanship, production, or merchandise of such person, or to be an article, or thing of any peculiar or particular description, made or sold by such person; and also to include any name, signature, word, letter, emblem, figure, mark, or sign which in pursuance of any statute or statutes for the time being in force relating to registered designs, is to be put to, placed upon, or attached to any chattel or article during the existence or continuance of any copyright, or other seal right acquired under provisions of such statutes. By the Act, forging a trade-mark, or falsely placing any trade-mark with

intent to defraud, or forging a trade-mark to any vessel, case, wrapper, &c., in which any article is sold, is made a misdemeanor, and all persons who sell any such articles are liable to a penalty of a sum equal to the value of the articles sold, and a sum not exceeding 5*l.*, or less than 10*s.* Any addition or alteration to trade-marks, made with intent to defraud, are made forgeries, and any person who may have sold an article with a false trade-mark upon it, may be summoned to give information as to where he procured it. The marking of any false indication of quantity upon an article with intent to defraud, subjects the person to a penalty of a sum equal to the value of the articles, and a further sum not exceeding 5*l.*, and not less than 10*s.*; and the selling of such an article, to a penalty of not more than 5*l.*, or less than 5*s.* The finder of an article with a trade-mark is deemed to contract that the mark is genuine. No proceeding can be taken under the Act after the expiration of three years next after the committing of the offence, or one year next after the first discovery thereof by the person proceeding.

MERCIA. [ENGLAND.]

MERCURIALIS, a genus of plants belonging to the natural order *Euphorbiaceae*. *M. perennis*, Perennial Mercury, is a native of woods and thickets in Great Britain. *M. annua*, Annual Mercury, is a common plant in waste uncultivated lands. It once had a place in the British Pharmacopœia on account of its supposed efficacy as an emmenagogue.

MERCURY or QUICKSILVER (symb. Hg., equiv. 100, sp. gr. 13·6), is one of the so-called noble metals, and possesses the remarkable property of being fluid at ordinary temperatures; it boils at 660° Fahr., giving off vapour of sp. gr. 6·976, and may therefore be distilled; it is solid at -40° Fahr., and contracts at the moment of congelation, and becomes malleable. It is of a silvery white colour, with a striking metallic lustre. In consequence of the uniform rate at which it expands when treated, from considerably below 0° to above 300° Fahr., it is employed in the construction of thermometers. Mercury when pure runs in small spherical drops over smooth surfaces; but when not pure the drops become elongated and *tailed* in form, and leave a gray stain on porcelain or glass. It is a good conductor of electricity, and its capacity for heat is extremely small.

The mercury as imported into this country is commonly contained in iron bottles secured by a screw in the opening, and is usually almost chemically pure. If the presence of other metals is suspected it may be pressed through leather to separate mechanical impurities, re-distilled, and then digested for a few days in dilute cold nitric acid, which exerts little action if more oxidizable metals are present. It is then freed from the nitric acid by washing with distilled water, and is finally dried either by heat or by passing through it clean bibulous paper, when it becomes pure chemically and mechanically. The quantity of mercury imported into the United Kingdom in 1864 was 4,763,499 lbs., value 512,349*l.* Nearly the whole came from Spain and Portugal. This quantity was, however, unusually large; and in 1865 it decreased to 1,781,825 lbs., almost precisely the same as in 1863.

The mercury of commerce is entirely obtained from *cinnabar*, its principal ore, which is a bisulphide of mercury, known also as vermillion, of a brownish red colour, massive and sometimes crystalline. The substance of this latter name used as a pigment, is a sulphide of mercury, but is more frequently an artificial product. It is also found, although rarely, as a *chloride* (which is a grayish translucent substance), and as an *iodide* and a *selenide*. Native or virgin quicksilver occurs only in small quantities, and in cavities of the sulphur ores. Native amalgam, or a compound of mercury and silver, is a white opaque substance, generally crystallized in cubes.

The mines occur in comparatively few places; those of Almaden in Spain, and Idria in Carniola, are the most important. The ore is to be found in upper Hungary, Transylvania, and the district of Zweibrücken in Germany, and it is procured also from the Ludwig mine near Wetzlar, and from the Val Sassina in Lucca; the mine del Siele, near Grosseto, in Italy, yields 7000 lbs. in a year. Mercury is now obtained in large quantity from California; in 1862, 158,661 lbs. were imported from thence.

There are two methods of reducing the metal from its ore. The cinnabar may be burned in a furnace, in which case the sulphur is given off as sulphurous acid, and the mercury is collected in a condensing chamber; or the sulphur may be separated by the action of slaked lime or iron filings, which reagents, with the ore, are put into cast or sheet iron, or earthenware retorts; and the metal on being set free and volatilized by the heat, is condensed by cold.

There are two oxides of mercury, the dioxide or sub-oxide (known also as the black oxide and mercurious oxide), Hg₂O, and the peroxide HgO, which is a red body. The former is an unstable compound, which on exposure to heat quickly passes into the red and the free metal (Hg₂O = HgO + Hg). The peroxide also parts with its oxygen readily on exposure to a pretty strong heat, and is frequently employed by the chemist for procuring that gas in small quantity. The salts of this latter oxide are generally obtained either by its direct solution or by digesting excess of mercury with the acids; as, for example, with nitric or sulphuric acid, when in the former case the nitrate (HgO, N O₅ + 8 Aq), and in the latter the sulphate (HgO, S O₃), are formed.

The haloid salts of mercury are very important compounds, the most important of which are the chlorides; these being the sub-chloride of mercury (Hg₂Cl) or calomel, and the chloride (HgCl) or corrosive sublimate. The sub-chloride or calomel when procured by precipitation, is a white pulverulent substance, whereas that obtained by sublimation is crystalline, hard, and dense. Its sp. gr. is 7·175; it is colourless, inodorous, insipid, and sometimes regular crystals are observed; the primary form of which is a square prism. It melts at 509° Fahr., and volatilizes unchanged at 570°. It is quite insoluble in water. The chloride is a white, semi-transparent, crystalline mass; the perfect crystals appear to be a right rhombic prism. This substance has a specific gravity of 5·4, and the density of its vapour is 9·4. It is soluble in sixteen parts of cold, and three parts of boiling water. It is inodorous, and of a nauseous and acrid taste, and it is a violent

poison. The symptoms produced by a poisonous dose of this salt come on immediately; during the act of swallowing an intense feeling of constriction, and a burning heat in the throat are experienced, while a metallic taste is left in the mouth. Violent pain in the stomach and abdomen is felt in a few minutes, and vomiting of mucus and blood, and purging, follow. The pulse becomes small, frequent, and irregular, the tongue white and shrivelled, the skin cold and clammy, the respiration difficult, and death is preceded by fainting or convulsions. Any dose exceeding two grains would probably prove fatal to an adult, unless vomiting were induced, or the whites of eggs administered. Death commonly ensues in from one to five days, but may take place in less than half an hour, or not for three weeks or more.

Sulphur and Mercury unite in two proportions, forming the sulphide and the bisulphide. The sulphide (M S) is a black powder, insoluble in water, and volatilized at a high temperature. The bisulphide (M S²), before alluded to as forming cinnabar or vermilion, may be produced artificially; it is a compact, deep red, crystalline mass, inodorous, insipid, and insoluble. A black mixture of mercury and sulphur forms the *Ethiops Mineral*. *Phosphorus and Mercury* form a brownish insoluble compound. *Selenium and Mercury* unite to form a tri-coloured substance.

With iodine and bromine mercury forms two iodides and bromides corresponding in composition to the chlorides. Both the iodides are used in medicine; the bromides are of no practical importance. *Metals and Mercury*, or the greater number of them, readily combine; other metal compounds are called *alloys*, but those which contain mercury are called *amalgams*. *Ammoniacal amalgam* is one of those. This fugitive combination is produced by first making an amalgam of metallic mercury with sodium, the union of these two bodies takes place with flashes of flame. Into a tall glass cylinder is then poured a warm solution of chloride of ammonium (sal ammoniac), following which the sodium amalgam is poured in, when the whole swells up to many times the original volume of the materials employed, and becomes a butter of mercury and of sal ammoniac, through its entangling the hydrogen liberated by the sodium from the water of the solution of the chloride of ammonium. In a short time the amalgam subsides, and the metallic mercury reappears. Mercury combines with nitrogen, forming a nitride, Hg₃ N (a brown powder which explodes on being struck with a hammer, or when suddenly heated), and three nitrides of the suboxide of the metal.

Mercury combines with many acids to produce salts; among which acids the chief are—*nitric*, as already stated, *muratic*, *sulphuric*, *carbonic*, *phosphoric*, *fulminic*, and *acetic acids*. The best known of these salts is *Turbeth Mineral*, composed of oxide of mercury and sulphuric acid, and *Fulminate of Mercury*, a detonating substance composed of protoxide of mercury and fulminic acid. This remarkable substance (consisting of 2 Hg₂ O Cy₂ O₂) is prepared by dissolving 100 grains of mercury in a measured ounce and a half of nitric acid, aided by heat. This solution is poured, when cool, into two measured ounces of alcohol in a porcelain basin, and gently warmed; it soon effervesces and evolves ethereal vapour. During this action a gray

precipitate falls, which is to be immediately separated by decantation and filtration, and washed with small quantities of distilled water, and carefully dried at not more than 100° Fahr. The substance thus obtained will detonate by friction or percussion, and is in demand for the manufacture of percussion caps. The cyanide of mercury (Hg Cy) may be prepared by dissolving the red oxide in prussic acid, and is the best source from which to procure readily cyanogen for experimental purposes. In respect to the salts of mercury generally, the soluble salts of the protoxide are mostly white, of a metallic taste, and not virulently active as poisons. Some of them, when neutral, are resolved by water into basic and acid salts. The soluble salts of the peroxide or binoxide are mostly white when neutral, yellow when basic; they are poisonous, and nauseously metallic to the taste, and are often resolved by water into acid and basic salts. Mercurial salts are mostly volatilized at a red heat.

The uses of mercury are so numerous that more than a brief reference to a few of them would be superfluous. It is employed extensively in the extraction of gold and silver from their ores by amalgamation. Its amalgams are much used in the processes of silvering and gilding; and some, as those of copper and cadmium, are employed by the dentist for stopping decaying teeth. It is incessantly in use in the laboratory of the chemist, and is indispensable for making many sorts of philosophical instruments. It is the source of several valuable pigments, of which vermilion is the chief, and the antiseptic properties of one of its chlorides has already been adverted to. Liquid mercury is no longer used in medicine, although until lately it was occasionally given with the view of overcoming by its weight obstructions in the intestinal canal. In such case its effects are supposed to be purely mechanical; but it may, when taken into the system, be chemically acted on, and produce violent disorders.

The medicinal uses of mercury are dependent on preparations of the substance, and their degree of action will, of course, be according to the nature and relation of the substance in any case employed, and to the amount and the mode of its administration. The following are the diseases in which mercurial preparations are held by the profession as of most utility:—(1) In *internal congestions*, as of the liver, &c., to increase the secretions, and hence relieve the vessels of the affected organ; (2) In various *acute inflammations*, especially of serous membranes (q. v.), of the structure of the liver and of the lungs, &c.; (3) In numerous forms of *chronic inflammation*; (4) In *dropsies*, dependent upon inflammation of serous membranes or disease of the liver, but not in dropsy from disease of the kidneys, where they are generally injurious; (5) In numerous *chronic affections* in which an alterative action is required; and (6) As a purgative (to be followed by a black draught), when a patient is in the condition popularly known as bilious (in this case, blue pill is usually as efficacious as calomel).

In *Syphilis* preparations of mercury were at one time an effective mode of treatment. It is now generally considered neither prudent nor necessary to resort to medicaments of this kind for the treatment of such maladies.

If calomel, blue pill, or any other mercurial medicine be given in too large doses, or for too long a period, most serious consequences may result—such as very profuse salivation, with swelling of the tongue and gums, and loosening of the teeth; purging; certain skin affections; disease of the periosteum and of the bones; and a low febrile condition, accompanied with great general prostration.

The doses of calomel for an adult vary from three to six grains when taken as a purgative. If the object is to affect the system generally, as in a case of acute inflammation, small doses (half a grain to two grains, combined with a little opium) should be given several times a day; and even still smaller doses should be prescribed. The *Compound Calomel Pill*, popularly known as *Plummer's Pill* (in which the calomel is associated with oxysulphide of antimony and guaiacum) is a most valuable alterative in chronic skin-diseases—a five-grain pill to be taken every night.

Corrosive sublimate, although a very powerful irritant poison, is extremely useful in very small doses as an alterative in many chronic affections of the nervous system, the skin, &c. The dose varies from one-thirtieth to one-eighth of a grain. This medicine should always be given on a full stomach.

Certain external applications require a few remarks. The plasters, ointments, and liniments are absorbed by the skin, and act in the same manner as mercurial preparations taken internally.

White Precipitate Ointment is the universal remedy for the destruction of lice, and is a useful stimulating application in chronic skin-diseases. *Ointment of Nitrate of Mercury*, called also *Citrine*, or *Golden Ointment*, is a most useful stimulating application in inflammation of the eyelids, in indolent ulcers, &c.; and the *Ointment of Nitric Oxide of Mercury* is similar in its action. [LINIMENTS.]

The *toxicological* relations of the mercurial compounds must be briefly glanced at. There are cases on record in which, probably from some peculiarity of constitution, ordinary and even small doses of the milder mercurials have caused death; thus, Christison mentions a case in which two grains of calomel destroyed life by severe salivation and by ulceration of the throat; and similar cases in which small doses of gray powder, blue pill, and calomel have proved fatal, are recorded by Taylor in his 'Medical Jurisprudence.' These testimonies to the very hazardous character of these medicaments, show that they require skilful handling.

MERCURY, the planet nearest to the sun. Its orbit being entirely within that of the earth, it never recedes to the point of the heavens opposite to the sun, but is always found within 29° of the sun, or 36,000,000 miles. Hence it is only visible to the naked eye in the evening when it is to the east of the sun, and near to its greatest distance (or elongation) from the sun, so that the sun can descend sufficiently below the horizon to allow the planet to be seen just before its setting; similarly, it is only visible in the morning (before sunrise) when it is near its greatest elongation westward of the sun. The phases of Mercury are not visible without a telescope. The apparent diameter of Mercury varies from 5 to 12 seconds: the real diameter is $\cdot 398$ of that of the earth, or about 3140 miles. Its bulk is to that of

the earth as 63 to 1000; its mass is reckoned at the two-millionth part of that of the sun. It revolves on its axis in $24^{\text{h}} 5^{\text{m}} 28^{\text{s}} \cdot 3$. Its orbit is inclined to the ecliptic in an angle of $7^{\circ} 0' 9''$. It has seven times the light and heat of the earth; and its mean distance from the sun is $\cdot 3870981$ of that of the earth.

The transits of Mercury, or passages of the planet over the sun's disc, take place when the conjunction (the inferior conjunction, as it is called, Mercury being between the earth and the sun) happens at the time that the planet is near its node. These transits are not so useful in the determination of the sun's parallax or the longitude of the place of observation as those of Venus. The following are, according to Delambre, the times of the transits which will yet take place in the present century (civil time in Paris):—

1868	4 Nov., 7 A.M.	1891	10 May, 3 A.M.
1878	6 May, 7 P.M.	1894	10 Nov., $6\frac{1}{2}$ P.M.
1881	8 Nov., 1 A.M.		

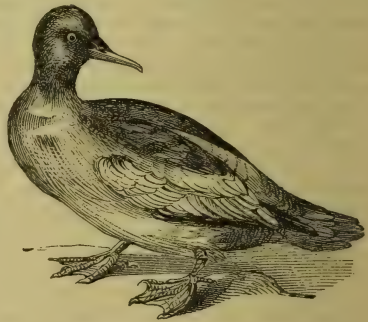
MERCURY, DEPRESSION OF. [DEPRESSION OF MERCURY.]

MERGANINÆ, a sub-family of the *Anatidæ*, including the *Goosanders*, or *Mergansers* (*Les Harles* of the French), and constituting the genus *Mergus* of Linnaeus.

In the genus *Mergus* the beak is more slender and more cylindrical than in the ducks; each mandible is furnished along its edges with small, pointed, saw-like teeth, directed backwards; the tip of the upper mandible is hooked. In their general aspect and plumage these birds approach the true ducks, but their gizzard is less muscular, and the intestinal canal and its cæcal appendages are shorter.

In the males the lower larynx is dilated into an enormous bulla or drum, partly membranous. Habits, aquatic; food, fishes and their fry. Hind toe lobated.

The members of this genus swim well, but from



Goosander (*Mergus merganser*.)

the weight and flattened form of their bodies appear deeply immersed in the water, the head, neck, and back only being visible. They are also excellent divers, moving, or rather flying, beneath the surface with great rapidity and to a great distance at a time, and by these submarine flights they capture their finny prey. Their flight is strong and swift, and they have great endurance on wing, but from the shortness and backward position of the legs are awkward upon land. They are natives of the colder climates, and

are found during the summer or breeding season in very high latitudes. The males after pairing time are subject to a partial change in the colour of their plumage, similar to that which takes place in many species of the sub-family *Anatina*.—Selby. [DUCKS.] We may enumerate as examples the Goosander (*Mergus merganser*), the Red-breasted Merganser (*M. serrator*), the Hooded Merganser (*M. cucullatus*), and the Smew, or White Nun (*M. albellus*). In a paper on the 'Natural History of Lewis,' laid before the Royal Society of Edinburgh in March, 1866, Dr. Duns stated that the Goosander occasionally breeds in that locality, and that the Red-breasted Merganser is frequently seen there in March and April.

MERGUS. [MERGANINÆ.]

MERIDA. [ESTREMADURA, Spanish.]

MERIDIAN (*meridies*, 'mid-day'). In the heavens the meridian is the circle which passes through the pole and the zenith of the spectator: on the earth it is the circle which passes through the pole and the spectator's position; consequently the terrestrial meridian is the section of the earth made by the plane of the celestial meridian.

The circle derives its name from being that on which the centre of the sun is found at mid-day, or real noon. In the case of a fixed star, the time at which its altitude is greatest is the moment of its coming on the meridian; but in that of the sun or a planet, the orbital motion prevents the moment of its culmination (or coming on the meridian) from being exactly that of its attaining its highest point; though the difference is not worth noting for ordinary purposes.

MERINO, a breed of sheep formerly confined to Spain, but now reared in Saxony, and of late introduced with success into Australia. They are valued for the superior fineness of their wool. The word, which is Spanish, signifies an overseer of pasture lands, and is applied to this breed of sheep because in Spain they are kept in immense flocks under a general overseer, and with right of pasturage all over the kingdom.

MERIONETHSHIRE, a county of North Wales, is bounded N. by Caernarvonshire and Denbighshire, N.E. by Denbighshire, E. and S. by Montgomeryshire, S. by Cardiganshire, and S.W. and W. by Cardigan Bay, an inlet of the Irish Sea. Its greatest length N.E. to S.W. is 45 miles; its greatest breadth N.W. to S.E. is 30 miles. The area is 602 square miles, or 385,291 acres, of which about one-half is common or waste, and about 50,000 acres arable. In 1861 the population comprised 19,145 males and 19,818 females—total, 38,963; being an increase of 120 only, or 0.3 per cent. since 1851. At the last census there were 8499 inhabited houses in the county, 352 uninhabited, and 39 building.

Coast Line and Surface.—The northern part of the coast is formed by the estuary of which the Traeth Mawr and the Traeth Bach are portions. From the Traeth Bach the coast runs south about six miles past Harlech to the little headland on which stands the village of Mochraes or Mochras. The coast is skirted by sands dry at low water, and at some distance out to sea are three sand-banks, the 'Dutch Bank,' the 'Pontigal Bank,' and the 'Sarn Badrig.' This remarkable shoal runs from the immediate neighbourhood of the coast 22 miles out to

sea in a south-west direction; it is composed of sand and gravel. It is dry at the ebb in spring tides, and in storms is marked by fearful breakers. From Mochraes the coast runs S.E. to Barmouth, and thence S. to the Dovey and the Towy. There are few cliffs along the coast. Merionethshire is the most mountainous of all the Welsh counties, and contains some of the loftiest peaks in North Wales. The Berwyn mountains traverse the county from north-east to south-west, skirting the valleys of the Dee, the Wnion, and the Maw. Many of their summits are from 2000 to 3000 feet high. *Cader Idris*, though not the highest, is the most remarkable; its summit consisting of huge columns of crystalline greenstone, like the basaltic columns of the Giant's Causeway. There are other mountain groups and offsets.

The county is almost entirely occupied with the slate rocks which predominate in North Wales. Along the valley of the Dee, as far up as Bala and the valley of the Elwen, a bluish-gray limestone is found, which is quarried for lime, the principal manure employed in the county. Great quantities of white limestone are quarried and burnt for lime near Corwen. Westward of the limestone the rocks are chiefly slaty, forming abrupt and rugged mountains of desolate appearance. Lead and copper mines are worked near Towyn at the mouth of the Disynwy, and copper mines near Barmouth. There are slight indications of volcanic agency among the mountains.

The principal rivers belonging to the county are the Dee, the Maw, and the Dovey, with their respective affluents. The Dee rises near the Berwyn mountains, and flows through Lake Bala into Denbighshire; it receives the Lew, Twrch, Glettwr, Alwen, and other small streams. The Maw, the Dovey, and the Disynwy all rise within the county, and, after receiving many small streams, fall into the Irish Sea.

There are many lakes, most of them small. The largest are Llyn-Tegid, or Bala Lake, 12 miles in circumference, and abounding with trout, carp, and pike; and Llyn-y-Myngil.

Divisions and Towns.—Merionethshire is divided into six hundreds. It is in the dioceses of St. Asaph and Bangor. It is in the North Wales Circuit, and the assizes are held at Bala in the spring, and at Dolgelly in the summer. The county returns one member to Parliament. In 1865 the number of voters on the register was 1527. There are six polling-places, and Harlech is the place of election.

The only towns which require to be noticed are the following:—

Bala (*Llanycil*), a market town, 18 miles N.E. from Dolgelly, is situated at the northern end of the lake called Bala Pool. The town consists chiefly of one wide street. Flannels, woollen stockings, and gloves are manufactured, and a large trade in butter and cheese is carried on. The population of the town in 1861 was 2383.

Bala Pool is the largest lake in Wales. It is 4 miles long, but less than a mile in width, and has an average depth of 40 feet.

Barmouth (or *Aberynaur* or *Llanaber*), a small market town and seaport, 8 miles W. by S. from Dolgelly, is situated on the north side of the estuary

of the river Maw, or Mawddach, at the foot of a lofty mountain, and the houses rise in a succession of terraces, which communicate by flights of steps. A few sloops belong to the port; and timber, bark, copper, hosiery, and flannels are exported. It is resorted to in summer as a pleasant place for sea-bathing. The population of the town is 1600.

Corwen, a market town, $8\frac{1}{2}$ miles W. of Llangollen, is beautifully situate on the Dee, in a picturesque valley, and at the base of the Berwyn mountains. It consists of one street of plain stone houses, with a church, three chapels, school, reading room, &c. The population, mainly employed in agriculture, amounted in 1861 to 2042.

Dolgelly, or *Dôlgellau*, the chief town of Merionethshire, is situated on the south bank of the river Wnion, about a mile above its junction with the Maw. It is 208 miles from London by the Shrewsbury road. The town stands in a pleasant valley, and consists mostly of narrow streets of small houses. Coarse woollen cloths, called 'webs,' and flannels are manufactured; and there are extensive tanneries, fulling mills, and bleaching grounds in the neighbourhood. The church is a neat structure, and there are some places of worship for dissenters. Population of the town in 1861, 2217; parish, 3457.

Festiniog is a small neat town, in the centre of some very attractive scenery. Population of the parish, which includes an area of 16,456 acres, 4553.

Harlech, 14 miles N.W. from Dolgelly, is seated near the shore of Cardigan Bay. It is little more than a village of small size and insignificant appearance, situated between a wild and desolate mountain country and the sea. The most striking object is the castle, the ruins of which are situated on a lofty rock facing the bay, and rising above an extensive marsh once occupied by the sea. Its walls are tolerably perfect; they form a square of about seventy yards each way, with a round tower at each corner. It is a county polling-place.

Townyn, a market town, of one street of plainly-built houses, had a population in 1861 of 2859.

History and Antiquities.—In the earliest period of the authentic history of the island, Merionethshire was included in the territory of the Ordovices. In the Roman division of the island, it was included in the province of Britannia Secunda. It is said to have been called Mervinia by the Romans.

There are several traces of Roman works in this county. Remains of camps exist near Bala, and in the immediate neighbourhood of that town is Tommeny-Bala, an artificial mound supposed to be of Roman origin.

During the Saxon period and the reigns of the earlier English kings of the Norman dynasty, Merionethshire does not appear to have been the scene of events of historical interest.

In the war of the Roses, Harlech was held for the Lancastrians, but was taken by Sir Richard Herbert. In the civil war of Charles I., Harlech Castle was the object of contention. The repeated captures of this place, and a skirmish near Dolgelly, which had been garrisoned for the Parliament, were the only incidents of the contest which occurred within the county.

The principal remains of the middle ages are Harlech Castle, the ruins of Cymmer Abbey, near Dolgelly, and two or three small castellated buildings.

MERLIN, or more properly, MERDHN. Some of the Welsh antiquaries speak of three Merlins: Merdhn Emrys, or Merlinus Ambrosius; Merdhn Wyllt, or Merlinus Caledonius, or Merlinus Sylvestris; and Merdhn ap Morvryn, otherwise called Merlinus Avolonius (from a poem ascribed to him, entitled 'Avallenau,' or the Orchard), and also known by the Latin names of Melchinus, Melkinus, and Mervynus. (Nicholson's 'Eng. Hist. Library.') It is generally agreed, however, that the second and third are the same person; and it is far from improbable that all the three Merlins are but one individual. Of Merlin Ambrosius the principal account we have is in Geoffrey of Monmouth's 'Historia Britonum,' where he is represented as a great prophet and enchanter, who flourished in the time of King Vortigern, or about the middle of the fifth century. Of the Caledonian Merlin there is a life in Latin hexameters, by Geoffrey of Monmouth, who professes to have compiled it from an Armorican original; it is extant in one of the Cotton MSS. Collections of the Prophecies of Merlin have appeared in French, at Paris, 1498; in English, at London, 1529 and 1533; in Latin, at Venice, 1554; and there are also manuscripts of them, in French and English, in the Cotton and other libraries. The 'Avallenau,' and some other Welsh poems, attributed to Merdhn Wyllt, are published in the 'Welsh Archæology,' 3 vols. 8vo, 1801, &c.

MERLIN, the English name for the *Falco Esalon* of Linnæus; *Faucon de Roche* of the French; *Stein*



Merlin (*Falco Esalon*).

Falke of the Germans; *Smerlio*, *Smeriglio*, and *Falchetto* of the Italians.

This beautiful and daring little Falcon (the smallest of the British Falconidæ) is generally distributed through Europe. According to Dr. Richardson it occurs also in North America (Lakes Huron and Superior), and a closely allied species, if not the same, is found in South Africa. In our island it breeds on the moors of some of our northern counties, and according to Mr. Eyton, on Cader Idris in North Wales. [FALCONIDÆ.]

MERLU'CIUS, a genus of fishes, belonging to the *Gadidæ*, or family of Cod-fishes, distinguished by the possession of only two dorsal fins and one anal fin, and the absence of barbule on the chin. This latter character distinguishes the species of the genus *Merlucius* from the Burbot (*Lota*) and Rocklings (*Motella*), and there being only two dorsal fins removes

the present genus from the more typical Cod-fishes, where there are three dorsal fins. As a British example we may mention the Hake (*M. vulgaris*), found on the western and southern coasts.

MERMAID (Ger. *meer*, 'sea,' and *magd*, 'maid'), a mythic creature, supposed to be half woman and half fish, which probably originated in the cetaceous *dugong* and *manatee* (or sea-cow), which suckle their young at the breast. Their fore-fins somewhat resemble arms and hands, and their hinder part terminates in a fish-like tail.

MERO'PIDÆ, a family of Fissirostral birds, of which the Bee-eater (*Merops apiaster*) may be regarded as the type. [BEE-EATER.]

MEROVINGIANS. [FRANCE.]

MERRIMAC, River. [MASSACHUSETTS.]

MERSEBURG is the most eastern of the three governments into which the Prussian province of Saxony is divided, and has an area of 3994 square miles, with a population in 1862 of 831,555. The eastern and larger part of the government has in general a level surface, with gentle eminences, but no mountains; the western portion is more mountainous, being partly occupied by branches of the Harz mountains and the Thüringerwald; this portion, however, contains extensive and fertile levels, and the whole of the government, though the soil is unequal, may be called fertile. The principal rivers are the ELBE and its tributaries, the Schwarze Elster, on the right bank, the Mulde and the Saale on the left; the Saale receives the Elster and the Unstrutt. The government is traversed by the Magdeburg-Leipzig railway, which is joined at Halle by the Weimar-Halle line.

Merseburg, the chief town of the government, is situated on the Saale, 10 miles by railway S. by W. from Halle, and had at the last census, 11,837 inhabitants. The most remarkable buildings are—a fine palace, now used for the government offices; the cathedral, which has one of the largest organs in Germany; the cathedral school; the monastery of St. Peter, in the suburb of Altenburg; the palace of Count Zechi; episcopal palace; school of surgery; the military hospital; and the new town-hall. There are manufactories of various kinds, and extensive breweries and distilleries. The trade of Merseburg is considerable.

Dürrenberg, a small village between Merseburg and Lützen, has important salt-works, which produce about 12,000 tons of salt yearly.

Eilenburg, a town of 9800 inhabitants, stands N.E. of Merseburg, on an island in the Mulde, which is reached by two bridges. The town, which is surrounded by walls and ditches, has manufactories of printed cotton, vinegar, starch, brandy, woollen yarn, &c. Luther preached here at the commencement of the Reformation in 1522.

Eisleben, the birth-place of Luther, is situated 16 miles N.W. from Halle, on a hill above the Buse, and contains several churches, a gymnasium, schools, hospitals, and 9800 inhabitants, who are engaged in a brisk inland trade, in the manufacture of potashes and tobacco, and in linen weaving, and the silver and copper mines and smelting works of the neighbourhood.

Halle. [HALLE.]

Naumburg, a station on the Thuringian Railway,

standing near the right bank of the Saale, is a well-built town, surrounded by walls which separate it from several suburbs. The chief buildings are a fine Gothic cathedral, a hospital, the court-house, the town-hall, and the gymnasium. This town is the seat of the court of appeal for the governments of Merseburg and Erfurt. It has 14,500 inhabitants, who manufacture broad-cloth, cotton, linen, stockings, gloves, leather, starch, soap, vinegar, beer, brandy, and chemical products. Two great annual fairs are held here, one in June, the other in December, for the sale of all kinds of industrial produce; besides these, three other annual fairs are held for the sale of horses and cattle.

Sangerhausen, a well-built walled town, situated at the foot of the Harz mountains, 31 miles N.W. from Merseburg, has 6386 inhabitants, many of whom are engaged in the copper mines and works near the town. Some manufactures of linens and woollens are also carried on. In the place are two castles.

Torgau is a strongly fortified town, 70 miles S.S.W. from Berlin, situated in a low marshy country on the left bank of the Elbe, which is here spanned by a bridge partly of wood and partly of stone. The population is 8961; they manufacture woollen cloth, linen, hosiery, leather, and soap, and trade in corn, timber, and lime.

Weissenfels, a town of 8000 inhabitants, 11 miles by railway N.E. from Naumburg, stands on the right bank of the Saale, which here becomes navigable, and is crossed by a bridge. It is a walled town, entered by four gates, which lead to as many suburbs. On a rock outside the town stands an old castle, now used as barracks. A training house for schoolmasters, a gymnasium, an asylum for deaf mutes, two hospitals, and an almshouse, are the principal institutions of the town. Jewellery, porcelain, leather, and merino, are the chief manufactures. The remains of Gustavus Adolphus, king of Sweden, who fell at the battle of Lützen, are buried in the convent church, now no longer used.

Wittenberg, a fortified town N.N.W. of Torgau, situated on the Elbe, which is here crossed by a wooden bridge 1000 feet long, was celebrated for its university, which was united to that of Halle in 1817, and in which Luther was a professor in 1508. A colossal statue of Luther was erected in the marketplace in 1817, and the university church contains the tombs of him and Melancthon. Luther's cell in the Augustine convent, and Melancthon's house, are still preserved. The town has a theological seminary, a lyceum, gymnasium, several woollen and linen factories, breweries, distilleries, dye-houses, and 11,072 inhabitants, who are also engaged in gardening and in the Elbe fisheries. Wittenberg is on the railway from Berlin to Leipzig. It was taken by assault by the Prussians in 1814. The Reformation began here in 1517.

Zeitz, a walled town entered by six gates, built on the slope of a steep hill, on the right bank of the Elster, 18 miles S.E. from Naumburg, contains a fine old castle, called Moritzburg, a cathedral, a Protestant gymnasium, several churches, a lyceum, a library of 12,000 volumes, and 11,100 inhabitants, who manufacture calico, broad cloth, leather, starch, beer, spirits, pottery, gloves, ribands, &c.

MERSEY. [CHESHIRE; LANCASHIRE.]

MERTHYR TYDVIL. [GLAMORGANSHIRE.]

MERTON COLLEGE, OXFORD. This college was first founded at Malden in Surrey, in 1264, by Walter de Merton, bishop of Rochester and chancellor of England, who in 1274 removed it to Oxford.

The foundation formerly consisted of a warden, twenty-four fellows, fourteen post-masters, four scholars, two chaplains, and two clerks. Under the ordinance framed by the commissioners appointed for the purposes of the statute 17 and 18 Vict. c. 81, the following changes were made:—The fellowships are reduced from twenty-four to eighteen, and are now all open, without any preference in respect of place of birth. The other offices are also thrown open, but their number remains unaltered. The buildings of this college consist of three courts; the outer one, toward the street, was rebuilt in 1589, except the tower and gate, which are of the fifteenth century. The chapel, at the west end of the outer court, is also a parish church, dedicated to St. John the Baptist. It contains, among other monuments, that of Sir Thomas Bodley. (*Oxford University Calendar*, 1866.)

MERULIDÆ, a family of birds embracing the Blackbirds, Thrushes, Dippers (*Cinclus*), Orioles (*Oriolus*), Pittas (*Pitta*), Rock-thrushes (*Petrocincla*), and other denti-rostral genera. Mr. Vigors places this family between the *Laniadæ* or *Shrikes*, and the *Sylviadæ* or *Warblers*.

MERULIUS, a genus of Fungi, deriving its name from *Merula*, 'a blackbird,' some of the species being black. The only known means of preventing the attacks of this and other fungi upon timber is a free circulation of dry air, or the impregnation of the wood with corrosive sublimate.

MERVILLE. [NORD.]

MESEMBRYACEÆ, a natural order of polypetalous Exogens, consisting of plants inhabiting various parts of the world, in very dry temperate climates, but especially the Cape of Good Hope, where the species are extremely numerous. The common Ice-plant of the gardens, *Mesembryanthemum crystallinum*, so called because its cuticle is elevated in the form of multitudes of crystalline points, is burnt in the Canaries for the sake of its ashes, from which barilla is made.

MESENTERY, a term in Anatomy, applied to several duplicatures of the peritoneum, which maintain the different portions of the intestinal canal in their respective situations; allowing, however, more or less motion. They are formed of two laminae, between which are contained the corresponding portion of intestine and the vessels that pass to it. One only of these duplicatures has received the name of *Mesentery*, properly so called. This belongs to the small intestine which it suspends and retains *in situ*. Its posterior margin, which is the smallest, is straight, and descends obliquely from the left side of the body of the second lumbar vertebra to the iliac fossa. Its anterior margin is curved, and corresponds to the whole length of the small intestine.

MESHED, or MUSHED, a fortified city of Persia, the capital of Khorassan, in lat. 36° 17' N., long. 59° 25' E. Population, 100,000. It has manufactures of velvets, jewellery, sword-blades, &c., and gunpowder, and an active trade with Bokhara, Candahar, Herat, and Yzed. The town stands in the midst of

a fertile plain, is inclosed by strong walls about 7 miles in circuit, and contains the magnificent mausoleum of the Imam Riza and the Caliph Haroun-al-Raschid; but its private buildings are mostly of sun-dried brick, and its colleges are in ruins. The mosque is the richest in the world, having an annual revenue of 50,000*l.*, and has two minarets; the doors are studded with rubies, and covered with gold. The shrine is visited by about 30,000 pilgrims every year. The town is by far the most important in north-east Persia, being the centre of numerous converging routes. It is the chief city of the great sect of Shiites, and is thus of nearly equal importance with Mecca, the sacred city of orthodox Mohammedans.

MESMERISM. [ANIMAL MAGNETISM.]

MESNE, in law, a term denoting *intermediate*, or *intervening*. Thus *Mesne process* is generally used in contradistinction to *final process*, and signifies a writ or process issued between the commencement of an action, and the suing out of final process, or execution. By a recent statute the power of personal arrest on mesne process is abolished; and a capture cannot take place until final judgment has been given.

MESOLE, a mineral of a yellow or grayish-white colour, and pearly lustre. It is a fibelliform spar, and occurs in globules of a flat or lamellar structure, radiating from a centre. Its constituents are silica, alumina, lime, soda, and water.

MESOLITE (Gr. *μεσος*, 'middle,' and *λίθος*, 'a stone'), a mineral which occurs in long slender prisms, terminated by translucent quadrilateral pyramids, of a grayish colour, and sometimes colourless; specific gravity, 2.26.

MESOLONGHI, or MISSOLONGHI, perhaps the ancient *Olenus*, in Livadia, a small town in Greece, lies on the northern side of the Gulf of Patras, near its entrance, and right opposite Cape Kologria, or Papas, in the Morea, 22 miles west of Lepanto. It became remarkable during the last Greek insurrection against the Turks, through its siege and capture by Ibrahim Pasha, the commander-in-chief of the besiegers. The heroic resistance of the Greek garrison, and their ultimate fate, made the name of Missolonghi popular over all Europe. Lord Byron died here in 1824.

MESOPOTAMIA is a Greek word which means 'a tract between rivers.' Mesopotamia is called in the Old Testament *Aram-naharaim*, that is 'Aram,' or 'Syria between the two rivers,' and is the ancient name of the country lying between the Tigris and Euphrates. It was bounded on the N. by Mount Masius (*Karajeh Daghi*), a branch of Mount Taurus, and on the S. by the Median wall and the canals which connected the Tigris and Euphrates, by which it was separated from Babylonia. The name of Mesopotamia, which was never employed to designate any political division, did not come into use till after the time of the Macedonian conquest of Asia. It is called by the Arabs in the present day *Al Jezireh*, 'the island.'

Mesopotamia may be divided into two parts. The northern part, from Mount Masius to about 35½° N. lat., is a fertile country watered by the Chaboras and the Mygdonius; the southern part, from the neighbourhood of Circesium to the Median wall, is a flat

and deserted country, which Xenophon has described in the 'Anabasis' (i. 5). The northern part of Mesopotamia was divided into two parts by the river Aborras or Chaboras (*Khabour*), called Araxes by Xenophon, which rises in Mount Masius, and receiving the Mygdonius (*al Hualî*) on the E., flows into the Euphrates at Circesium. Of these divisions the western was called Osroene, and the eastern Mygdonia. The entire region is now comprehended in the pashalics of Diarbekr and Bagdad.

The chief town of Mygdonia was Nisibis, also called Antiochia Mygdonica (*Nisibin*), situated on the river Mygdonius, in a fertile plain at the foot of Mount Nisus.

The chief town of Osroene was Edessa (*Orfa*), in the north-west of the province, 9 geographical miles from the Euphrates. Two days' journey, according to Niebuhr, south-east of Orfa, was the ancient town of Charrae (*Harran*), the Haran of the Scriptures, where Abraham's family dwelt after they had left Ur of the Chaldees. Charrae is memorable in Roman history for the defeat of Crassus.

Circesium (*Kerkesia*), at the union of the Euphrates and Aborras, was a very ancient town: it is called Carchemish in the Old Testament. A little to the north of Circesium, near Thapsacus, was an ancient ford across the Euphrates.

MESOTYPE (Gr. *μεσος*, 'middle, and *τύπος*, 'form'), a mineral occurring in trap rocks (the prismatic zoelite), of a yellowish-brown, red, or white colour. Its specific gravity is 3.2; and its constituents silica, alumina, soda, lime, and water.

MESOZOIC (Gr. *μεσος*, 'life'), the name now given to the middle, or as it was formerly denominated, the secondary of the three great geological periods. It includes the New Red Sandstone, or Triassic, the Lias, the Oolite, the Wealden, and the Cretaceous series, and in England is peculiarly important on account of its wealth in fossil remains.

MESPIIUS, a genus of plants belonging to the natural order *Rosaceae*, and to the sub-order *Pomeae*. The species are trees, natives of Europe, and in a wild state are furnished with spines, which all disappear on cultivation. *M. Germanica*, the common Medlar, is a native of Europe and Siberia. It is found in Great Britain in hedges and thickets, in Surrey, Sussex, and Cheshire. It is cultivated on account of its fruit, which is eaten in a state of decay. Its taste and flavour are peculiar, and greatly esteemed by some persons. [FRUIT.]

MESSAGE, PARLIAMENTARY. An official communication, written or verbal, sent by the sovereign to either House of Parliament. Messages to the Commons to desire any proceedings on their part, are usually written in the sovereign's own hand; those sent when a member of the house is put under arrest on account of the public service are verbal, and delivered by a minister of the department of service concerned. Messages from the Commons to the Lords are sent by one member, but will not be received unless eight at least attend in all. Messages from Lords to Commons are sent by two masters in chancery, or on special occasions by two judges.

MESSE DI CAPELLA, in Music, a term used by the Italians as applicable to masses sung by the grand chorus; in which compositions there are various fugues, double counter-points, and other elaborate

constructions. *Messe Concertati* are masses in which the recitation is intermixed with choruses. (Busby.)

MESSENGERS-AT-ARMS are the officers who execute the writs issuing from the supreme courts in Scotland.

MESSENGERS, KING'S or QUEEN'S. Certain officers employed under the secretaries of state, who carry despatches both at home and abroad. They were formerly employed to serve the secretaries' warrants for the apprehension of persons suspected of high treason, or other grave offences against the state; and it was not unusual for them to keep the prisoners they apprehended in their own houses.

MESSE'NIA, a country of ancient Greece, was bounded on the E. by Laconica, on the N. by Elis and Arcadia, and was surrounded by the sea on the western and southern sides. It was separated from Laconica by the mountain chain of Taygetus; and from Elis and Arcadia by the river Neda and the high land which runs between the bed of the Neda and the sources of the Pamisus. Its area has been calculated by Clinton at 1162 square miles, which is about the area of Staffordshire.

Messenia is described by Pausanias as the most fertile province in the Peloponnesus. The western part of Messenia is drained by the river Pamisus, which rises in the mountains between Arcadia and Messenia, and flows southward into the Messenian bay (Gulf of Koroni). The basin of the Pamisus is divided into two distinct parts. The upper part, usually called the plain of Stenyclerus, is of small extent and moderate fertility; but the lower part south of Ithome is an extensive plain, celebrated in ancient times for its great fertility, whence it was frequently called *Macaria*, or the 'Blessed.' Leake describes it as covered with plantations of the vine, the fig, and the mulberry, and 'as rich in cultivation as can well be imagined.' The western part of Messenia is diversified by hills and valleys, but contains no high mountains.

On the division of the Peloponnesus, after the Dorian conquest under the Heraclidae, Messenia fell to the share of Cresphontes, who fixed his capital in Stenyclerus, and divided the country into five districts. Pylus, however, appears to have retained its independence till a much later time. The history of Messenia belongs to the general history of Greece, and is particularly connected with that of Sparta.

The chief towns on the western coast were Pylus and Mothone, or Methone (*Modon*). The bay of Pylus (*Navarino*), which is protected from the swell of the sea by the island of Sphacteria (*Sphagia*), is the best harbour in the Peloponnesus.

The only town inland of any importance was Messene, at the foot of Mount Ithome, on the summit of which was the citadel. Strabo speaks of this citadel and of Acrocorinthus as the two strongest places in Peloponnesus; and the account of Pausanias, who praises the strong fortifications of the town, is confirmed by the solid and beautiful masonry which remains to the present day. The area of the present government of Messenia is 1329 square miles, and the population in 1861 was 117,181. The capital is Calamoe.

MESSIAH is a Hebrew word, of the same signification as the Greek *Χριστός* (Christ) 'anointed.' In the Old Testament the word is repeatedly applied

to persons who were consecrated to the service of God in some sacred office. Thus the Jewish priests, prophets, and kings are called *anointed* (Messiah), or *the anointed of God*. From this general meaning the word has passed into a particular use, referring to the illustrious personage whom the Jews expected, and whom their descendants still expect, to confer some signal blessings on their nation and the world. The word is found in this sense twice in the Old Testament. (Psalm ii. 2, and in Daniel ix. 25, 26.)

The belief of the ancient Jews respecting the person and office of the Messiah is derived from the passages of the Old Testament which are understood as predictions concerning him. An elaborate examination of all such passages occupies the 4th chapter of the 2nd book of Dr. Smith's 'Scripture Testimony to the Messiah.'

At the time of Christ's advent various expectations respecting the Messiah prevailed among the Jews. It is sufficiently evident from the New Testament, that while some looked for a human prince who was to deliver them from the Roman yoke and exalt them to national supremacy, others expected a divine teacher, who was to confer spiritual blessings not only upon them but also on the Gentiles. The opinion of the Samaritans recorded in John iv. 42, that the Messiah would be a religious teacher and 'the Saviour of the world,' is worthy of special attention, because the Samaritans received no part of the Scriptures but the Pentateuch, and were cut off from all intercourse with the Jews by national hatred.

It is the belief of all Christians that Jesus Christ is the Messiah predicted in the Old Testament. The evidence of this fact is contained in the four gospels, from which it appears that his lineal descent, the place, time, and other circumstances of his birth, life, and death, the miracles he performed, and the doctrines he taught, all agree to the minutest particular with the prophecies respecting the Messiah. For a new view of his life, see the work entitled 'Ecce Homo.' [JESUS.]

MESSINA, a province of the Kingdom of Italy, is bounded W. by the province of Palermo, S. by that of Catania, N. by the Mediterranean, and E. by the Faro or Strait of Messina. The area of the province is 1699 square miles, and the population in 1862 was 394,761. A continuation of the mountainous ridge that crosses Sicily from W. to E. covers the greater part of the surface, and terminates in Cape Pelorus. The streams are numerous, but short: in summer, nearly dry; during the rainy season, torrents. The province contains many beautiful and fertile valleys. Its chief products are silk, hemp, flax, sulphur, wine, oil, and fruit of every sort. The province is divided into four districts, twenty-seven circondarios, and ninety-seven communes. Among the chief towns of the province are those that follow:—MESSINA. *Melazzo*, the ancient *Mylæ*, a seaport town on a promontory of the northern coast facing the Lipari islands, stands 15 miles west of Messina, and has a castle and 10,493 inhabitants, many of whom are employed as sailors and fishermen. *Patti*, on the same coast, 15 miles south-west of Melazzo, has several churches and convents, and 7574 inhabitants. *Taormina*, the ancient *Tauromenium*, on the east coast, an old-looking town

with 2978 inhabitants, is built upon a steep cliff towering above the sea; it has an ancient theatre and other ruins scattered around. *Castro-Reale*, in a valley rich in oil and wine, has 7553 inhabitants. *Mistretta*, in the most western part of the province, has a population of 10,638 (1861).

The islands of Lipari are included in the administrative province of Messina. [LIPARI ISLANDS.]

MESSINA (the ancient *Zancle* and *Messana*), the chief trading town and port of Sicily, lies on the north-east coast of the island. The town is built partly on a declivity, and partly on the sea-shore. The larger part of it rises in the form of a crescent on the west side of the harbour, along which there is a fine quay lined by a handsome row of buildings. The public buildings are—the cathedral, the churches of La Candelara and the Capuchins, which contain some fine pictures; the Greek church of Santa-Maria; the royal palace; the archiepiscopal palace; the arsenal, the loggia, the bank, the convents, the public library, hospitals, theatres, a town hall, exchange, custom-house, lyceum; with a lazaretto on the east side of the harbour. The town has several broad quays, and generally wide streets, paved with lava. The port is defended by a citadel and six forts. Messina gives title to an archbishop; it has a provincial court of appeal, a commercial tribunal, a royal college, and in 1862, 103,324 inhabitants. Some manufactures of damasks and satins are carried on. There are also many tanneries and iron foundries. The port is formed by a strip of sandy beach projecting into the sea south of the town, and sweeping into a semicircle. The harbour, which is about 4 miles in circumference, is one of the best in the Mediterranean. It has deep water throughout, and large vessels can load and unload close to the quays. The chief exports are oranges and lemons, raisins, currants, silk, wine and spirits, olive oil, linseed, salt fish, &c.; the imports consist of colonial produce, cotton and woollen goods, hardware, and other manufactured articles. The total value of all the imports in 1864 was 884,298*l.*; of all the exports, 986,738*l.* The former restrictive quarantine measures having been done away with, and every facility being now afforded to vessels of all nations, foreign shipping at this port has considerably increased during the last five or six years. It has steam communication with Naples, Marseilles, and Malta; and an active tunny and other fisheries. There are three lines of British steamers trading regularly to Messina—viz., fifty arrive and depart every year, with an aggregate tonnage of 20,000 tons, from and to London, touching at several Italian ports; thirty, carrying altogether about 24,000 tons, from Liverpool, for Corfu and Trieste; and thirty more, measuring a total of 10,000 tons, from and to Liverpool and Glasgow, touching at Italian ports. The coasting trade, which was formerly restricted to national vessels, is now open to ships of several nations, but is chiefly carried on by Italian steamers, which touch at several places on the coast of Italy and Sicily. A dry dock, between the Lazaret and Fort St. Salvatore, capable of containing vessels of the largest burthen, has just been completed. Great damage was done to the city in 1848, when it was taken by the Neapolitan troops, after a bombardment of five days, on the 7th of September. Messina surrendered to the Sardinians,

on the 13th March, 1861, and thus became annexed to the new kingdom of Italy.

MESTA, a Spanish word which commonly means a mixture of two or more kinds of corn, but is applied in a particular sense to the union of the sheep of several proprietors in one collective body: of the custom denoted by this particular application of the term, the present article treats. The vast tracts thrown out of cultivation, and left unoccupied after the expulsion of the Moors from Estremadura in the thirteenth century, were soon clothed by nature with rich pasture, which attracted the attention of the upland shepherds of Leon and Castile, who drove their flocks thither to milder winter quarters. The great plague of 1348, which swept away two-thirds of the population of Spain, left many more unclaimed and uninhabited lands in most of the provinces of Spain, and on these also the restless flocks soon encroached. On this custom of migratory pasturage, originating in usurpation, in circumstantial necessity, or in both, the proprietors of the flocks, who have always included the great nobles, conventual and other ecclesiastical corporations, and persons in power, founded a claim, which long possession converted into a prescriptive right, so that the mesta has long been an institution of Spain, regulated by a special code, and guarded by its own judges and courts of law. The number of these migratory sheep at the present time probably exceeds five and a half millions. In the month of April the flocks leave the plains of Andalucia and Estremadura for the cooler pastures of Leon, the two Castiles, and Arragon, whence they begin to return southwards in October. For the lands depastured during the winter months a low price is paid, regulated by usage, and on which no advance is allowed. The sheep are divided into flocks of 10,000, each managed by a conductor, who has under him fifty shepherds and as many dogs. They pass unnoledsted, and feed over the pastures and commons that lie on their road; they are not allowed to traverse cultivated lands, but the proprietors of such lands are obliged to leave a clear space, 85 yards wide on each side of the road, for the passage of the flocks. At night they are penned in with nettings made of the esparto rush. The different routes and the length of each day's journey in these migrations are fixed by immemorial usage. Lambing takes place during the winter sojourn in the south. The sheep-shearing commences in May on the northward journey, and is effected in vast buildings by the road-side, called *Esquileo*, capable of containing 50,000, and some of them 60,000 sheep; the principal of these buildings are in the environs of Segovia.

The Spanish sheep are descended from a cross between the famous Baetican breed and a flock of English sheep sent over with John of Gaunt's daughter, Catherine, on her marriage with the heir of Enrique III., king of Castile. These are said to have been called *marinos* from having come over the sea, and hence by corruption came the name *merinos*. The wool of the sheep belonging to the mesta is celebrated for its fineness, length of fibre, and silky softness; this excellence is said to be owing to the habits of the sheep, whereby they are led to live in almost always the same temperature. The carcass of the mesta sheep is bad; indeed they are prized

only for the fleece; after five years they are useless, having then lost their teeth. The sheep know of themselves when to go northwards, and when to return to the south; and if not led on will set out of their own accord. They are always on the move (except when penned for the night), and from this circumstance they are distinguished from the stationary sheep of Spain by the name of *trashumantes*, or 'wanderers.'

MESTIZO, in Spanish America, the child born of a union between a Spaniard or Creole, and a native Indian.

METAGALLIC ACID is a black, shining, tasteless compound, not dissolved by water, but easily taken up by the alkalies, ammonia, potash, and soda, in solution. It consists of $O^3 H^3 Cl^2$.

METAGENESIS (Gr. *μετά*, 'change,' and *γένεσις*, 'birth'), a term applied to those changes of form which the representative of a species undergoes in passing, by means of successively generated individuals, from the egg to the perfect state: as, the egg of the Medusa develops into a polype, which, assuming a form called Strobila, separates into numerous individual young Medusae. The larval polype produces other similar polypes by gemmation, each of which, after becoming a Strobila, is resolved into numerous Medusae.

METALLURGY is the art of separating metals from their ores. The processes vary for every metal.

METALS. A class of simple or elementary bodies, as distinguished from the non-metallic substances, frequently but improperly called *metalloids*. They are at present supposed to be upwards of fifty in number; namely, aluminium, antimony, arsenic, barium, bismuth, cadmium, caesium, calcium, cerium, chromium, cobalt, copper, didymium, erbium, glucinum, gold, ilmenium, indium, iridium, iron, lanthanum, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, niobium, norium, osmium, palladium, pelopium, platinum, potassium, rhodium, rubidium, ruthenium, silver, sodium, strontium, tantalum, tellurium, terbium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, and zirconium. This catalogue is constantly liable to be increased by new discoveries, whilst on the other hand, the distinct nature of some of the above may be disproved. The right of certain bodies to be regarded as metals is a matter of grave dispute. Thus arsenic, boron, selenium, silicon, and tellurium are alternately pronounced to be metallic and non-metallic, according to the varying weight assigned to certain analogies. Even hydrogen, a permanent gas and the lightest of all known bodies, has been pronounced a metal, the type of the so-called magnesium group. Hence we see that, like most binary antagonistic classifications, the division of bodies into metallic and non-metallic is of exceedingly little value, and cannot stand a critical examination. With the exception of mercury, which is liquid, the metals are solid at ordinary temperatures, though potassium is soft as wax at the heat of the human hand. All are fusible save arsenic, which when heated passes at once into a state of vapour without liquefaction. Their melting points vary, however, exceedingly. Thus while potassium fuses at 136° Fahr., titanium, platinum, iridium, and tantalum withstand the most intense heat of an ordinary furnace.

Some metals are readily volatilized at moderate temperatures, and may in consequence be distilled. Among these are mercury, potassium, sodium, zinc, cadmium, arsenic, and tellurium, whilst others may be maintained for a long time in a state of fusion without any perceptible loss.

The metals are of all substances the best conductors of heat. If the conducting power of gold be assumed = 1000, that of platinum is 981, of silver 973, of copper 898, iron 374, zinc 363, tin 304, lead 180. Their capacity for heat follows a different series, bismuth and lead ranking first.

The facility with which metals conduct an electric current varies with the temperature. At 32° Fahr. the series is as follows:—Silver, copper, gold, tin, iron, lead, platinum. According to Pouillet each of the following metals is electro-positive towards those which succeed:—Zinc, lead, tin, iron, antimony, bismuth, copper, mercury, silver, gold, tellurium, palladium, platinum. It must, however, be remembered that the relative electric position of a metal is liable to be modified by the nature or even the degree of concentration of the liquid—acid, alkaline, or saline solution—with which it is in contact. The following metals are capable of being rendered *magnetic*, that is, of being attracted by either pole of a magnet, and when suspended between two magnetic poles, of pointing in a straight line between them:—Iron, nickel, cobalt, manganese, chromium, cerium, titanium, palladium, platinum, and osmium. The remaining metals are *diamagnetic*, that is, are repelled by either pole, and if suspended between two magnetic poles, point at right angles to the line of connection.

Copper and titanium are reddish, and gold yellow, but the remaining metals are all of various shades of gray; when in a very fine state of subdivision they appear black.

Their lustre, known as the *metallic* lustre, is peculiar and characteristic. They differ, however, very considerably in the degree in which they possess this attribute, and in many it is only temporarily elicited under the burnishing steel. The metals are generally considered perfectly opaque, even when reduced to thin leaves. Gold leaf, however, which is only 1-200,000th of an inch thick, transmits a portion of greenish light. It is probable, therefore, that the other metals also would be semitransparent could they be rendered sufficiently thin.

A high specific gravity was formerly supposed a characteristic attribute of metals—a notion overturned by the discovery of potassium and sodium, which are so light as to float upon water. Gold and platinum are the heaviest bodies known, the density of the latter being 22½.

Some metals, such as gold, silver, copper, tin, lead, cadmium, zinc, iron, platinum, palladium, potassium, sodium, nickel, and frozen mercury, are malleable, *i.e.*, admit of being hammered out into plates or leaves. The remainder are more or less brittle, and some, such as arsenic, antimony, and bismuth, are readily reduced to powder. Gold is the most malleable. Certain malleable metals are ductile, or capable of being drawn into thin wire. Gold, silver, platinum, iron, and copper are most to be noted in this respect. The ductility and malleability of the same metal are not always in proportion. Iron is

the most tenacious, and titanium the hardest metal. The structure of metals is lamellar, granular, fibrous, or crystalline. Bismuth, tin, and copper readily assume a crystalline form.

In a chemical point of view metals are divided into *light* and *heavy*. The former when united with oxygen yield alkalies and earths, whilst the latter under the same circumstances form what are known as metallic oxides.

All metals may be combined with oxygen. Some take up this element at common temperatures from air or water, whilst others—the so-called *noble* metals—can only be oxidized by the aid of acids, and readily resume the metallic state. Some of the oxygen compounds of metals are acid, others basic, and others again, the suboxides and peroxides, play neither part.

Metals form numerous and important compounds with chlorine, bromine, iodine, fluorine, and sulphur; but their combinations with hydrogen, nitrogen, carbon, and boron are few, and in general of little moment.

Among themselves metals form a class of compounds known as alloys. These are generally harder and more elastic than the metals of which they are composed, and are in consequence, of great utility in the arts and manufactures. Brass, bronze, pewter, white metal, German silver, bell-metal, type-metal, solder, and the compounds of silver and gold used for coinage and jewellery, are the most important.

Most of the metals are readily soluble in acids. Platinum, however, can only be dissolved in hot concentrated nitro-muriatic acid, and upon iridium even this acts but very feebly.

METAMORPHIC ROCKS (Gr. *μετά*, and *μορφή*, 'form'), those rocks or materials of the earth's crust which are not now in the condition in which they were originally accumulated; such as marbles, quartzites, slates, gneiss, micaceous and other schists, sandstones, shell limestones, and the like.

METAMORPHOSIS OF PLANTS. [VEGETABLE MORPHOLOGY.]

METAPHYSICS. Metaphysics is a word which has received definitions various and apparently contradictory, but the most important of which are, nevertheless, ultimately reconcilable. The best conspire in representing it as the science of the primary principles of human knowledge, or which determines the ultimate meaning, foundation, and limits of our beliefs. It is, in short, the science of the sciences—the regulative science of human knowledge and belief. And as the solution of its principal problems implies a systematic study of Mind, it has also been described as the science of the facts—the fundamental facts in the universe—or phenomena of consciousness. As expressive of summary or ultimate science, or at least of the aspiration after it—the aspiration after the purification and perfection of our intellectual life, Metaphysics and Philosophy are used often as synonyms.

The origin of the term Metaphysics is obscure. It was probably first applied to those books of Aristotle which profess to unfold a Science of Being, and which, in the arrangement of his works, followed his Physics. They were accordingly called by his editors 'those after the Physics' (*τὰ μετὰ τὰ φυσικά*); and by the Stagyrite himself, they are referred to under

the names of Theology, First Philosophy, and Wisdom (σοφία). Discussions essentially metaphysical in their character constitute the Dialectic of Plato; which is conversant with a phase of the problems common to it with the Wisdom of Aristotle, and with the metaphysical systems of modern Europe.

Modern is distinguished from ancient Metaphysics by its closer relation to the facts or phenomena of human consciousness. The metaphysical aspiration was originally directed to *being* as distinguished from *phenomenon*; because the former implied the notion of the permanent and necessary, as contrasted with the transitory and contingent, which entered essentially into the ancient conception of a phenomenon. Being or the Real was regarded as necessary and eternal; phenomena or the apparent, as contingent and temporal; and as the ideal of the metaphysician is in the former and not in the latter, Being was regarded as the common object of all high philosophical study. But metaphysicians have sought to contemplate Being or the Real either in abstraction from, or else in and through means of, the successive phenomena of human consciousness. At the former of these two points of view, commencing with abstract axioms about Being as such, they have sought to deduce *à priori* the essential characteristics of its evolutions in time; at the latter of these two points of view, they have sought *à posteriori* to determine the limits of the intellectual power of man, as well as the nature and origin of those conceptions of necessity, permanence, and objective externality, of which we are conscious. The abstract or *à priori* point of view is common to ancient and mediæval with some modern metaphysicians; the analysis of our conscious life, and especially of intelligence, for metaphysical purposes, is more particularly characteristic of the modern mind. In Aristotle, Spinoza, and Hegel, we have specimens of abstract and demonstrative metaphysics; in Locke, Kant, and among the Scotch metaphysicians, we have investigations into the actual possibility of an *à priori* metaphysics which transcends our presentative and representative experience. The *possibility* of a necessary Science of Being as such, is the problem discussed, and resolved in the negative by Locke, Kant, Reid, and Hamilton; while these philosophers have differed among themselves in their manner of describing and analyzing the conscious life by which human science is according to them determined and limited.

The various points of view thus occupied by metaphysicians have suggested a variety of names applicable to portions and phases of the metaphysical province. As the Science of Being *per se*, or in its most abstract character, and aloof from an inductive analysis of our entire conscious experience, it is called Ontology. As the science of Supreme and Absolute Being, or God, it is Theology. As a science purely speculative, and having for its objects supersensual ideas, unattainable by presentative experience, it is Transcendental Philosophy. As an inquiry into the possibility of ontological, theological, and supersensual science, in consistency with the constitution of human nature, it is Intellectual or Rational Psychology. As an induction of the phenomena of an embodied consciousness, in the spirit of merely physical research, it is Empirical or Inductive Psychology.

A course of metaphysics may be introduced by

descriptions of our ideas and conscious life, as intelligent, emotional, and volitional; and inductions of the laws of our conscious states as spontaneously associated. The course or system itself consists properly of two great problems—the problem of finite, conditioned, or relative existence, suggested by the Perception through which we are brought in the senses into relation with an External World; and the problem of Infinite or Unconditioned existence and Absolute Reason or Science, with the mass of speculative thought to which it has given rise, by which the history and character of opinion on all questions has from age to age been more or less determined.

Metaphysics, or the Science of Knowledge and Belief in its *ultimate principles*, is the complement to Logic, or the Science of Knowledge and Belief as *reasoned*. The latter is the introduction to, and the former the consummation of, education in philosophy. [LOGIC, PHILOSOPHY.]

As examples of works expository of modern metaphysics, the reader may be referred to the *Meditations and Principles of Philosophy* of Des Cartes; the *Essay* of Locke; the *Principles of Human Knowledge* of Berkeley; the *Critik of the Pure Reason* of Kant; the *Essays* of Reid, with the *Notes* of Sir W. Hamilton, and his other metaphysical works.

METEMPSYCHO'SIS (μετεμψύχωσις), derived from a Greek word signifying the passage or transmigration of souls, forms a part of the philosophical or religious belief of the Hindus. The migration of souls from one body to another also formed a leading feature of the Pythagorean doctrine, and was a part of the Egyptian religious system.

METEORIC STONES, or *Aérolites*, are bodies which have fallen upon the earth from the atmosphere, and are named from *ἀήρ* (*aēr*), 'atmosphere,' and *λίθος* (*lithos*), 'a stone.' The generic name of *Luminous Meteors* is now, however, more commonly adopted, and includes falling or shooting stars, bolides, and the like. The fall of stones from the atmosphere was known to the Greeks; but the first man of science in modern times who directed attention to the subject of *aérolites* was Chladni, a German philosopher, who, in a tract published at Riga and Leipzig, in 1794, upon the mass of native iron found by Pallas in Siberia, maintained the credibility of the traditions of that and other stony bodies having fallen from the air. From that time greater attention than before was paid to the popular accounts of meteoric stones. In 1796 a stone was exhibited in London, weighing fifty-six pounds, which was said to have fallen in Yorkshire, in December of the preceding year. In the year 1799, Sir Joseph Banks received a circumstantial account, accompanied by specimens, of a fall of stones from the atmosphere, which was said to have taken place near Benares, in the East Indies, in the preceding December; and as these specimens were nearly identical with the Yorkshire stone, incredulity began to give way. It was not, however, until the appearance of a paper by Howard, in the 'Philosophical Transactions' for 1802, giving an account of his analysis of the Benares stone, that men of science declared their belief in the phenomenon.

A detailed description of one very remarkable shower of stones will illustrate the subject generally. On the 26th of April, 1803, at one o'clock in the

afternoon, the sky being clear, with the exception of a few light clouds, a ball of fire was observed in Normandy, in many places far distant from each other—namely, Caen, Falaise, Alençon, Verneuil, and Pont Audemer, which moved rapidly from south-east to north-west; and about the same time, in the district of L'Aigle, loud explosions were heard, which lasted from five to six minutes, resembling the sound of cannon and musketry, and were followed by a long-continued noise, like that of many drums. The meteor from which the noise proceeded appeared not so much like a ball of fire, but rather like a small rectangular cloud, which, during the phenomenon, seemed not to move; but the vapour of which it consisted was sent out, after each explosion, in all directions. It seemed to be about half a league north-west from L'Aigle, and must have been at a very considerable elevation, as it appeared to the inhabitants of two villages, more than a league distant from each other, to be immediately over their heads at the same instant. Throughout the whole district over which the cloud hung, there was heard a hissing noise, like that of a stone from a sling, and a vast number of stones fell to the ground. The space on which they fell formed an ellipse of two leagues and a half long by one broad, the largest diameter being from south-east to north-west, the direction in which the meteor moved: the largest stones were found at the south-east end of the ellipse, and the smallest at the opposite extremity. Above two thousand were collected, and they varied in weight from two drams to seventeen pounds and a half.

Ærolites, when taken up soon after their fall, are extremely hot. They are generally angular, of prismatic and pyramidal forms, the angles being rounded; their broken irregular surface is coated with a fused black crust, like varnish, seldom exceeding 1-50th of an inch, or a quarter of a line, in thickness. When broken, they differ a little in appearance; but they are, for the most part, composed of a collection of small spherical bodies, of a gray colour, imbedded in a gritty substance, and often interspersed with yellow spots. One of the most remarkable circumstances is the great similarity of composition of all the meteoric stones, on whatever part of the earth they have fallen. Iron, nickel, silica, magnesia, and sulphur are the chief ingredients, especially iron; but the earths, alumina and lime, the metals manganese, chrome and cobalt, together with carbon, soda, and water, have also been found in minute and variable quantities. No new substance, nothing with which we were not already acquainted, has ever been discovered in their composition.

Chladni has compiled a very copious catalogue of all recorded instances, from the earliest times: of which twenty-seven are previous to the Christian era; thirty-five from the beginning of the first to the end of the fourteenth century; and eighty-nine from the beginning of the fifteenth to the beginning of the present century. Within the last fifty years a vast number have been recorded; but the actual number must greatly exceed the recorded instances. Livy, Plutarch, and Pliny all speak of meteoric stones which had fallen in ancient times.

Besides ærolites properly so called, masses of malleable iron, often of vast size, have been found

in situations which, together with their composition, leave no doubt as to their being of meteoric origin. An immense mass, seen by Pallas in Siberia, was found quite insulated, at a great elevation, on a mountain of slate near the river Yenesei, removed from everything that could excite suspicion of its being a production of art, and totally different from any ore of iron seen either before or since that time. The mass, which weighed about 1400 lbs., was of an irregular form, not solid, but cellular like a sponge, the cells containing small granular bodies of a glassy nature, afterwards found to be the simple mineral olivine, so common in basalt. Another vast mass of meteoric iron was found in South America in 1778, about 500 miles north-west from Buenos Ayres. It lay in a vast plain of above a hundred leagues in extent, half sunk in the ground, and the size was such as, estimating it by the specific gravity of iron, would give a weight of more than thirteen tons. According to the analysis of Proust and of Howard, it contains 90 per cent. of iron, and 10 of nickel. Another mass was found in Brazil, about 50 leagues from Bahia, the weight of which was estimated at 14,000 lbs. Many other instances of similar masses of iron might be mentioned, which are evidently of meteoric origin; but the only instance on record of iron having been actually seen to fall from the atmosphere, is that which took place at Agram, in Croatia, in 1751. On the 26th of May, about six o'clock in the evening, the sky being quite clear, there was seen a ball of fire, which shot along with a hollow noise from W. to E., and after a loud explosion, accompanied by a great smoke, two masses of iron fell from it, in the form of chains welded together. The average number of meteors which traverse the atmosphere daily has been estimated at 7,500,000. In 1799 and 1833 they were so numerous that 34,000 fell per hour.

Ærolites and meteoric iron are not the only products of meteors which have fallen upon the earth after explosion. Numerous instances are mentioned of black and red dust, which has covered great tracts of land; and of the fall of a soft gelatinous matter of a red colour like coagulated blood, which may have given rise to stories of the sky having rained blood. Such appearances have not unfrequently accompanied the fall of stones.

The origin of this remarkable class of natural phenomena is involved in great obscurity, and many different theories have been proposed to account for them. By some they have been supposed to be bodies ejected from distant volcanoes belonging to our earth. Another hypothesis is, that meteoric bodies are formed in the atmosphere. A third that they are bodies thrown out by the volcanoes which are known to exist in the moon, with such force as to bring them within the sphere of the earth's attraction. But the theory most consistent with all known facts and laws of nature is that proposed by Chladni, viz., that they are bodies moving in space, either accumulations of matter as originally created, or fragments separated from a larger mass of similar nature. Davy remarks, 'The velocity of motion of these bodies must, in all cases, be immensely great, and the heat produced by the compression of the most rarefied air from the velocity of motion must be probably sufficient to ignite the mass; and all the

phenomena may be explained, if *falling stars* be supposed to be small solid bodies moving round the earth in very eccentric orbits, which become ignited only when they pass with immense velocity through the upper region of the atmosphere, and if the *meteoric bodies* which throw down stones with explosions be supposed to be similar bodies which contain either combustible or elastic matter.'

The latest views on this subject regard meteors rather as being planetary than mere satellites of the earth. Humboldt says, in his '*Kosmos*,' 'Shooting stars, fire-balls, and meteoric stones are, with great probability, regarded as small bodies moving with planetary velocity, and revolving in obedience to the laws of general gravity in conic sections round the sun. When these masses meet the earth in their course, and are attracted by it, they enter within the limits of our atmosphere in a luminous condition, and frequently let fall, more or less strongly heated, stony fragments, covered with a shining black crust.' The fire-balls which are occasionally seen to shoot across the sky, have been estimated at from 500 to 2800 feet in diameter; their height, when visible from the earth, at from 16 to 140 miles; and their velocity of motion at from 18 to 36 miles in a second. The regular recurrence of shooting stars, about the middle of the months of August and November of each year, is considered to confirm this astronomical view of the origin of meteorolites; and different days throughout the year have been marked as distinguished by these phenomena, as if there were streams of these small bodies near the earth on those days. Humboldt's final views may be gathered from the following:—'The different meteoric streams, each of which is composed of myriads of small cosmical bodies, probably intersect our earth's orbit in the same manner as Biela's comet. According to this hypothesis, we may represent to ourselves these asteroid-meteors as composing a closed ring or zone, within which they all pursue one common orbit.'

The origin and composition of these remarkable bodies remains, however, a constant subject of scientific speculation. The most recent theory is that propounded by the eminent physicist, Mr. H. C. Sorby. In his paper in the '*Proceedings of the Royal Society*' he says that, in the first place, it is important to remark that the olivine of meteorites contains most excellent 'glass cavities,' similar to those in the olivine of lavas, thus proving that the material was at one time in a state of igneous fusion. The olivine also contains 'gas cavities,' like those so common in volcanic minerals, thus indicating the presence of some gas or vapour. To see these cavities distinctly, a carefully-prepared thin section and a magnifying power of several hundreds are required. The vitreous substance found in the cavities is also to be met with outside and amongst the crystals, in such a manner as to show that it is the uncrystalline residue of the material in which they were formed. It is of a claret or brownish colour, and possesses the characteristic structure and optical properties of artificial glasses. Some isolated portions of meteorites have also a structure very similar to that of stony lavas, where the shape and mutual relations of the crystals to each other proved that they were formed in situ on solidification. A structure is also found so remarkably like that of consolidated volcanic

ashes as to be mistaken for it. It would appear that after the material of the meteorites was melted, a considerable portion was broken up into small fragments, subsequently collected together, and more or less consolidated by mechanical and chemical means, amongst which must be classed a segregation of iron, either in the metallic state or in combination with other substances. 'There are,' says Mr. Sorby, 'certain peculiarities in physical structure which connect meteorites with volcanic rocks, and, at the same time, others in which they differ most characteristically—facts which, I think, must be borne in mind, not only in forming a conclusion as to the origin of meteorites, but also in attempting to explain volcanic action in general.'

On the 25th of August, 1865, some remarkable meteorites fell in the territory of the tribe of Senhadja, Algeria, of which a native Arab gave the following graphic description:—'It was about midday,' he says, 'I was returning from the forest, when all at once I heard a violent report, not unlike that of several pieces of cannon. I was surprised and looked around me. It could not be thunder, for an instant before the sky had been quite clear. Almost at the same instant I heard a rumbling noise in the air. I crouched down, recommending my soul to God, thinking I must be crushed by the object coming from the sky; but at that moment the object fell near me, throwing up a cloud of dust. I ran to it, quite astonished at my not being dead, and found it was a stone. In attempting to get it out of the hole, I was obliged to withdraw my hand immediately, for I felt an excessive heat. I waited some time, and then went to fetch other persons with pickaxes, and in the course of the evening we got out the stone, which had lost nearly all its heat. We broke off some pieces in order to preserve them carefully as amulets against infernal spirits, and then we carried it to the caid.' From subsequent information collected by M. Grenade, a surveyor, it appears that the original shape of the stone was a parallelepipedon with a nearly square base, but with its faces bulging out a little in the middle. It was 35 centimètres long, about 16 feet deep and 22 feet broad; it weighed 25 kilogrammes. The hole it had made in the ground was 50 centimètres deep. The ground, it is true, was soft to the depth of about 20 centimètres, but at that depth was a very hard limestone.

METEOROLOGY, derived from the Greek adjective, *μετεωρος*, signifying 'suspended in the air,' is the science which treats of the atmosphere, and the various causes which affect its condition. The most important of these are temperature and watery vapour, which by their combined effect produce variations in pressure, wind, and rain or other downfall.

For information relative to the chemical constitution and the mass of the atmosphere, we must refer to the article *ATMOSPHERE*.

Temperature.—The temperatures of the atmosphere and of the surface of the earth are dependent on the amount of heat received by radiation from the sun, and also inversely on the amount radiated away into space. It is probable that the atmosphere presents less resistance to the admission of heat from the sun than to its escape, so that the presence of the atmosphere tends on the whole to make the earth warmer. The lower strata of the atmosphere are

warmer than the higher, and have nearly the same mean temperature as the surface of the earth.

In general, the temperature of the surface of the earth and of the lower strata of air is greatest near the equator, and diminishes as we recede from it—a difference which is obviously owing to the greater obliquity of the sun's rays with increasing latitude. But other causes modify this effect, and, in fact, the system of *isothermal lines*, *i.e.*, lines drawn through those places which have the same mean annual temperature, is found to differ very considerably from the parallels of latitude. (See Plate.) The hottest portion of the land is Central Africa, about 10° north of the equator, and the hottest portion of the open sea is in the Pacific, a few degrees south of the equator, the mean temperature of the air in both these regions being about 84°. In like manner the north pole is (probably) not the coldest part of the northern hemisphere. It appears that there are two poles of cold (*i.e.*, centres of greatest cold in the northern hemisphere, both situated between lat. 75° and 80°, one of them to the north of Siberia, in about 120° east long., the other to the north-west of Baffin's Bay, in about 80° west long., their mean temperatures being from 1° to 3°. The mean temperature of the British Isles is much higher than that of most places in the same latitude, being for the centre of Great Britain about 50°, which is the same as that of New York, although the latter place is about 13° further south. The high mean temperature of the British Isles is owing to the prevailing south-west winds, which blow from a warm region of the Atlantic, and arrive at our shores laden with warmth and moisture. These winds in their course pass over the Gulf Stream, which is a current of warm water of great breadth and depth flowing through the ocean. It takes its name from the Gulf of Mexico, from which escaping through the Gulf of Florida, it flows in a N.E. direction as far as about 38° N. lat. It then turns to the eastward and becomes gradually wider and less rapid, until, after passing halfway across the Atlantic, its course can with difficulty be traced. It would appear that one branch of it winds round to the southward and loses itself in that part of the ocean called the Sargasso Sea; while another branch takes a north-easterly course past the coast of Ireland, Scotland, and Norway, contributing materially by its vicinity to the relatively high temperature of these countries.

But the climate of a place, as regards temperature, depends not only on the mean temperature (*i.e.*, the average of all times of the year), but also very much on the *range* of temperature (*i.e.*, the difference between the hottest and coldest times). Small islands in the midst of large oceans have always a very small range of temperature, while the interior of large continents has a very large range. This difference is caused by the different properties of land and water as regards heat. The heating of land by the sun's rays takes place principally at the surface, which is many degrees warmer in summer, and colder in winter, than the soil a few feet deeper—a state of things which never exists in the ocean, where the intermingling of the waters renders any considerable difference of temperature impossible. Another obstacle to variations of temperature at sea is the latent heat of steam—increase

of temperature producing increased evaporation, which is a cooling process; while, on the other hand, when much moisture is present in the air a fall of temperature produces condensation, a warming process. The equable climate of Great Britain, which is warmer in winter and cooler in summer than the continent of Europe, is mainly owing to the amount of moisture present in its atmosphere, or both these peculiarities are owing to the vicinity of the ocean, and to the winds which blow thence.

Moisture is another important element of climate. The amount of water which can be held in the form of vapour within a given space of air, depends chiefly on the temperature; the warmer the air, the greater is the quantity of vapour that it can contain. Vapour is never absent from any portion of the air which we breathe; and, on the other hand, it is very rarely that the full amount of vapour which can be contained is actually present. When this full amount is present, the air is commonly said to be *saturated*; but the phrase is objectionable as regards scientific accuracy, inasmuch as the quantity of vapour which can be contained in a given space at a given temperature is the same, whether the space is empty or full of air; so that if the word saturation is to be applied at all, it should be to the space, not to the air contained in the space.

When the amount of vapour present in the atmosphere is less than usual, we experience a feeling of harshness in the air; on the other hand, an excess of vapour produces a feeling of closeness. In the former case perspiration is rapidly evaporated, and the skin has consequently a tendency to dryness; in the latter case, from slowness of evaporation, perspiration speedily becomes sensible.

Since the amount of vapour necessary for saturation increases with the temperature, it is obvious that by lowering the temperature we produce an approach to saturation. When air (containing vapour) is cooled to such an extent as just to produce saturation, it is said to be cooled down to its *dew-point*. If it is cooled below this point a portion of its vapour will pass from the gaseous to the liquid form, and will be deposited in the form of dew or rain. In nature, dew is produced by the cooling of the ground below the dew-point of the air in contact with it; while rain is produced by the cooling of a mass of air below its dew-point. This latter result may be obtained indirectly by the mixing of two portions of air at different temperatures; for although each portion may be able to hold its own vapour before the mixing takes place, it may easily happen that the mixture will be over-saturated, and must therefore deposit the excess of moisture in the form of rain. The quantity of vapour which air can contain, though it increases with the temperature, does not increase in simple proportion; and the law of increase is such that if two portions of air equally moist and unequally warm are mixed together, the mixture is more moist than either of its components. We use the word *moist* here in the sense of the technical term *humidity*. The *humidity* of a mass of air is the ratio of the vapour actually present in it to the quantity of vapour requisite for saturation. In this sense one portion of air may be more moist than another, and, at the same time, may contain a less weight of vapour per cubic foot.

The *dew point* of air may be directly measured by cooling a polished surface until it is seen to be dimmed by the deposition of dew. This is the principle of the hygrometers of Daniell and Regnault, the dew being in both these instruments deposited on the bulb of a thermometer. *Humidity* is most easily measured by two thermometers, one of the ordinary kind and the other having its bulb covered with muslin moistened with water. The evaporation from the moist bulb produces cooling, and this effect is greatest when the air is driest. Hence the difference of the readings of the two thermometers is a measure of the dryness of the air; and tables have been published showing, for any two readings of the thermometers, what is the dew-point and what the humidity. [HYGROMETER.]

Pressure, tension, or elastic force, is another variable quality of air. To understand the idea conveyed by these names (which are used interchangeably), it must be premised that every gas or mixture of gases has a tendency to expand, and exerts an expansive force equally in all directions, so that if confined in a cubical box with two sides horizontal and the other four vertical, the pressure exerted on all six sides would be the same. This expansive force is usually expressed in terms of the pressure exerted on each square inch of surface in contact with the gas; thus, the mean pressure of air in the latitude of Paris, at the level of the sea, is 14.7304 lbs. per square inch. If there were no movement in the atmosphere, the pressure per square inch at any place on the earth's surface would be equal to the weight of a vertical column of air one inch square, extending through the whole depth of the atmosphere. From this connection between pressure and weight of air, the name 'barometer' (literally, weight-measurer) has been given to the instrument which really indicates, not the weight, but the pressure of the air. [BAROMETER.] From the habitual use of this instrument, in which the pressure of air is balanced by the weight of a column of mercury, it is common to speak of the pressure of the air, or of any constituent of the air, as being so many inches of mercury. The mean pressure at sea level in the latitude of Paris is 29.922 inches, the mercury being at the freezing point of water.

The variations which occur in this element are mainly due to variations in temperature and moisture. Air when warmed expands, and consequently becomes specifically lighter, thus acquiring a double tendency to rise above the surrounding air; and when it has so risen it must, from the tendency of fluids to find their own level, overflow laterally. The addition of moisture affects air in two ways; first, by increasing its mass or total quantity; secondly, by rendering it specifically lighter, in virtue of the fact that steam or vapour of water is lighter than air at the same temperature. When vapour is condensed into rain, and still more when it is frozen into snow or hail, the temperature of the containing air is raised by the latent heat given out by the vapour. These causes concur to produce both vertical and lateral movements of air, and when from these or other causes an excess of air is accumulated over any region of the earth's surface, the increase of pressure thus produced will be indicated by a corresponding rise in the barometer.

If observations of the barometer be taken regularly at stated hours, it will be found that there are indications of a regular *diurnal variation*, the greatest pressures on the average (say) of a month, being at about 10 a.m. and 10 p.m., and the lowest about 4 a.m. and 4 p.m., the times differing, however, somewhat according to the season of the year. This variation is the joint effect of solar heat and evaporation, which, to a certain extent, counteract each other in their effect on the barometer.

The *annual variation* of the barometer also presents the phenomenon of a double maximum and minimum.

Dividing the whole pressure into the two portions due respectively to dry air and vapour (the irrelative proportion being known by observations on the humidity of the air), it is found that the pressure of dry air attains its maximum at midwinter and its minimum at midsummer, while the times for the other portion are just the reverse. It is to this opposite variation of the two elements of pressure that the total effect of a double maximum and minimum is due.

When it is summer in one hemisphere, and consequently winter in the other, the colder hemisphere acts as a condenser for receiving the moisture evaporated in the warmer. The pressure of vapour is greater in the warmer hemisphere, and the pressure of dry air is greater in the colder. Owing to the excess of water in the southern hemisphere, the pressure (or amount) of vapour is greater in that hemisphere on the average of the year, than in the northern, but the pressure of dry air is less; and from the lightness of vapour as compared with dry air, the total pressure is also less.

Wind is, in the first instance, the direct result of difference of pressure. When a body of air is pressed with greater force on one side than on the other, it yields to the greater pressure; hence, as a rule, the wind blows from regions of high to those of low barometer, and whenever the barometer falls unusually low a storm of wind usually follows.

The phenomenon of *land and sea breeze*, so well known in tropical regions bordering on the sea, is produced by the unequal heating of land and sea. During day, the sun's rays render the land very warm, while they have comparatively little effect on the temperature of the surface of the sea. Hence the air over the land becomes warmer and lighter than that over the sea, and when the former ascends in virtue of its lightness, the latter rushes in to supply its place; thus producing the agreeable sea breeze which usually sets in late in the afternoon, and is delightfully refreshing to the inhabitants. At night the reverse effect takes place. The land radiating away its heat to the cold sky, becomes colder than the sea, and the air incumbent over it becoming specifically heavier, flows out seawards, producing the land breeze. The periodical winds called *monsoons* are produced by the same cause acting on a larger scale; that is to say, by the warming of the interior of a continent during summer, and its cooling during winter.

The origin of the *trade winds* is to be found in the heating of the equatorial regions by the sun's rays. The air in these regions consequently ascends, and heavier air rushes in from both sides to supply its place, while the heated air which has ascended spreads

out laterally, producing an upper current in the opposite direction to that beneath. Were the earth stationary, and uniformly heated all round the equator, the winds thus produced would be due north and due south. The cold air from the polar regions would flow directly towards the equator, and the heated air from the equatorial regions would flow back to the poles. But the rotation of the earth, which gives to places near the equator a greater velocity from west to east than those far from it, causes an apparent motion of the air from east to west. Hence the trade winds in the northern hemisphere blow from the N.E., and those in the southern hemisphere from the S.E. They extend generally to about 28° on each side of the equator, but vary their limits according to the season of the year, moving northwards and southwards with the sun. They are separated by an equatorial belt of calms and variable winds about 6° in breadth. In the temperate zones there is a constant struggle between the polar current of air, which feeds the trade wind, and the returning equatorial current or counter-trade, the latter in general predominating, producing a S.W. wind in the northern temperate zone, and a N.W. wind in the southern. The descent to the surface of the earth of the counter-trade, which at the commencement of its course is an upper current, must be ascribed to the cooling and consequent increase of specific gravity, which it experiences in the upper regions of the atmosphere.

The *velocity* of the wind is usually from two to twelve miles an hour, the former producing a light air, the latter a stiff breeze. The highest winds on shore, in these latitudes, seldom exceed about thirty miles an hour. The *pressure* exerted on a surface directly perpendicular to the wind is proportional to the square of the velocity, and if the one be reckoned in lbs. per square foot, and the other in miles per hour, the pressure is approximately equal to 1-400 of the square of the velocity.

Much attention has been of late paid to the subject of *cyclones* or *rotatory storms*. In the southern hemisphere these storms *always* revolve in the *same direction as the hands of a watch lying with its face upwards*; while in the northern hemisphere they *always* revolve in the opposite direction. The centre is always characterized by very low barometer.

The *hurricanes* of the tropics, which blow with a violence unknown in temperate regions, belong to the class of cyclones; and in those regions where they are most frequent, they have regular tracks along which they always move, subject to comparatively small deviations. Their diameters are usually from 100 to 300 miles, and the motion of the centre is from two to forty miles an hour.

Rain occurs whenever the temperature of a mass of air is lower than its dew-point. The rain will of course be heaviest when the dew-point is high and the temperature low; in other words, when a mass of air heavily laden with moisture is cooled to a very low degree. These conditions are most completely fulfilled in mountainous districts near the sea, where the wind, laden with moisture from the sea, becomes chilled by the cold mountain tops. In the Andes of Patagonia 13 feet of rain have been observed to fall in forty-one days, and at Cherraponjie in the Khasyah mountains, east of Calcutta, about 540 inches

fall annually during the S.W. monsoon, from May to August inclusive. The mean annual rain-fall in Great Britain is about 30 inches, the wettest portion being the hill districts of Cumberland and Westmoreland, and the western highlands of Scotland, and the driest being the eastern counties of England.

When the dew-point of a mass of air is below freezing point, *snow*, instead of rain, is formed on its being cooled below this point. *Hail* is formed by the freezing of rain-drops during their descent.

The identity of *electricity* with the lightning flash was first established by Franklin. It is now known that electricity is present in the atmosphere at all times, though the mode of its production must still be regarded as uncertain. It is probable that the frequent association of heavy rain with thunderstorms is due to the fact that air, when laden with globules of water, acquires the power of conducting electricity, which it does not possess in their absence. The probability of lightning seems to be in proportion to the amount of vapour and the suddenness of its condensation. In confirmation of this view, it may be remarked that heavy rain, even when unaccompanied by lightning or thunder, is always accompanied by the manifestation of atmospheric electricity of unusual strength. The writer has on several occasions obtained sparks, during heavy rains or snow, from an insulated metallic vessel which was discharging water through a projecting pipe. [ELECTRICITY.]

In fine weather, and also during fog, atmospheric electricity is almost invariably positive. In showery weather it is generally positive and negative alternately. Its strength is extremely variable, changing generally by some twenty per cent. of its total amount every two or three minutes.

We must now give some account of *meteorological instruments*, and the usual *modes of observation*. Two meteorological societies, the British and the Scottish, have now been in existence for several years. Their observers are scattered over the length and breadth of the British Isles, and their records are despatched every month to head-quarters, where they are compared and published.

The instruments chiefly employed are THERMOMETERS, BAROMETERS, RAIN-GAUGES, and ANEMOMETERS.

The ordinary mercury *thermometer* is employed for ascertaining the temperature of the air at any given time. It is placed at the height of four or five feet from the ground, in the open air in the shade, protected from rain, but not from wind. The principal difficulty in the way of ascertaining the temperature of the air with accuracy is the disturbing effect of radiation from the ground and surrounding objects. Perhaps the best practical way of observing the temperature is to place the thermometer in the interior of a double box (i.e., a box within a box), the sides being louver-boarded, and the top furnished with a ventilator.

The highest and lowest temperatures of the air are observed by means of self-registering instruments. The minimum thermometer (for lowest temperature) usually employed is an alcohol thermometer, having its tube horizontal, and a glass float, which is carried backward by the alcohol when the temperature falls, and is left behind when it rises. Of maximum thermometers (for highest temperature), there are two

or three distinct kinds in general use. Perhaps the most common is that which consists of a mercury thermometer, with tube horizontal, and containing a small stick of steel called the index, which is pushed forward by the mercury when the temperature rises, and is not drawn back when it falls. Self-registering thermometers are usually observed once a day, and are reset immediately after the observation. The proper position for them is the same as for the ordinary thermometer above mentioned. The same position is also proper for the wet-bulb thermometer, which consists of an ordinary mercury thermometer, with a piece of wet muslin tied over its bulb. Some keep it constantly moist by means of a cotton wick communicating with a vessel of water. The readings of this thermometer, taken in conjunction with those of an ordinary thermometer, furnish data for computing the humidity of the air.

A thermometer exposed to the sun's rays is also frequently employed. Its bulb is usually blackened, to increase the absorption of heat, and a still higher temperature is obtained by inclosing the blackened bulb in an outer case of transparent glass with a space of air between. This outer case serves to exclude the action of wind upon the bulb, and thus leaves an effect dependent on radiation alone.

The *barometer* employed is of the simplest kind; the mechanism of the wheel-barometer, so commonly used as a weather glass, being incompatible with accuracy. The barometer used for scientific purposes is simply a vertical glass tube of not less than 3-10ths inch internal diameter, filled in its lower portions with mercury, and plunged in a cistern of mercury to which the air has free access; while the upper portion of the tube contains the nearest possible approach to a vacuum. The whole is inclosed in a brass case on which the scale is engraved. The observer first adjusts the level of the mercury in the cistern, so that its upper surface corresponds with the zero point of the scale, and he then observes which point on the scale corresponds with the upper surface of the column of mercury in the tube. The reading is taken, by means of a vernier, to the hundredth, or in some instruments to the thousandth of an inch; but this reading, which expresses the height of a column of mercury whose pressure equals that of the atmosphere, requires to be corrected for the different specific gravity of mercury at different temperatures. The specific gravity at the temperature 32°, the freezing point of water, is the standard to which the reduction is made. In comparing barometric indications at different localities, account must be taken of difference of level; for the atmospheric pressure being proportional to the weight of the superincumbent air, of course diminishes as we ascend. This difference amounts, roughly speaking, to a tenth of an inch for every ninety feet of difference in level. The mode of allowing for this difference, which is commonly adopted in the publication of results from a number of places, is to reduce the observed pressures to sea-level; that is, to calculate what would be the pressure at each place at the bottom of a shaft sunk to the mean level of the sea.

Rain-gauges, used for measuring the depth of rain-fall, are of various kinds, but they agree in having a horizontal circular orifice for receiving the rain as it falls. The upper part is usually cylindrical, from

three inches to a foot in diameter, and made of thin metal (copper, tin, or zinc). They are placed at various heights, from three inches above the ground to the tops of buildings, and it is found that as the height is diminished, the quantity of rain received is greater—a phenomenon whose cause is still disputed.

Of *anemometers*, or wind-gauges, the best is that invented by the Rev. Dr. Robinson, of Armagh, consisting of four hemispherical cups of thin metal attached to the extremities of four horizontal arms. When the wind blows it strikes against the hollow of the cup or cups on one side, and against the back of those on the other. The effective pressure is much greater against the former than against the latter, and rotation is consequently produced. The four arms are in a horizontal plane, and are attached to a vertical axis which turns with them, the number of revolutions being indicated by wheels precisely similar to those of a gas meter. Dr. Robinson found, both by theory and experiment, that the velocity of the centre of any cup is always one-third of the velocity of the wind; hence the instrument is available for observing either the velocity of the wind at a particular time, or the total horizontal movement of the air during a lengthened period.

Most of the instruments which we have described have been adapted to *self-registration*, and at the Royal Observatory, Greenwich, photographs are taken daily, showing the fluctuation of temperature and barometric pressure continuously throughout the twenty-four hours. This object is attained by causing a piece of photographically prepared paper to move horizontally at a constant slow rate; while a lamp, whose light is concentrated by a cylindric lens, illuminates the paper *above* the column of mercury in barometer or thermometer, that portion of the paper which is immediately behind the mercury being screened by the mercury from the light. The line separating the discoloured from the unaffected portion of the paper accordingly shows how the mercury has risen and fallen during the day.

Of late years an attempt has been made to apply meteorological science, on a large scale, to the *prediction of weather*, and especially to the *prediction of storms of wind*. Telegraphic reports of the state of the weather, and the readings of meteorological instruments, are despatched daily from about eighteen places round our own coasts, a few French ports, and Heligoland, to the Meteorological Department of the Board of Trade, in London, lately under the direction of the much-lamented Admiral Fitzroy. This is done at 10 a.m., and copies of the information thus received, arranged in a tabular form, together with forecasts of weather founded thereon, are sent an hour afterwards to the *Times* (for second edition), *Lloyd's*, and the *Shipping Gazette*; to the Board of Trade, Admiralty, and Horse Guards. Soon afterwards similar reports are sent to other afternoon papers; and late in the day, copies, more or less modified in consequence of telegrams received in the afternoon, are sent out for the next morning's early papers. When a storm is apprehended, orders are telegraphed to the *storm-signal* stations to hoist the proper signal. Of these signals there are different kinds, to indicate the direction from which the wind is expected to blow, and the degree of violence; and the order sent indicates which signal is to be hoisted.

Of a great number of shipmasters whose opinions as to the practical value of the storm-signals were individually asked in a recent parliamentary inquiry, the great majority were strongly favourable.

The method pursued in forming these forecasts cannot be completely explained in moderate compass. The following account is abridged from an official report by Mr. Babington, the present head of the Meteorological Department of the Board of Trade:—

‘Considering that there are two constant principal wind-currents, N.E. and S.W., of which the characteristics, especially with regard to temperature and degree of moisture or dryness, are totally distinct, all varieties of wind and weather in these latitudes may be traced to the operation of these two main currents—singly, in combination, or in antagonism; at times running in parallel lines, but in opposite directions; frequently superposed; and occasionally meeting at various angles of incidence. Upon the relative prevalence or failure of either or both of these currents all conditions of weather appear to depend.

‘It is clear that changes must begin at some places earlier than at others; and the observations telegraphed daily to this department from the outposts afford the means of forming a very good opinion respecting the nature and probable course of such changes. One or two examples must suffice, although the various examples that might be given are numerous; as also are the disturbing causes which must be taken into account.

‘Suppose a northerly (E.N.E.—N.N.W.) current to have been prevailing generally over this country with fine weather, the barometers at all the outposts during the continuance of such weather will have been steady, or slowly rising, nearly uniform, or slightly higher at the northern than at the southern stations; there will have been much evaporation, and the sky will have been comparatively clear and free from cloud, while the temperatures, when free from the influence of radiation, will have been somewhat below the average.

‘Suppose, now, the northern barometers rise rapidly above the average, while the temperature remains low and the sky clear. This is an indication of more wind from a northern quarter, but probably without rain. Should, however, the southern barometers fall at the same time, while the temperatures in the south are much higher than in the north, the wind will probably increase to a gale from a northern quarter, and a sudden chilling of the atmosphere in the south will ensue, causing rain.

‘The first approach of a southerly current is usually indicated by a diminution of pressure (falling barometers) in the north and west, caused by a failure of the polar current; the upper clouds are seen to be passing from the south, and the temperature increases.

‘Occasionally a temporary failure of both currents takes place. We may have very low barometers, but for a day or two little or no wind. Such a state of things, however, never continues long. It is then

especially necessary to watch for the first signs of approaching wind. The first indication is usually an increase of pressure in the direction from which the wind is coming. Should the French barometers rise rapidly, or stand (say) an inch higher than in Scotland, the result will be a gale from the southward. Should both the French and the Scotch barometers rise rapidly, while in Ireland and central England the pressure continues very low, we may feel sure that both currents are approaching in force, and that the collision will be violent, causing much rain, and (according to the angle of incidence), either south-west and north-west gales, or a cyclonic movement, which, experience has shown, will probably advance in an easterly or north-easterly direction. On the other hand, should the increase of pressure be gradual and general, the combination of the two currents will be gradual also, and though there may be rain, the winds will not be violent.

‘There are a few grand rules, which, though not always free from disturbing causes, may be considered as generally holding good:—

‘1st. The essentially distinct characteristics of the two main currents should never be forgotten.

‘2nd. The direction of wind is usually from the place of high barometer towards the region of low barometer.

‘3rd. The force of wind is usually proportional to the differences of barometric pressure, not to the actual pressure.

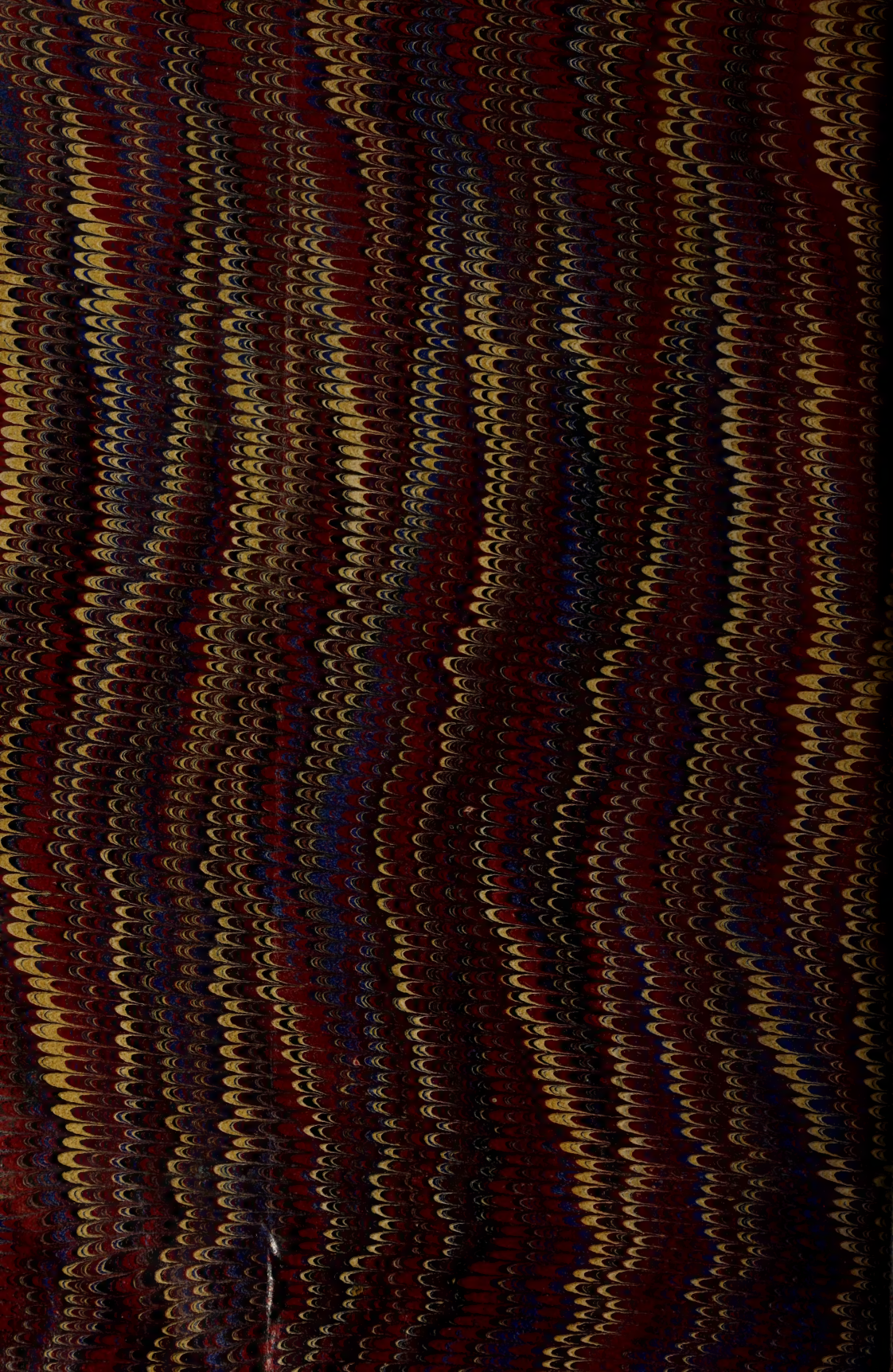
‘4th. It was believed by Admiral Fitzroy that there exists a lateral transference of the whole body of atmosphere eastward.

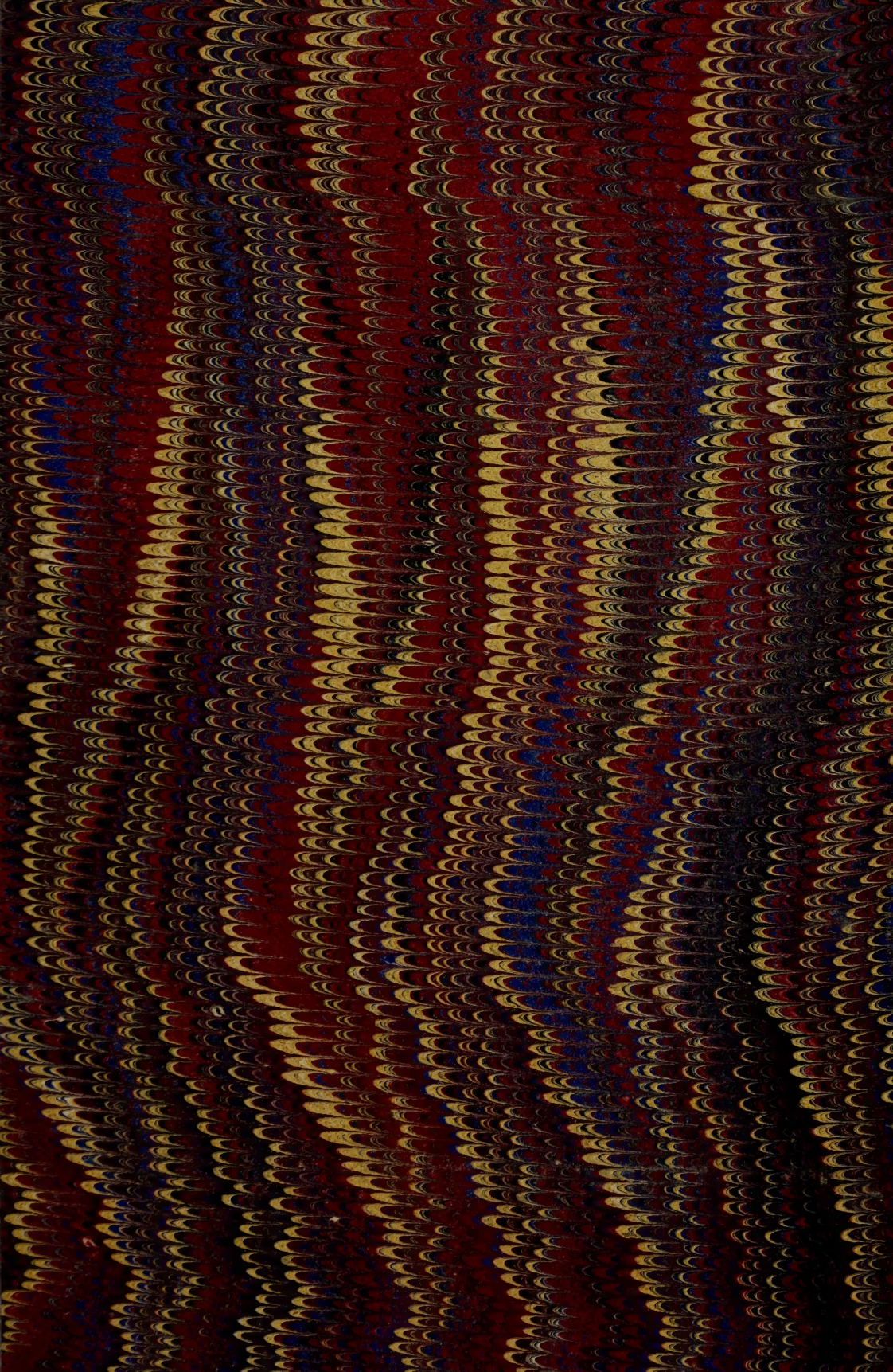
‘Electrical and auroral occurrences should be carefully watched; and the influence of high land, &c., must be borne in mind.’

There is another point in connection with forecasting in which the late Admiral Fitzroy took great interest, namely, the frequency with which important atmospheric disturbances have been preceded by disturbances on electric wires above ground, and also on submarine wires.

Of the Plates which accompany this article, Plates 1, 2, 3, 4, are devoted to the appearances presented by clouds under different circumstances as respects sunlight, mutual position, and the position of the spectator. See also the article CLOUDS. Plate 5 exhibits a system of isothermal lines, whose significance we have already explained. The system of broken lines which accompany them are isogeothermic lines, that is, lines of equal surface temperature; for instance, the broken line marked 65° 75° passes over those portions of land and sea in which the surface temperature of soil and sea, respectively, is 65° 75°. The isothermal lines, on the other hand, pass through those regions which have the same air-temperature. In both cases, the temperatures referred to are the mean annual temperatures. and their amounts are indicated in degrees of Fahrenheit’s scale.

END OF VOL. VIII.





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